

State Electricity Profiles

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Preface

Section 205(a)(2) of the Department of Energy Organization Act of 1977 (Public Law 95-91) requires the Administrator of the Energy Information Administration (EIA) to carry out a central, comprehensive, and unified energy data and information program that will collect, evaluate, assemble, analyze, and disseminate data and information relevant to energy resources, reserves, and related economic and statistical information.

To assist in meeting these responsibilities in the area of electric power, EIA has prepared this report, *State Electricity Profiles*, which provides a statistical overview of the electric power industry in each of the United States and the District of Columbia. It is intended for a wide audience, including Congress, Federal and State

agencies, the electric power industry, and the general public.

The legislation that created EIA vested the organization with an element of statutory independence. EIA does not take positions on policy questions. EIA's responsibility is to provide timely, high-quality information and to perform objective, credible analyses in support of deliberations by both public and private decisionmakers. Accordingly, this report does not purport to represent the policy positions of the U.S. Department of Energy or the Administration.

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Introduction

The U.S. electric power industry is undergoing profound change. The industry, once considered a natural monopoly, has opened its wholesale market to competition as ordered by the Federal Energy Regulatory Commission on April 24, 1996. The retail market is not far behind. In fact, as of December 1998, 13 States have passed restructuring legislation.

Due to the role electricity plays in the Nation's economic and social well-being, interested parties have been following the electric power industry's transition by keeping abreast of the restructuring and deregulation events that are taking place almost daily. Much of the attention centers around the States and how they are restructuring the business of electricity supply within their respective jurisdictions. This report is designed to profile each State and the District of Columbia¹ regarding not only their current restructuring activities, but also their electricity generation and concomitant statistics from 1986 through 1996. Included are data on a number of subject areas including generating capability, generation, revenues, fuel use, capacity factor for nuclear plants,² retail sales, and pollutant emissions. Although the Energy Information Administration (EIA) publishes this type of information, there is a lack of a uniform overview for each individual State. This report is intended to help fill that gap and also to serve as a framework for more detailed studies.

In addition to basic statistics in tables and graphs, a textual section is provided for each State, discussing some of the points relative to electricity production that are noteworthy in, or unique to, that particular State. Also, each State is ranked according to the place it holds, as compared to the rest of the States, in various relevant areas, such as its average price of electricity per kilowatthour, its population, and its emissions of certain atmospheric pollutants.

Each State profile begins with a map that ranks the five utilities with the largest *operated* generating capabilities in the State. An ordinal letter and shading code are assigned to the utilities. Only those utilities that are investor-owned and have service areas within the State are mapped. Therefore, each of the five largest utilities does not necessarily appear. A utility that operates a large amount of capability and serves customers within a State might not be an investor-owned utility and, therefore, would not be mapped. Similarly, a utility that operates a large amount of capability in a State but does not serve any customers in that State would not be mapped. In Massachusetts, for instance, the New England Power Company (NEPC) operated the largest amount of generating capability within the State in 1996; however, the company had no retail sales. Retail sales (which require a service territory) in 1996 were the property of NEPC's parent company, New England Electric System. In this case, therefore, NEPC is not mapped.

Each map also shows the name, location, and rank of the five largest *utility* generating plants in the State and their primary generating fuels.³ The plant rank is based on net summer capability. The total land area of the State is displayed as well. The average price of electricity in each State is also noted, along with the delineation of North American Electric Reliability Council (NERC) Regions.⁴ Table 2 in each chapter provides data that accompanies the five largest plants. The utility listed is the one that operates the plant.

The final chapter covers the Nation as a whole. It, too, begins with a map showing the five largest investor-owned utilities ranked by the generating capability that they operate and the five largest plants in the country.

Some data are shown for utilities, some for nonutilities, and some for a combination of the two, which are

¹ Where mention is made of "the State(s)" in subsequent text, the District of Columbia is included unless otherwise noted.

² Capacity factor is a measure of a unit's performance. It is defined as the ratio of the amount of actual electricity produced in a given period to the amount of electricity that could have been produced if the unit operated at its full rated capacity for 100 percent of the period.

³ The primary generating fuels are the predominant fuels, where predominance is based on the quantity of British thermal units (Btus). A Btu is the quantity of heat required to raise the temperature of 1 pound of water by 1 degree Fahrenheit.

⁴ Overall reliability planning and coordination of the interconnected power systems are the responsibility of NERC, which was formed voluntarily in 1968 by the electric utility industry as a result of the 1965 power failure in the Northeast. NERC's 10 regional councils cover the 48 contiguous States, part of Alaska, and portions of Canada and Mexico (Figure I1).

referred to throughout the report as “industry” data. The tables and graphs are titled accordingly. For example, Figures 1, 2, and 3 present only utility information. Industry data are presented wherever possible (Tables 1, 3, 4, 5, and 6) to provide the most complete picture; however, in order to protect the confidentiality of individual respondents’ data, nonutility information is withheld in certain instances. This withheld information was collected from Form EIA-867, “Annual Nonutility Power Producer Report,” and is identified in various tables with the letter “W.”⁵ The inset below identifies 22 States where nonutility information is withheld (13 States in 1986, 14 in 1991, and 6 in 1996). In the chapters on the latter 6 States (Arizona, Kentucky, Mississippi, Nebraska, North Dakota, and Wyoming), Table 1 indicates that nonutility information and industry capability and generation totals are withheld for 1996. Therefore, national rankings throughout the report regarding these data elements are based on 44 States and the District of Columbia. National rankings for all other data elements, e.g., emissions, retail sales, etc., are based on all 50 States and the District of Columbia. Table 3 gives the percentage of capability of the five largest utilities based on industry or utility totals. Tables 4, 5, and 6 show the percentage shares of capability, generation and consumption for 1986, 1991, and 1996 based only on utility totals for the aforementioned 22 States, whereas the remaining 29 States show percentage shares based on industry totals.

In addition, the percentage shares in Tables 4, 5, and 6 are italicized for the 22 States listed to further identify their treatment. Any footnotes that are not explained in the figures and tables can be found in the Notes and Sources section at the end of the report.

Table 3 presents utilities ranked on the basis of the generating capability they operate within each State. Table 10 presents utility data for retail sales within the State. Sometimes utilities that operate power plants only sell power on the wholesale level. These utilities would appear in Table 3, but would not be included in Table 10 totals. Other utilities whose sales are included in Table 10 might not appear in Table 3 because they operate no generating capability in the State.

Appendix A provides a table showing the 1996 national rankings of the States for several categories of electricity data. To assist in explaining the relationship between utilities and nonutilities, Appendix B provides a summary of the major characteristics of each by ownership category or type.⁶ Appendix C contains a list of addresses of State agencies that can provide additional information about the electric power industry and restructuring activities in each of the States. Appendix D has relevant technical notes.

For details concerning the fundamental aspects of the electric power industry and current events surrounding

The 22 States for Which Nonutility Data are Withheld	
Arizona	Nevada
Delaware	New Mexico
Indiana	North Dakota
Iowa	Ohio
Kansas	Rhode Island
Kentucky	South Carolina
Maryland	Utah
Mississippi	Vermont
Missouri	West Virginia
Montana	Wisconsin
Nebraska	Wyoming

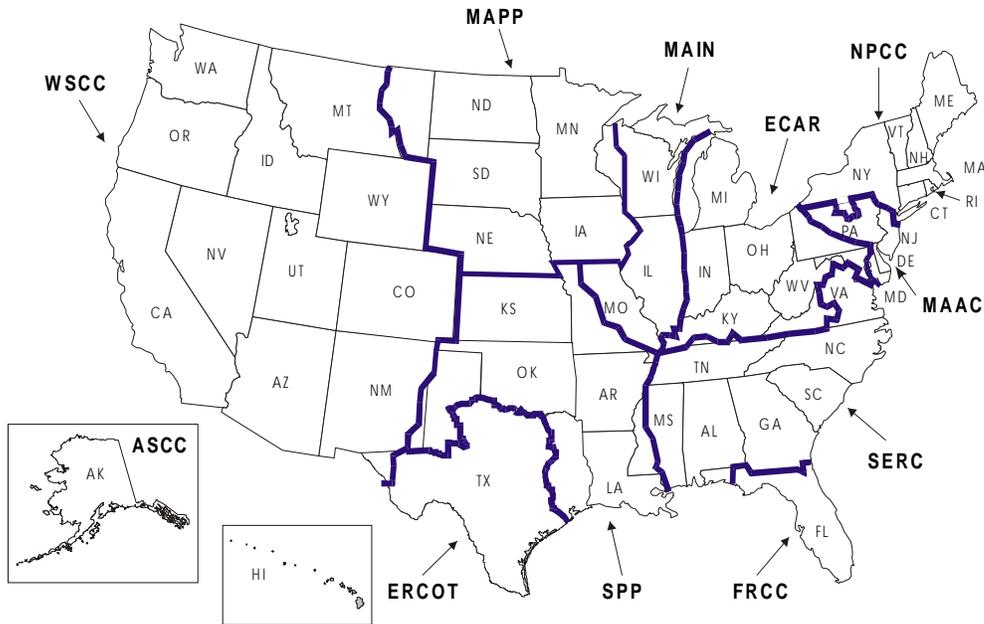
⁵ Certain data must be suppressed (withheld) during publication to provide the necessary confidentiality for respondents that operate in small reporting areas. Refer to the Technical Notes Appendix in this report for an explanation of what data are considered confidential and the methodology used to determine the disclosure of data. All sensitive cells identified in the withholding analysis are denoted with the letter “W.”

⁶ It is important to be aware that as the generation segment of the electricity industry moves toward total deregulation, the distinction between utilities and nonutilities will become less clear-cut.

its restructuring as it moves toward competition and deregulation in the generation segment of the industry, please refer to the EIA reports *The Changing Structure of the Electric Power Industry: An Update* (published in

December 1996) and *The Changing Structure of the Electric Power Industry: Selected Issues, 1998* (published in July 1998).

Figure I1. Regions of the North American Electric Reliability Council



Notes: The North American Electric Reliability Council's regional Electric Reliability Councils are ECAR-- East Central Area Reliability Coordination Agreement; SERC--Southeastern Electric Reliability Council; MAIN--Mid-Atlantic Interconnected Network; SPP--Southwest Power Pool; ERCOT--Electric Reliability Council of Texas; MAAC--Mid-Atlantic Area Council; MAPP (U.S.)--Mid-Continent Area Power Pool; WSCC (U.S.)--Western Systems Coordinating Council; NPCC U.S.)--Northeast Power Coordinating Council; and ASCC--Alaska Systems Coordinating Council. The Florida Reliability Coordinating Council (FRCC) was informally organized in October 1996 and officially became a NERC region on January 1, 1997.

Source: North American Electric Reliability Council.

Alabama

Two utilities, the Federally owned and unregulated Tennessee Valley Authority (TVA) and the Alabama Power Company (AP), a wholly owned subsidiary of the Atlanta-based Southern Company, are the dominant electric power industry players in Alabama. Together they account for over 95 percent of the utility generating capability in the State. The presence of TVA contributes to Alabama's relatively low electricity prices. In 1996, the average price per kilowatthour of electricity in Alabama was thirteenth lowest in the Nation.

One of the largest discrepancies between national rankings in population and utility generating capability is found in Alabama, a primarily rural State, which had the twenty-third largest population and the twelfth largest utility generating capability in 1996. This discrepancy is a result of the fact that Alabama is an exporter of electricity. Most of the electricity in Alabama is generated at coal-fired plants, and three of the five largest plants in the State are coal-fired. Alabama is also very reliant on nuclear power; the largest power plant in the State, TVA's Browns Ferry, is a nuclear plant. Nuclear generation increased substantially from 1986 to 1996 as Browns Ferry became more productive. Overall, coal and nuclear plants account for 85 percent of total electric power generation in Alabama. More utility hydroelectric power generation occurs in Alabama than in any other eastern State.

AP's service territory is the southern four-fifths of the State. It is the only utility in the State that is subject to regulation by the Alabama Public Service Commission (PSC) and it accounts for 62 percent of retail sales. The other 60 utilities are owned by the Federal government, the State government, or local cooperatives, accounting for 38 percent of retail sales.

Title IV of the Clean Air Act Amendments of 1990 specified 3,363 megawatts of nameplate capacity at AP's E.C. Gaston plant and TVA's Colbert plant to begin compliance with Phase I sulfur dioxide (SO₂) emissions requirements of the Environmental Protection Agency's (EPA's) Acid Rain Program in 1995. Both plants' affected units have been in compliance all three years of the program; that is, they have had enough allowances on hand to account for their SO₂ emissions. Emissions of SO₂, nitrogen oxides (NO_x) and carbon dioxide (CO₂) have increased in Alabama, however, because generation has grown at an average annual growth rate of 5.9 percent compared to 2.7 percent for the entire country. In fact, emissions of SO₂, NO_x, and CO₂ each rank Alabama in the top 11 States in the country.

It is likely that Alabama will need to design a State implementation plan (SIP) for reducing ground-level ozone in response to a proposal released by the EPA in October 1998. The EPA SIP call proposal does not mandate which sources must reduce pollution. However, EPA states that utilities would be one of the most likely sources of emissions reductions of NO_x.

With regard to the deregulation of the electric power industry, Alabama's State legislature passed the "Electricity Customer Severance Law" in May 1996. The law gives utilities the right to collect from customers who leave their system the amount of stranded costs associated with the customers' service. In December 1997, the PSC approved a preliminary staff report on restructuring the industry, and in April 1998 the Commission approved the establishment of a series of workshops on electric power industry restructuring to aid the Commission in making decisions.¹

¹ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

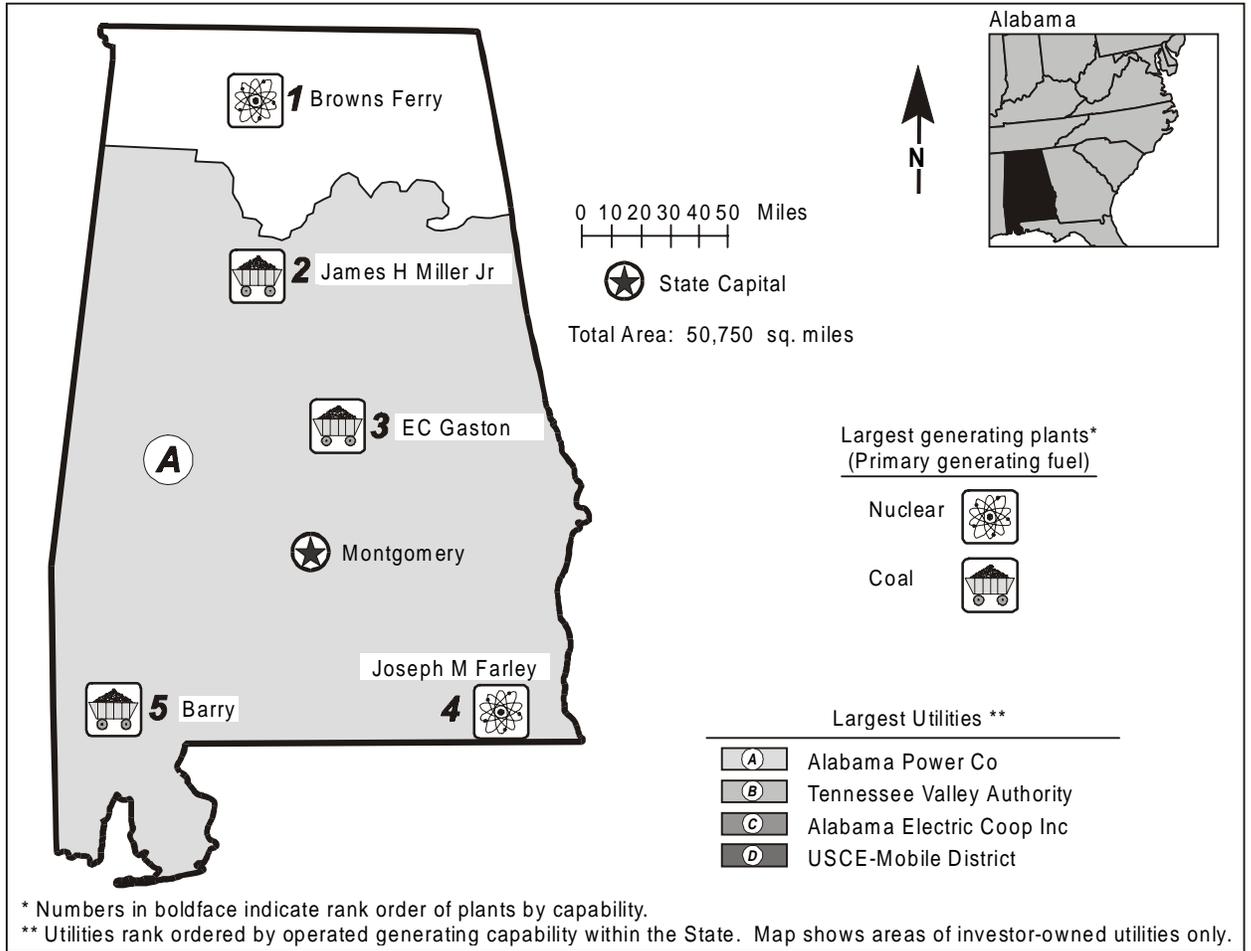


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		SERC	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	20,692	12
State Primary Generating Fuel		Coal	Generation (MWh)	115,093,211	6
Population (as of 7/96)	4,287,178	23	Average Age of Coal Plants	29 years	
Average Revenue (cents/kWh)	5.35	^a 13	Average Age of Oil-fired Plants	26 years	
Industry			Average Age of Gas-fired Plants	11 years	
Capability (MWe)	21,729	^b 12	Average Age of Nuclear Plants	19 years	
Generation (MWh)	121,705,111	^b 8	Average Age of Hydroelectric Plants	41 years	
Capability/person			Average Age of Other Plants	--	
(KWe/person)	5.07	^b 3	Nonutility^c		
Generation/person			Capability (MWe)	1,037	14
(MWh/person)	28.39	^b 3	Percentage Share of Capability	4.8	28
Sulfur Dioxide Emissions			Generation (MWh)	6,611,900	13
(Thousand Short Tons)	594	8	Percentage Share of		
Nitrogen Oxide Emissions			Generation	5.4	26
(Thousand Short Tons)	307	10	-- = Not applicable.		
Carbon Dioxide Emissions					
(Thousand Short Tons)	107,366	6			
Sulfur Dioxide/sq. mile (Tons)	11.70	13			
Nitrogen Oxides/sq. mile (Tons)	6.05	13			
Carbon Dioxide/sq. mile (Tons)	2,115.59	14			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Browns Ferry	Nuclear	Tennessee Valley Authority	3,195
2. James H Miller Jr	Coal	Alabama Power Co	2,680
3. E C Gaston	Coal	Alabama Power Co	1,924
4. Joseph M. Farley	Nuclear	Alabama Power Co	1,644
5. Barry	Coal/Gas	Alabama Power Co	1,637

Table 3. Top Four Utilities with Largest Generating Capability, and Type, Within the State, 1996 (Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Alabama Power Co	12,282	8,175	20	769	1,644	1,674
B. Tennessee Valley Authority	7,408	2,789	--	368	3,195	1,056
C. Alabama Electric Coop Inc	860	552	--	300	--	8
D. USCE-Mobile District	143	--	--	--	--	143
Total	20,692	11,516	20	1,437	4,839	2,881
Percentage of Industry Capability	95.2	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

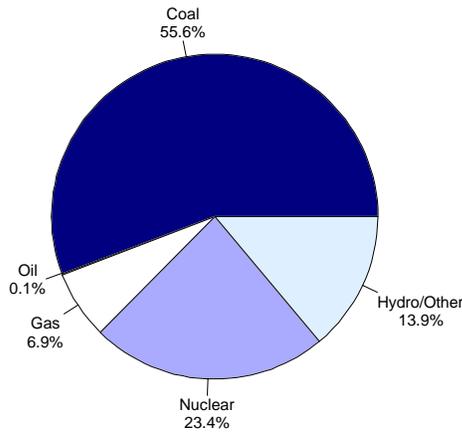


Figure 2. Utility Generation by Primary Energy Source, 1996

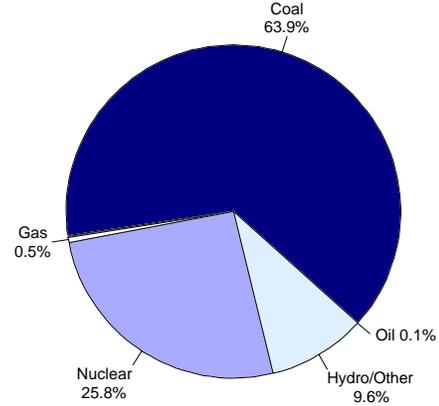


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

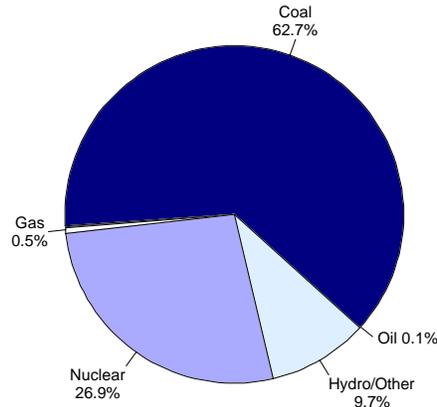


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	10,519	11,589	11,515	54.4	56.3	53.0
Oil	101	18	20	0.5	0.1	0.1
Gas	400	530	1,437	2.1	2.6	6.6
Nuclear	4,856	4,831	4,839	25.1	23.5	22.3
Hydro/Other	2,940	2,934	2,881	15.2	14.3	13.3
Total Utility	18,816	19,902	20,692	97.2	96.7	95.2
Total Nonutility	536	669	1,037	2.8	3.3	4.8
Industry	18,816	20,571	21,729	100.0	100.0	100.0

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	51,693,135	57,897,011	73,598,580	71.8	65.1	60.5
Oil	34,362	104,324	155,778	(s)	0.1	0.1
Gas	58,831	417,106	549,397	0.1	0.5	0.5
Nuclear	11,561,408	15,874,637	29,707,535	16.1	17.8	24.4
Hydro/Other	5,226,939	10,757,723	11,081,921	7.3	12.1	9.1
Total Utility	68,574,675	85,050,801	115,093,21	95.2	95.6	94.6
Total Nonutility	3,421,078	3,891,890	6,611,900	4.8	4.4	5.4
Industry	68,574,675	88,942,691	121,705,11	100.0	100.0	100.0

(s) = Nonzero percentage less than 0.05.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.517	0.576	0.737	64.6	57.0	51.5
Oil	(s)	0.001	0.002	0.0	0.1	0.1
Gas	0.001	0.004	0.006	0.1	0.4	0.4
Nuclear	0.125	0.170	0.316	15.6	16.9	22.1
Hydro/Other	0.055	0.111	0.114	6.8	11.0	8.0
Total Utility	0.698	0.863	1.175	87.2	85.4	82.1
Total Nonutility	0.103	0.147	0.256	12.8	14.6	17.9
Industry	0.800	1.010	1.431	100.0	100.0	100.0

(s) = Nonzero value less than 0.0005

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

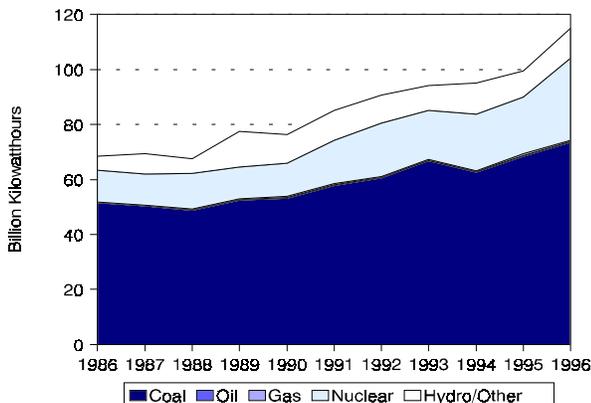


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

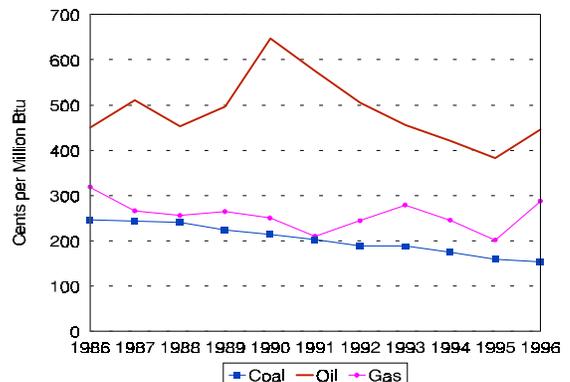


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	246.6	203.4	154.3	-4.6
Oil	450.6	575.2	445.7	-0.1
Gas	318.8	210.3	287.6	-1.0

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide . . .	528	555	594	1.2
Nitrogen Oxides ^d .	192	235	307	4.8
Carbon Dioxide ^d . .	52,849	76,333	107,366	7.3

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

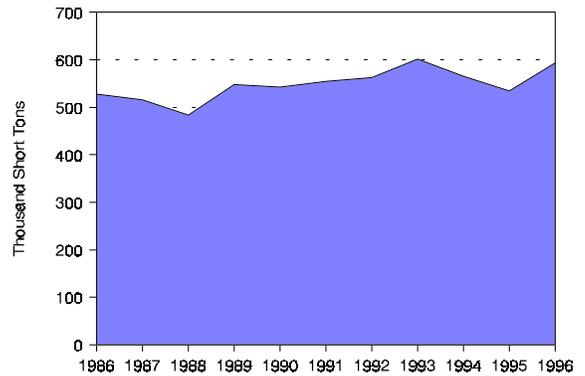


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

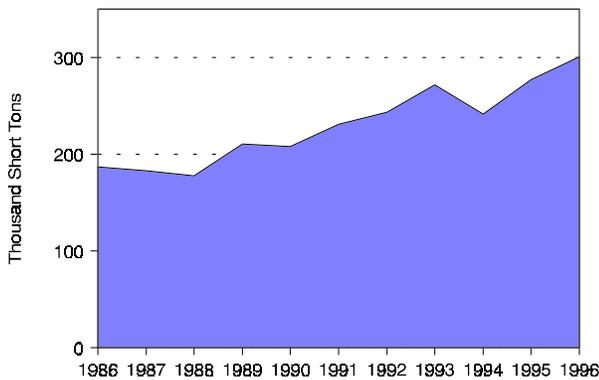


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

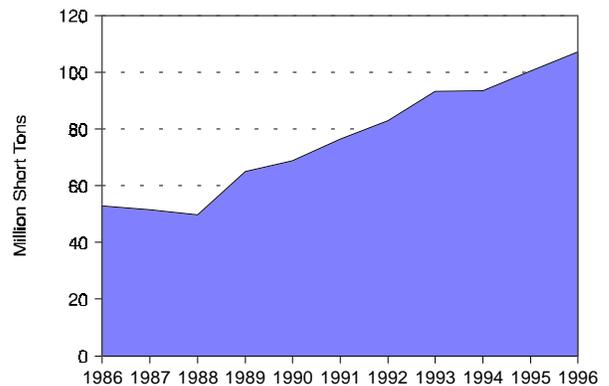


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . . .	18,258,939	21,293,428	25,634,024	3.5	35.4	34.8	35.1
Commercial . .	8,772,676	11,349,000	13,327,556	4.3	17.0	18.5	18.2
Industrial	24,045,609	27,985,476	33,522,650	3.4	46.6	45.7	45.9
Other	519,708	599,421	620,189	1.8	1.0	1.0	0.8
Total	51,596,932	61,227,325	73,104,419	3.5	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

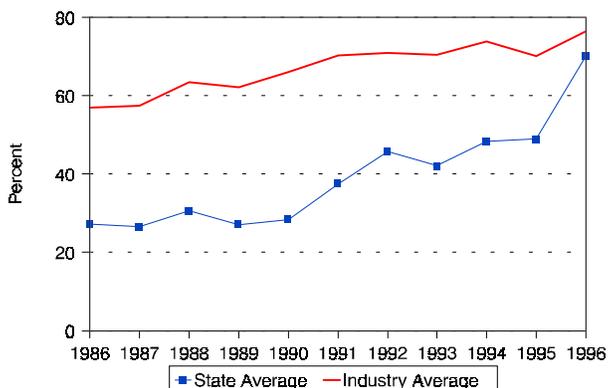


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	1	36	1	24	62
Number of Retail Customers	1,059,885	358,121	23	346,785	1,764,814
Retail Sales (MWh)	32,801,375	9,853,101	4,074,550	4,867,904	51,596,930
Percentage of Retail Sales	63.6	19.1	7.9	9.4	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,500,339	663,076	154,666	397,394	3,760,483
Percentage of Revenue	66.5	17.6	5.3	10.6	100.0
1991					
Number of Utilities	1	36	1	23	61
Number of Retail Customers	1,143,628	395,896	22	378,882	1,918,428
Retail Sales (MWh)	38,537,368	11,941,867	4,175,079	6,573,011	61,227,325
Percentage of Retail Sales	62.9	19.5	6.8	10.7	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,528,958	741,978	137,106	459,306	3,884,350
Percentage of Revenue	65.1	19.1	4.0	11.8	100.0
1996					
Number of Utilities	1	36	1	23	61
Number of Retail Customers	1,240,065	428,989	22	431,392	2,100,468
Retail Sales (MWh)	45,690,068	14,258,124	4,739,511	8,416,716	73,104,419
Percentage of Retail Sales	62.5	19.5	6.5	11.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,468,616	772,884	137,149	534,454	3,913,103
Percentage of Revenue	63.1	19.8	3.5	13.7	100.0

Alaska

In terms of its electric power industry, Alaska is a patchwork of unconnected grids. Due to its extremely low population density and the distance between population centers around the State, there are many small generators operating independently of one another. Three of the five largest plants in the State are primarily gas-fired plants. Alaska is the Nation's second largest oil producer and oil-fired plants account for a much larger portion of the generation in Alaska than in most other States. Alaska is also a significant producer of natural gas. The State's average electricity price in 1996 was the sixth most expensive in the Nation, since there are few economies of scale and there are no connections to the grid of the forty-eight contiguous States. Consumers have some of their bills subsidized by the State government.

Only one of the five largest utilities in the State is an investor-owned utility. Alaska Electric Light and Power operates in the panhandle of the State, around the capital, Juneau. Though it operates the fourth largest capability total of any utility, none of its plants is among the five largest in the State.

The five largest plants are operated by the Chugach Electric Association, the City of Anchorage, and the Golden Valley Electric Association. Chugach and Golden Valley are cooperatives. Cooperatives are groups organized under the law into utility companies that generate, transmit, and/or distribute electricity to specified areas not being served by other utilities. Such ventures are generally exempt from Federal income tax

laws. Chugach operates two of the three largest plants in the State including the largest, Beluga, a gas-fired plant north of Anchorage. It also operates Bradley Lake, a hydroelectric plant in the Fairbanks area and the third largest plant in the State.

The City of Anchorage operates the gas-fired George M Sullivan plant. Sullivan is the second-largest plant in the State. The fourth-largest plant is Golden Valley's North Pole plant. Ironically, it is located in the south central part of the State.

Almost half of the State's generation is from utility gas-fired facilities, while another fifth comes from utility renewable sources. Alaska was among the leaders in nonutility shares of capability and generation in 1996. Alaska's emissions of sulfur dioxide, nitrogen oxides, and carbon dioxide were among the lowest in the Nation in both absolute terms and in concentrations per square mile. These low totals are due to the low generation level (ninth lowest in the Nation) and the relatively "clean" means of generation that are utilized in the State.

Legislative action in Alaska has taken a different direction than other States with regard to deregulation. One bill introduced in 1997 would prevent retail competition unless clear evidence exists that it would be in the public interest. However, in January 1998, the largest utility in Alaska, the Chugach Electric Association, urged the Public Utility Commission and the State legislature to allow retail competition in the Greater Anchorage area.¹

¹ Energy Information Administration, Status of State Electric Utility Deregulation Activity, www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

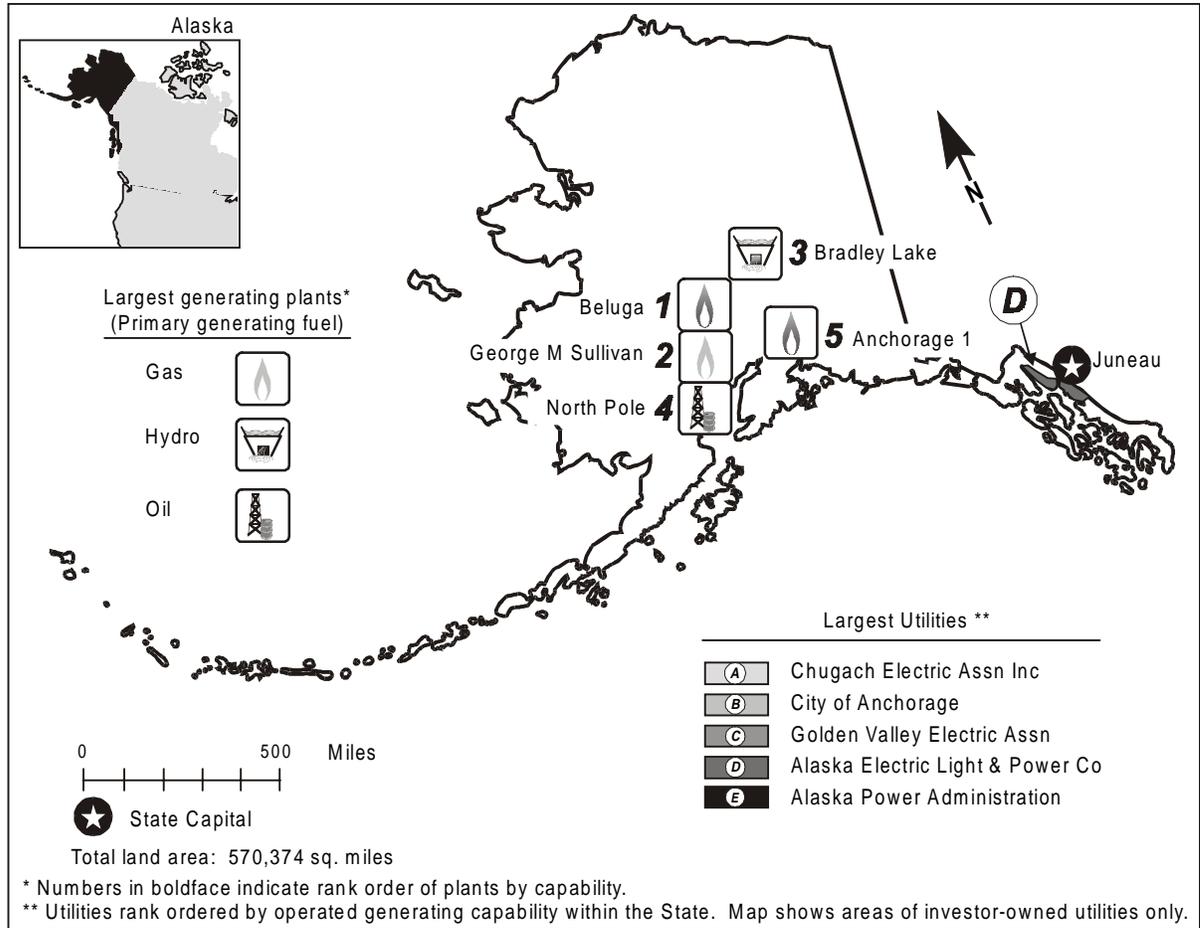


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		ASCC	Utility		
Net Exporter or Importer		--	Capability (MWe)	1,734	47
State Primary Generating Fuel		Gas	Generation (MWh)	4,982,268	49
Population (as of 7/96)	604,966	48	Average Age of Coal Plants	30 years	
Average Revenue (cents/kWh)	10.24	^a 45	Average Age of Oil-fired Plants	17 years	
Industry			Average Age of Gas-fired Plants	20 years	
Capability (MWe)	2,010	^b 42	Average Age of Nuclear Plants	--	
Generation (MWh)	6,147,022	^b 43	Average Age of Hydroelectric Plants	18 years	
Capability/person (KWe/person)	3.32	^b 17	Average Age of Other Plants	14 years	
Generation/person (MWe/person)	10.16	^b 32	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	16	45	Capability (MWe)	276	35
Nitrogen Oxide Emissions (Thousand Short Tons)	30	40	Percentage Share of Capability	13.7	11
Carbon Dioxide Emissions (Thousand Short Tons)	7,730	44	Generation (MWh)	1,164,754	35
Sulfur Dioxide/sq. mile (Tons)	0.03	50	Percentage Share of Generation	18.9	10
Nitrogen Oxides/sq. mile (Tons)	0.05	49			
Carbon Dioxide/sq. mile (Tons)	13.55	51			

-- = Not applicable.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Beluga	Gas/Hydro	Chugach Electric Assn Inc	334
2. George M Sullivan	Gas/Hydro	City of Anchorage	220
3. Bradley Lake	Hydro	Chugach Electric Assn Inc	108
4. North Pole	Oil	Golden Valley Elec Assn Inc	106
5. Anchorage 1	Gas	City of Anchorage	79

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Chugach Electric Assn Inc . . .	607	--	38	445	--	125
B. City of Anchorage	299	--	3	297	--	--
C. Golden Valley Elec Assn Inc	171	25	146	--	--	--
D. Alaska Electric Light & Pwr. . .	109	--	94	--	--	15
E. Alaska Power Administration	108	--	--	--	--	108
Total	1,294	25	281	742	--	248
Percentage of Industry	64.4	--	--	--	--	--

-- = Not applicable.

Figure 4. Utility Generating Capability by Primary Energy Source, 1996

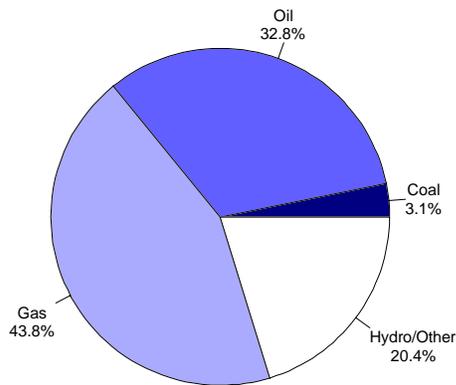


Figure 2. Utility Generation by Primary Energy Source, 1996

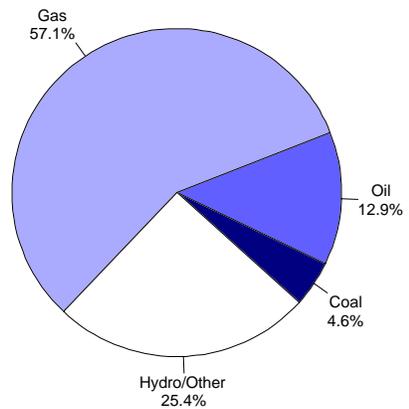


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

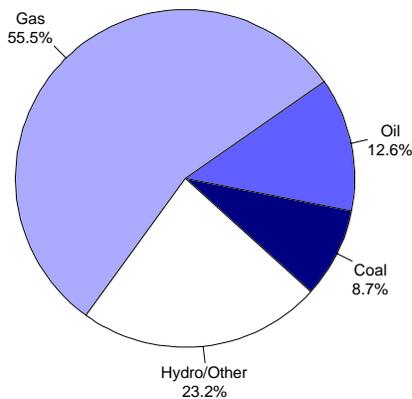


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	56	56	54	3.3	3.1	2.7
Oil	489	498	569	29.0	27.9	28.3
Gas	722	756	759	42.9	42.3	37.8
Nuclear	--	--	--	--	--	--
Hydro/Other	203	237	353	12.1	13.3	17.6
Total Utility	1,470	1,547	1,734	87.3	86.6	86.3
Total Nonutility	214	240	276	12.7	13.4	13.7
Industry	1,684	1,787	2,010	100.0	100.0	100.0

-- = Not applicable.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	292,944	325,914	229,129	5.7	6.3	3.7
Oil	458,956	407,088	643,278	9.0	7.8	10.5
Gas	2,691,148	2,657,316	2,843,998	52.8	51.1	46.3
Nuclear	--	--	--	--	--	--
Hydro/Other	808,724	896,113	1,265,863	15.9	17.2	20.6
Total Utility	4,251,772	4,286,431	4,982,268	83.4	82.4	81.1
Total Nonutility	848,290	917,328	1,164,754	16.6	17.6	18.9
Industry	5,100,062	5,203,759	6,147,022	100.0	100.0	100.0

-- = Not applicable.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.006	0.006	0.005	6.5	8.7	5.7
Oil	0.006	0.005	0.007	6.4	6.2	8.3
Gas	0.036	0.031	0.031	39.0	42.3	36.5
Nuclear	--	--	--	--	--	--
Hydro/Other	0.008	0.009	0.013	9.2	12.5	15.2
Total Utility	0.056	0.052	0.056	61.2	69.7	65.8
Total Nonutility	0.035	0.022	0.029	38.8	30.3	34.2
Industry	0.091	0.074	0.086	100.0	100.0	100.0

-- = Not applicable.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

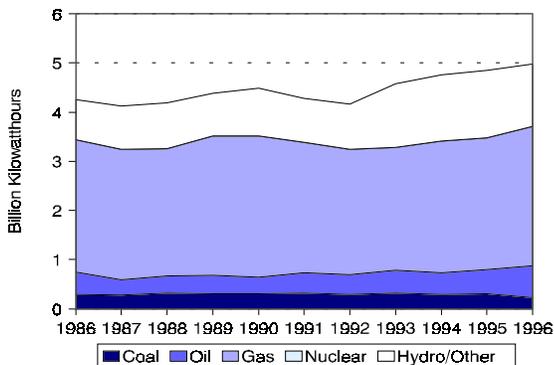


Figure 5. Utility Delivered Fuel Price for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

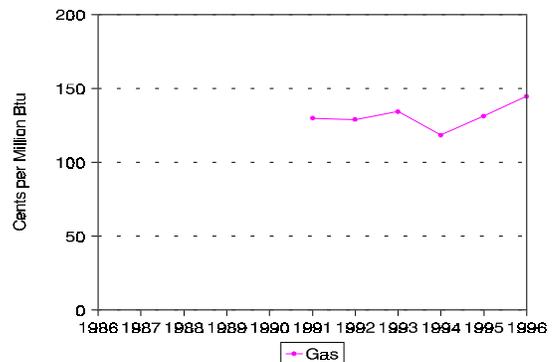


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	--	--	--	--
Oil	--	--	--	--
Gas	--	129.9	144.6	--

-- = Not applicable.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	8	11	16	7.2
Nitrogen Oxides ^d . .	25	29	30	1.8
Carbon Dioxide ^d . . .	5,715	6,524	7,730	3.1

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

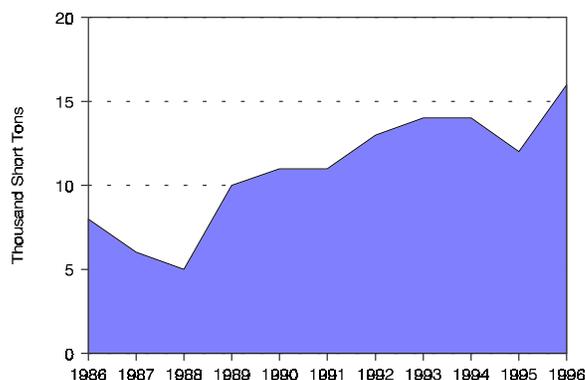


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

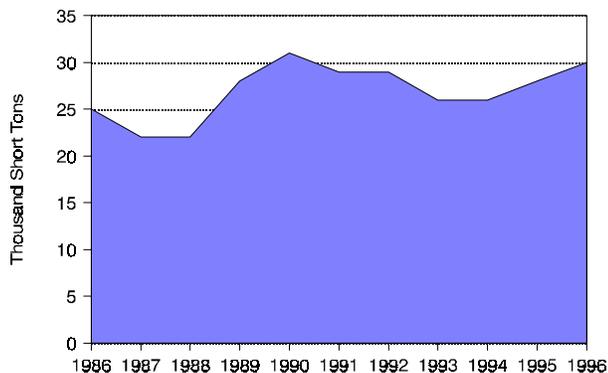


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

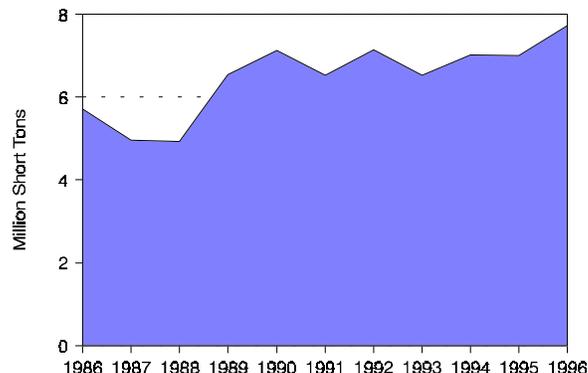


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	1,616,038	1,602,777	1,766,184	0.9	40.1	37.7	37.0
Commercial .	1,776,352	2,005,247	2,249,874	2.4	44.1	47.1	47.1
Industrial . . .	462,944	465,878	584,198	2.4	11.5	10.9	12.2
Other	174,140	181,811	179,306	0.3	4.3	4.3	3.8
Total	4,029,473	4,255,713	4,779,562	1.7	100.0	100.0	100.0

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	20	22	1	21	64
Number of Retail Customers	16,542	57,788	3	151,816	226,149
Retail Sales (MWh)	285,602	1,305,342	1,617	2,436,912	4,029,473
Percentage of Retail Sales	7.1	32.4	(s)	60.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	38,363	136,891	65	281,607	456,946
Percentage of Revenue	8.4	30.0	(s)	61.6	100.0
	1991				
Number of Utilities	24	36	1	22	83
Number of Retail Customers	19,702	61,044	2	156,343	237,091
Retail Sales (MWh)	356,454	1,349,999	3,840	2,545,420	4,255,713
Percentage of Retail Sales	8.4	31.7	0.1	59.8	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	44,287	142,741	57	281,906	468,998
Percentage of Revenue	9.4	30.4	(s)	60.1	100.0
	1996				
Number of Utilities	23	37	1	20	81
Number of Retail Customers	22,515	60,885	2	172,701	256,103
Retail Sales (MWh)	400,655	1,473,648	5,030	2,900,229	4,779,562
Percentage of Retail Sales	8.4	30.8	0.1	60.7	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	46,535	146,590	110	296,254	489,489
Percentage of Revenue	9.5	30.0	(s)	60.5	100.0

(s) = Nonzero percentage less than 0.05.

Arizona

The largest nuclear plant in the United States, Palo Verde, is located in Maricopa County in south central Arizona. It came completely on line in 1988. Although it is operated by the Arizona Public Service Company, it is owned jointly by seven utilities in the four States that border Mexico—Arizona, California, New Mexico, and Texas. It follows that Arizona is an exporter of electricity. The Grand Coulee hydroelectric plant in Washington is the only plant in the United States that has a larger capability than Palo Verde.

Although more than three-quarters of Arizona's residents live relatively close to Palo Verde in Maricopa and Pima Counties in the southern part of the State, four of the five largest plants are located in the far north of the State away from the population centers. In addition to Palo Verde, two of the five largest plants in the State are coal plants and two are hydroelectric plants on the Colorado River. In 1996, coal and nuclear facilities each accounted for more than two-fifths of Arizona's utility generation.

The two coal plants, Navajo, the second largest in the State, and Cholla, the fifth largest, are operated by the Salt River Project and the Arizona Public Service Company. Navajo has a capability of 2.3 gigawatts, and Cholla's capability falls just short of 1 gigawatt.

The Bureau of Reclamation, a division of the U.S. Department of the Interior, operates the two hydroelectric plants, Glen Canyon and Hoover, the third and fourth largest plants in the State. Hoover is actually larger than Glen Canyon, but because it straddles the Arizona-Nevada border, half of its capability is considered to be in Nevada, which makes it the fourth largest in Arizona. The Bureau of Reclamation is the second largest producer of hydroelectric power in the United States and the ninth largest utility in the country.¹

Currently, the State government of Arizona is subsidizing a lot of photovoltaic and other renewable generation. The State legislature passed a bill in May 1998 that sets rules for publicly owned utilities to enter the market when opened to competition in January 1999. In June 1998, the Arizona Corporation Commission approved a competitive market plan that will require utilities to fully divest themselves of their generation assets if they want 100 percent recovery of stranded assets. The plan also provided for a residential pilot program, 5 percent residential rate cuts over the next 2 years, and retail access for the largest 20 percent of customers by January 1, 1999, with access for all customers by January 1, 2001.²

¹ Bureau of Reclamation, <http://www.usbr.gov/power/new/fastfact.htm>.

² Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

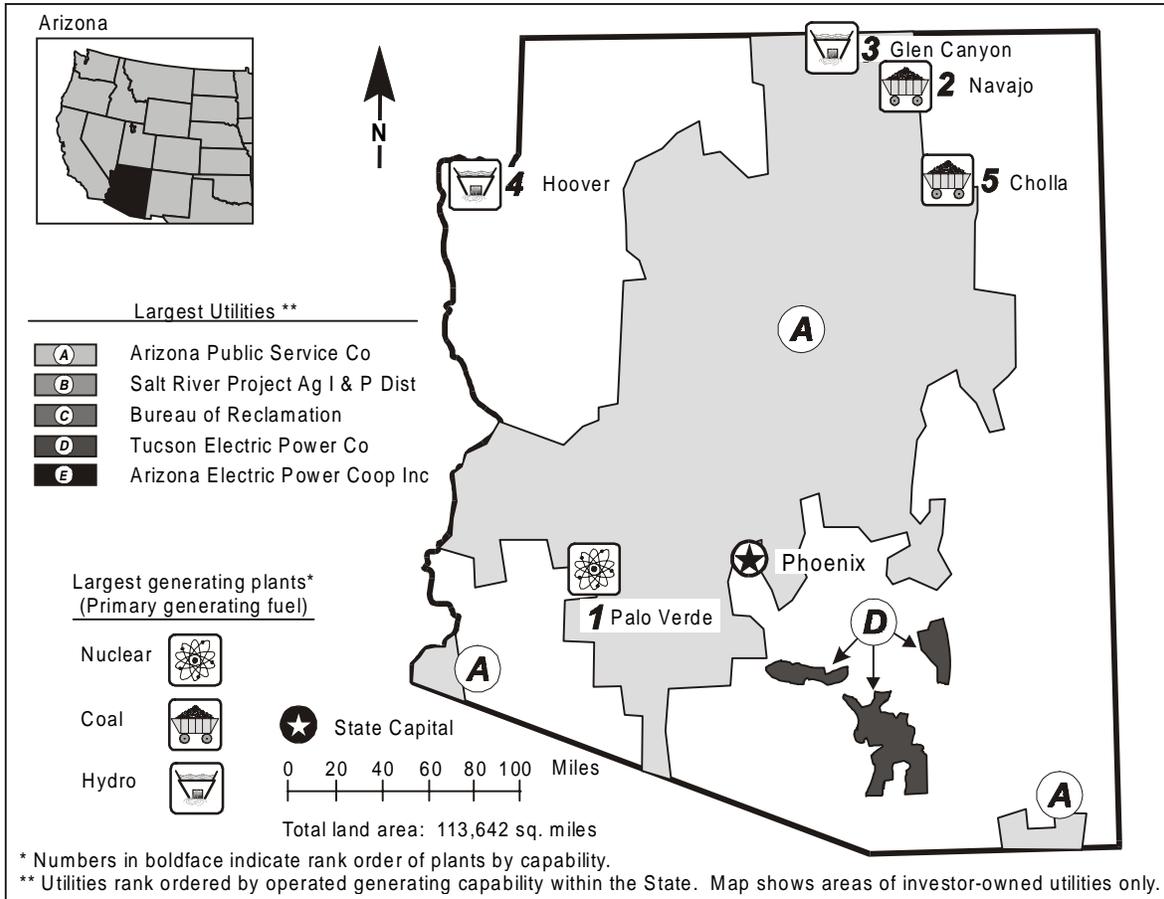


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		WSCC	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	15,146	19
State Primary Generating Fuel		Coal	Generation (MWh)	70,877,043	18
Population (as of 7/96)	4,434,340	21	Average Age of Coal Plants	18 years	
Average Revenue (cents/kWh)	7.54	^a 38	Average Age of Oil-fired Plants	22 years	
Industry			Average Age of Gas-fired Plants	29 years	
Capability (MWe)	W	^b W	Average Age of Nuclear Plants	9 years	
Generation (MWh)	W	^b W	Average Age of Hydroelectric Plants	40 years	
Capability/person (KWe/person)	W	^b W	Average Age of Other Plants	--	
Generation/person (MWh/person)	W	^b W	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	111	24	Capability (MWe)	W	W
Nitrogen Oxide Emissions (Thousand Short Tons)	120	29	Percentage Share of Capability	W	W
Carbon Dioxide Emissions (Thousand Short Tons)	36,592	29	Generation (MWh)	W	W
Sulfur Dioxide/sq. mile (Tons)	0.98	38	Percentage Share of Generation	W	W
Nitrogen Oxides/sq. mile (Tons)	1.06	40			
Carbon Dioxide/sq. mile (Tons)	321.99	41			

-- = Not applicable. W = Withheld.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Palo Verde	Nuclear	Arizona Public Service Co	3,751
2. Navajo	Coal	Salt River Proj Ag I & P Dist	2,250
3. Glen Canyon	Hydro	Bureau of Reclamation	1,288
4. Hoover	Hydro	Bureau of Reclamation	1,042
5. Cholla	Coal	Arizona Public Service Co	995

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996 (Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Arizona Public Service Co	6,118	995	70	1,296	3,751	6
B. Salt River Proj Ag I & P Dist	4,441	2,980	--	1,222	--	239
C. Bureau of Reclamation	2,629	--	--	--	--	2,629
D. Tucson Electric Power Co	1,362	876	--	486	--	--
E. Arizona Electric Pwr Coop Inc	520	350	89	81	--	--
Total	15,070	5,201	159	3,085	3,751	2,874
Percentage of Utility Capability	99.5	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

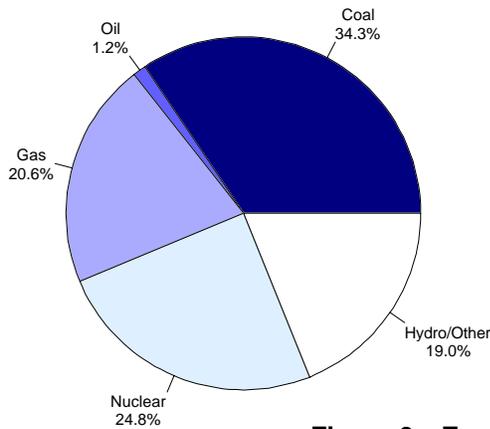


Figure 2. Utility Generation by Primary Energy Sources, 1996

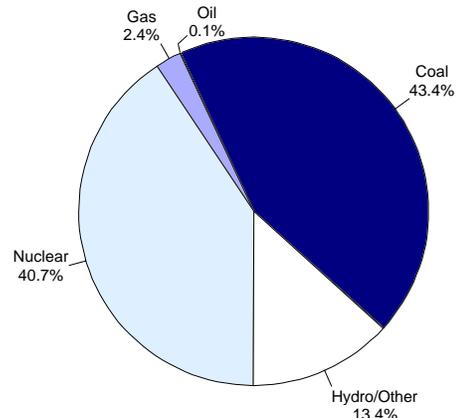


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

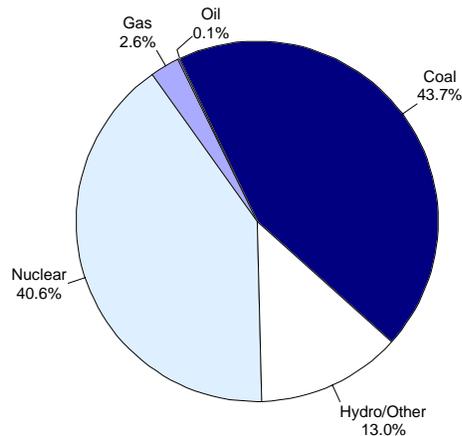


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	4,596	5,070	5,201	37.1	34.0	34.3
Oil	78	78	184	0.6	0.5	1.2
Gas	3,399	3,236	3,126	27.4	21.7	20.6
Nuclear	2,540	3,810	3,751	20.5	25.6	24.8
Hydro/Other	1,788	2,717	2,884	14.4	18.2	19.0
Total Utility	12,401	14,910	15,146	100.0	100.0	100.0
Total Nonutility	W	W	W	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	23,958,190	32,306,088	30,780,575	46.8	48.4	43.4
Oil	123,060	88,935	65,097	0.2	0.1	0.1
Gas	2,671,796	2,178,096	1,712,031	5.2	3.3	2.4
Nuclear	9,976,402	25,095,776	28,839,587	19.5	37.6	40.7
Hydro/Other	14,445,861	7,098,452	9,479,753	28.2	10.6	13.4
Total Utility	51,175,308	66,767,347	70,877,043	100.0	100.0	100.0
Total Nonutility	W	W	W	--	--	--

-- = Not applicable. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.251	0.333	0.330	46.2	47.5	43.7
Oil	0.001	0.001	0.001	0.3	0.1	0.1
Gas	0.032	0.024	0.020	5.9	3.4	2.6
Nuclear	0.108	0.270	0.306	19.9	38.4	40.6
Hydro/Other	0.151	0.073	0.098	27.8	10.5	13.0
Total Utility	0.543	0.701	0.754	100.0	100.0	100.0
Total Nonutility	W	W	W	--	--	--

-- = Not applicable. W = Withheld.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

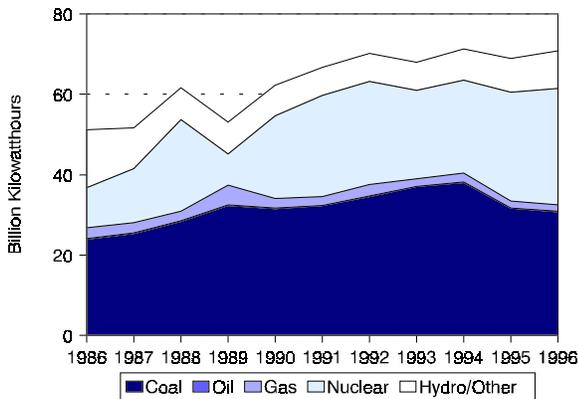


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

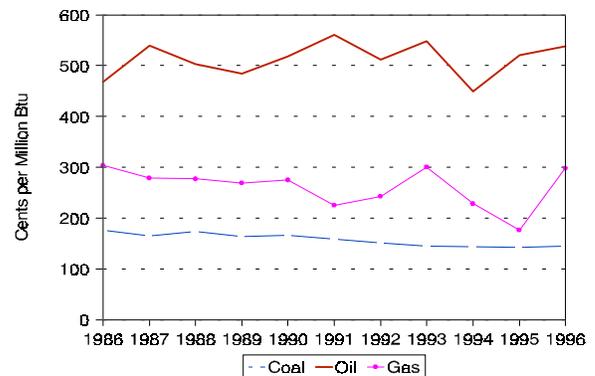


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	176.1	158.2	144.4	-2.0
Oil	467.7	560.8	538.6	1.4
Gas	303.7	225.3	298.2	-0.2

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	78	126	111	3.6
Nitrogen Oxides ^d	93	124	120	2.6
Carbon Dioxide ^d	28,284	37,851	36,592	2.6

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

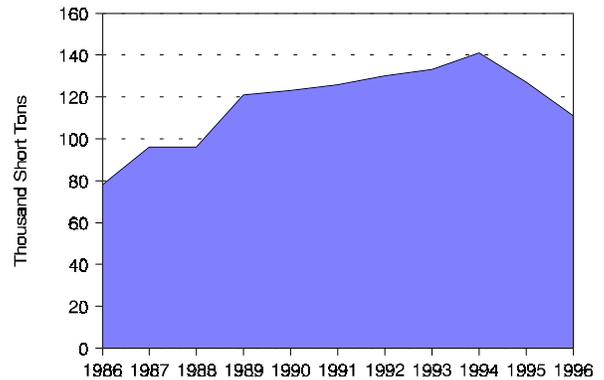


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

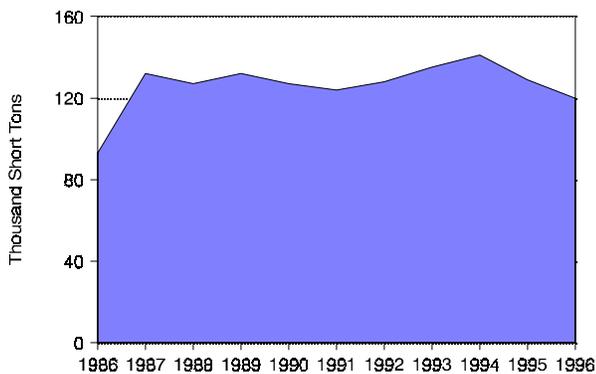


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

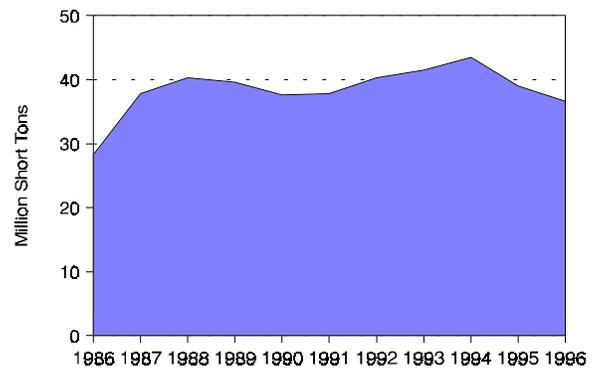


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996

(Megawatthours)							
Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential	12,539,655	15,641,499	19,746,491	4.6	36.9	37.4	37.9
Commercial	10,978,192	13,982,060	17,252,365	4.6	32.3	33.4	33.1
Industrial . .	8,357,769	10,404,969	12,782,917	4.3	24.6	24.9	24.5
Other	2,109,460	1,819,889	2,302,766	0.9	6.2	4.3	4.4
Total	33,985,077	41,848,417	52,084,539	4.4	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

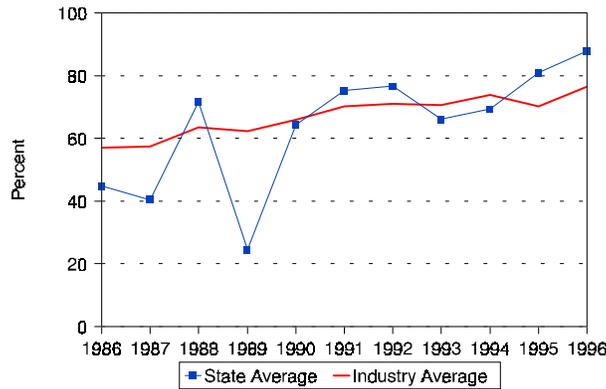


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	6	14	2	14	36
Number of Retail Customers . . .	805,865	501,802	18,132	90,161	1,415,960
Retail Sales (MWh)	18,325,488	12,788,395	664,194	2,207,000	33,985,077
Percentage of Retail Sales	53.9	37.6	2.0	6.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,935,635	1,053,903	24,966	205,744	3,227,513
Percentage of Revenue	60.0	32.7	1.0	6.4	100.0
	1991				
Number of Utilities	5	22	2	11	40
Number of Retail Customers . . .	929,419	599,924	15,119	101,649	1,646,111
Retail Sales (MWh)	22,507,072	16,420,308	370,109	2,550,928	41,848,417
Percentage of Retail Sales	53.8	39.2	0.9	6.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,182,034	1,299,289	23,625	182,536	3,690,413
Percentage of Revenue	59.1	35.2	0.7	5.0	100.0
	1996				
Number of Utilities	5	24	3	10	42
Number of Retail Customers . . .	1,087,155	696,463	16,016	119,372	1,919,006
Retail Sales (MWh)	27,381,714	20,570,571	760,191	3,372,063	52,084,539
Percentage of Retail Sales	52.6	39.5	1.5	6.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,284,772	1,408,770	30,490	205,547	3,929,579
Percentage of Revenue	58.1	35.9	0.8	5.2	100.0

Arkansas

Most of the electricity in Arkansas is generated at coal-fired plants. In 1992, all of the coal that was burned by Arkansas utilities was subbituminous coal from Wyoming. Arkansas is a net exporter of electricity and it has an efficient nuclear power program. From 1989 through 1996 Arkansas' nuclear capacity factor was higher than the national average. Arkansas Nuclear, the largest plant in the State, is the only nuclear plant in Arkansas, but in 1996, it generated almost one-third of the utility electricity produced in the State. The largest utility in the State by far is the Arkansas Power and Light Company (APL). APL operates all of the five largest plants in the State. The average price of electricity, 6.15 cents per kilowatt-hour, was about 10 percent below the national average.

The second and third largest plants, Independence and White Bluff, are coal-fired. Both are almost as large as Arkansas Nuclear. Independence is located in north-eastern Arkansas near Batesville, while White Bluff is southeast of Little Rock, near Pine Bluff. The fourth and fifth largest plants are gas-fired. Ritchie, the fourth largest, is in Phillips County along the Mississippi River in the east-central part of the State. Lake Catherine, the fifth largest, is southwest of Little Rock, near Hot Springs National Park.

Emissions of sulfur dioxide, nitrogen oxides, and carbon dioxide from Arkansas electricity generators and the concentrations of these pollutants were around the

national median values in 1996. Although Arkansas participated in the Ozone Transport Assessment Group process like all the other States east of the Rocky Mountains, Arkansas generators are not subject to the recently announced proposal from the Environmental Protection Agency (EPA) requiring submission of State implementation plans to address the regional transport of ground-level ozone. However, all of Arkansas' fossil-fuel fired units will be subject to emissions reductions requirements of Phase II of EPA's Acid Rain Program, which takes effect on January 1, 2000.

In 1996, utility coal units represented just under two-fifths of Arkansas' generating capability and over half of utility net generation. Nuclear capability and net generation, on the other hand, were just over one-sixth and almost one-third, respectively, in 1996. Nonutility generation as a share of the State total was stable over the 10 years examined, at 5.2 percent of the total in 1996.

Arkansas' General Assembly requested a study on competition in the electricity industry in April 1997. The report is due by January 1999. In May 1998, the Arkansas Public Service Commission concluded hearings on when and how to open the electricity market to competition. Entergy and two other investor-owned utilities agreed that competition should not begin before 2002, when neighboring Oklahoma is scheduled to open its electricity market to retail competition.¹

¹ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

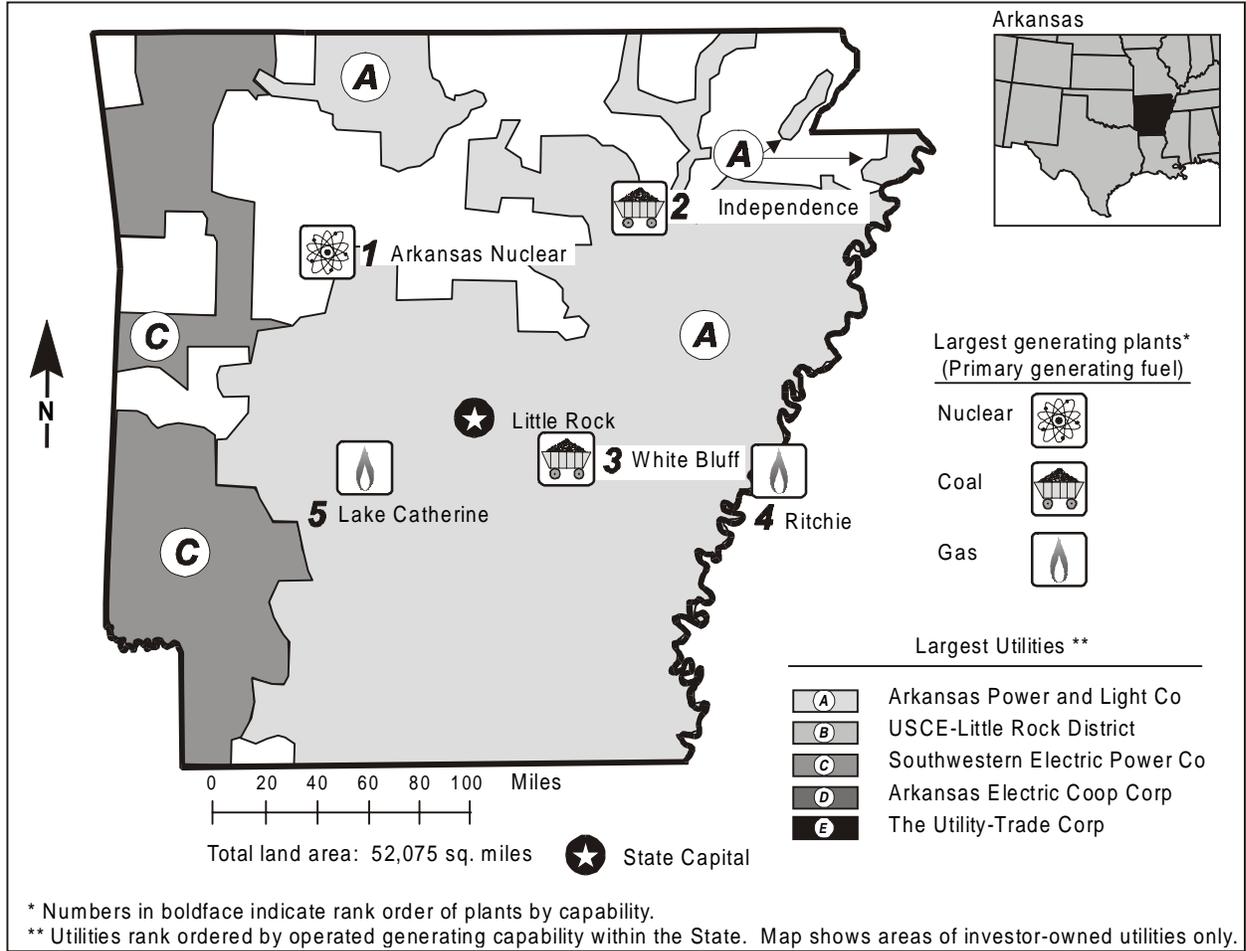


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		SPP/SERC	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	9,639	28
State Primary Generating Fuel		Coal	Generation (MWh)	43,677,535	26
Population (as of 7/96)	2,506,293	33	Average Age of Coal Plants	15 years	
Average Revenue (cents/kWh)	6.15	^a 25	Average Age of Oil-fired Plants	24 years	
Industry-Wide			Average Age of Gas-fired Plants	33 years	
Capability (MWe)	10,030	^b 26	Average Age of Nuclear Plants	19 years	
Generation (MWh)	46,076,282	^b 24	Average Age of		
Capability/person			Hydroelectric Plants	34 years	
(KWe/person)	4.00	^b 9	Average Age of Other Plants	--	
Generation/person			Nonutility^c		
(MWh/person)	18.38	^b 7	Capability (MWe)	391	31
Sulfur Dioxide Emissions	98	28	Percentage Share of Capability	3.9	33
(Thousand Short Tons)			Generation (MWh)	2,398,747	29
Nitrogen Oxide Emissions	102	32	Percentage Share of Generation	5.2	28
(Thousand Short Tons)					
Carbon Dioxide Emissions	38,628	25	-- = Not applicable.		
(Thousand Short Tons)					
Sulfur Dioxide/sq. mile (Tons)	1.88	32			
Nitrogen Oxides/sq. mile (Tons)	1.96	30			
Carbon Dioxide/sq. mile (Tons)	741.78	29			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Arkansas Nuclear	Nuclear	Arkansas Power & Light Co	1,694
2. Independence	Coal	Arkansas Power & Light Co	1,678
3. White Bluff	Coal	Arkansas Power & Light Co	1,659
4. Ritchie	Gas	Arkansas Power & Light Co	918
5. Lake Catherine	Gas	Arkansas Power & Light Co	756

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Arkansas Power & Light Co	7,551	3,337	194	2,256	1,694	70
B. USCE-Little Rock District	980	--	--	--	--	980
C. Southwestern Electric Power Co.	480	480	--	--	--	--
D. Arkansas Electric Coop Corp . . .	380	--	--	315	--	65
E. The Utility-Trade Corp	169	--	--	--	--	169
Total	9,560	3,817	194	2,571	1,694	1,284
Percentage of Industry Capability	95.3	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

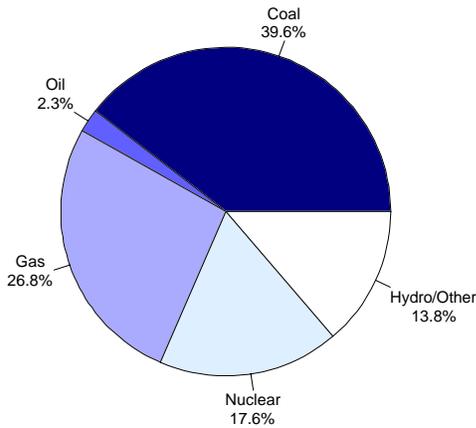


Figure 2. Utility Generation by Primary Energy Source, 1996

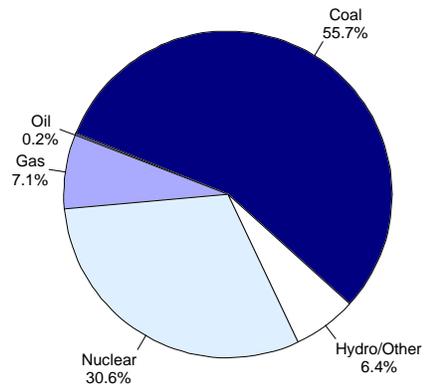


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

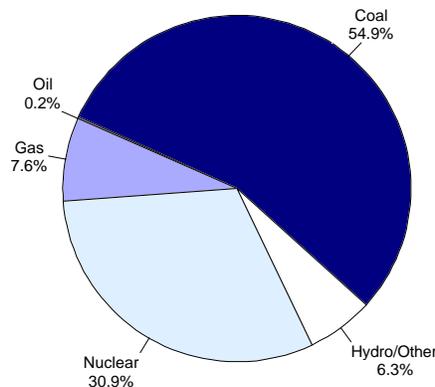


Table 4. Electric Power Industry Generating Capability, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	3,817	3,817	3,817	38.9	37.9	38.1
Oil	222	213	217	2.3	2.1	2.2
Gas	2,571	2,620	2,585	26.2	26.0	25.8
Nuclear	1,694	1,694	1,694	17.3	16.8	16.9
Hydro/Other	1,218	1,290	1,326	12.4	12.8	13.2
Total Utility	9,522	9,634	9,639	97.0	95.7	96.1
Total Nonutility	296	430	391	3.0	4.3	3.9
Industry	9,818	10,064	10,030	100.0	100.0	100.0

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	20,676,480	19,573,925	24,339,185	55.9	48.2	52.8
Oil	9,665	64,278	98,250	(s)	0.2	0.2
Gas	2,758,804	2,504,070	3,086,760	7.5	6.2	6.7
Nuclear	8,876,096	12,661,793	13,356,671	24.0	31.2	29.0
Hydro/Other	2,813,485	3,561,069	2,796,669	7.6	8.8	6.1
Total Utility	35,134,530	38,365,135	43,677,535	94.9	94.4	94.8
Total Nonutility	1,879,602	2,277,050	2,398,747	5.1	5.6	5.2
Industry	37,014,132	40,642,185	46,076,282	100.0	100.0	100.0

(s) = Nonzero percentage less than 0.05.

Table 6. Electric Power Industry Consumption by Primary Fuel, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.217	0.209	0.252	46.7	41.7	45.3
Oil	(s)	0.001	0.001	0.1	0.1	0.2
Gas	0.030	0.028	0.035	6.4	5.7	6.3
Nuclear	0.096	0.136	0.142	20.6	27.1	25.5
Hydro/Other	0.029	0.037	0.029	6.3	7.3	5.2
Total Utility	0.372	0.411	0.458	80.1	82.0	82.4
Total Nonutility	0.092	0.091	0.098	19.9	18.0	17.6
Industry	0.465	0.502	0.557	100.0	100.0	100.0

-- = Not applicable. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

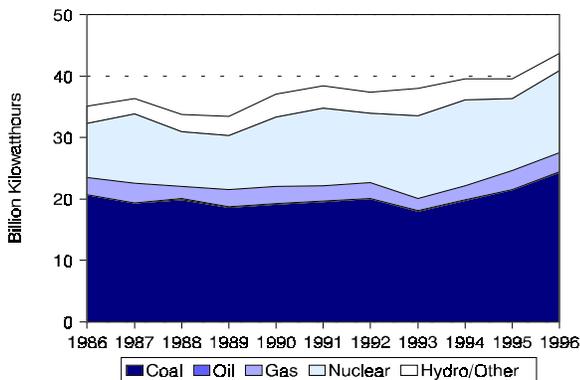


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

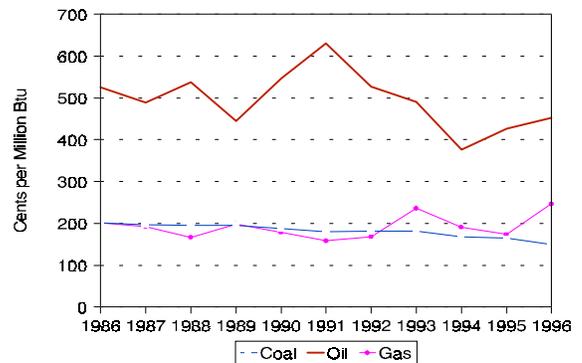


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	201.8	179.5	150.3	-2.9
Oil	525.1	630.2	452.5	-1.5
Gas	201.1	158.4	246.6	2.1

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide . .	71	82	98	3.3
Nitrogen Oxides ^d	84	94	102	2.0
Carbon Dioxide	24,265	32,045	38,628	4.8

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

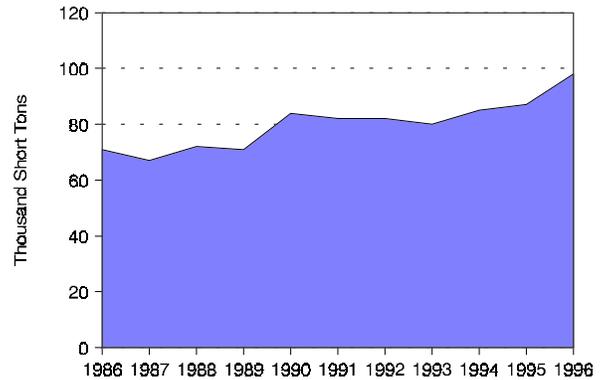


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

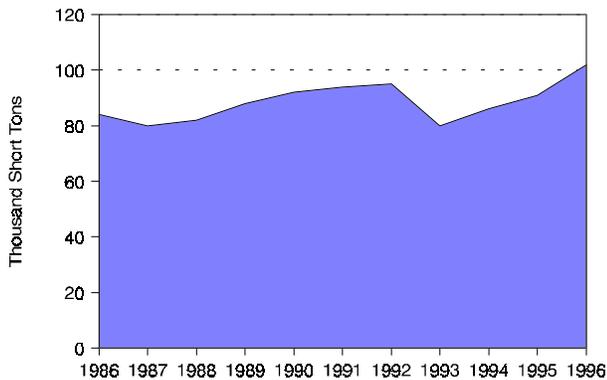


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

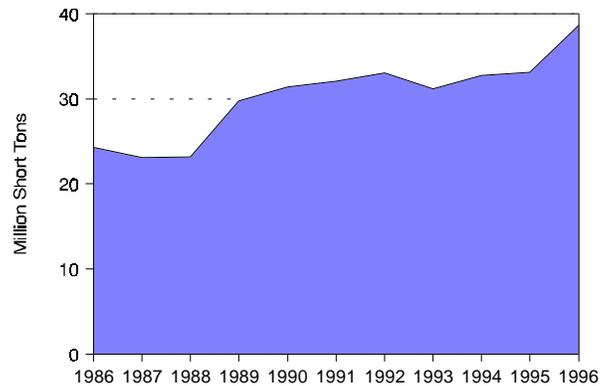


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	9,253,757	11,000,632	12,933,994	3.4	40.4	38.7	35.8
Commercial	5,344,310	6,300,359	7,442,490	3.4	23.3	22.2	20.6
Industrial . . .	7,762,783	10,517,510	15,139,481	6.9	33.9	37.0	41.9
Other	571,040	621,756	620,611	0.8	2.5	2.2	1.7
Total	22,931,891	28,440,257	36,136,576	4.7	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

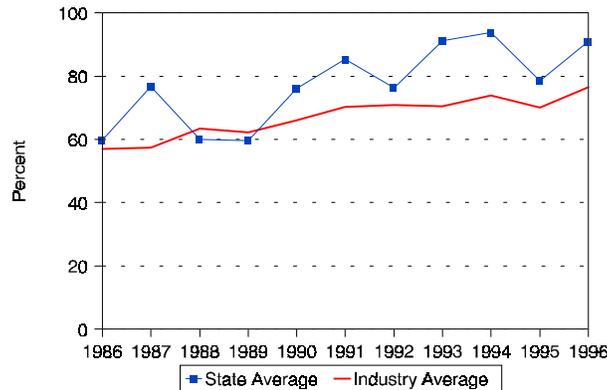


Table 9. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	4	15	--	19	38
Number of Retail Customers	675,867	115,670	--	278,625	1,070,162
Retail Sales (MWh)	16,361,136	2,681,080	--	3,889,675	22,931,891
Percentage of Retail Sales	71.4	11.7	--	17.0	100.0
Revenue from Retail Sales (thousand 1996 \$)	1,393,867	201,730	--	380,756	1,976,353
Percentage of Revenue	70.5	10.2	--	19.3	100.0
1991					
Number of Utilities	4	15	--	17	36
Number of Retail Customers	717,765	133,648	--	306,295	1,157,708
Retail Sales (MWh)	19,272,464	3,546,264	--	5,621,529	28,440,257
Percentage of Retail Sales	67.8	12.5	--	19.8	100.0
Revenue from Retail Sales (thousand 1996 \$)	1,490,054	229,013	--	419,477	2,138,544
Percentage of Revenue	69.7	10.7	--	19.6	100.0
1996					
Number of Utilities	4	15	--	17	36
Number of Retail Customers	770,999	146,011	--	357,012	1,274,022
Retail Sales (MWh)	22,656,231	4,620,702	--	8,859,643	36,136,576
Percentage of Retail Sales	62.7	12.8	--	24.5	100.0
Revenue from Retail Sales (thousand 1996 \$)	1,505,351	249,341	--	469,060	223,712
Percentage of Revenue	67.7	11.2	--	21.1	100.0

-- = Not applicable.

California

The first central generating station for the distribution of electricity to customers began operation in San Francisco. The California Electric Light Company, which was incorporated on June 30, 1879, was the first electric utility for public service.¹ In 1996, California had the largest population and the second largest utility generating capability. Historically, California has been reliant on hydropower. Since pioneer days, California has turned to water because of the lower cost of operation on streams of the Sierra.² The State had the largest non-utility capability in the Nation in 1996 and ranked sixth in percentage share of nonutility capability. Most of the utility electricity is generated today at hydroelectric plants although none of the five largest plants in the State is a hydroelectric plant.

California is also reliant on nuclear power. San Onofre, operated by Southern California Edison, the largest utility in the State, and Diablo Canyon, operated by Pacific Gas and Electric, are the two largest plants in California and the only nuclear plants in the State. There is no utility coal-fired capability or generation in California. Coal-fired plants are historically the most heavily polluting plants and California has many of the toughest environmental regulations in the Nation. The average price of electricity, 9.48 cents per kilowatt-hour, was tenth most expensive in the Nation. There are discrepancies between prices in Northern and Southern California, however. The average price of electricity for all consumers in the City of Los Angeles was 9.07 cents per kilowatt-hour in 1997, while in San Francisco the average price for all sectors was 5.34 cents per kilowatt-hour. This difference is at least partly attributable to the fact that Northern California utilities import cheaper

power from the Northwest while companies in Southern California do not.

California has been on the forefront of the move toward a deregulated environment for electricity. In September 1996, legislation was enacted to restructure the State's electric power industry. The law included provisions for the creation of an independent system operator and a competitive transition charge for recovery of stranded costs from 1998 through 2002. A 10-percent rate reduction was included, as was the continuance of energy efficiency programs financed with rate surcharges. In April 1998, the Public Utility Commission issued a final order that opened the electricity market to competition as of March 31, 1998. In June 1998, a coalition of consumer advocates challenged the restructuring law. The coalition succeeded in placing an initiative, Proposition 9, on the November 1998 ballot that would have shifted the burden of stranded costs to shareholders and given consumers a 20-percent rate reduction.³ Proposition 9 was defeated in the 1998 general election, however.

Nationally, California's electricity generators emitted the thirty-fourth highest level of sulfur dioxide (SO₂), the nineteenth highest of nitrogen oxides (NO_x), and the seventeenth highest amount of carbon dioxide (CO₂). Its concentrations for the three pollutants per square mile, however were eighth, eleventh, and thirteenth lowest, respectively. California's emissions of SO₂ from electricity generators increased almost five-fold from 1986 to 1991 and then more than doubled in 1996. Both its emissions of NO_x and CO₂ increased from 1986 to 1991 but declined in 1996, although not nearly to 1986 levels.

¹ Charles M. Coleman, *The Centennial Story of Pacific Gas and Electric Company*, Pacific Gas and Electric of California (San Francisco, 1952), p. 5.

² *Ibid.*, p. 333.

³ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

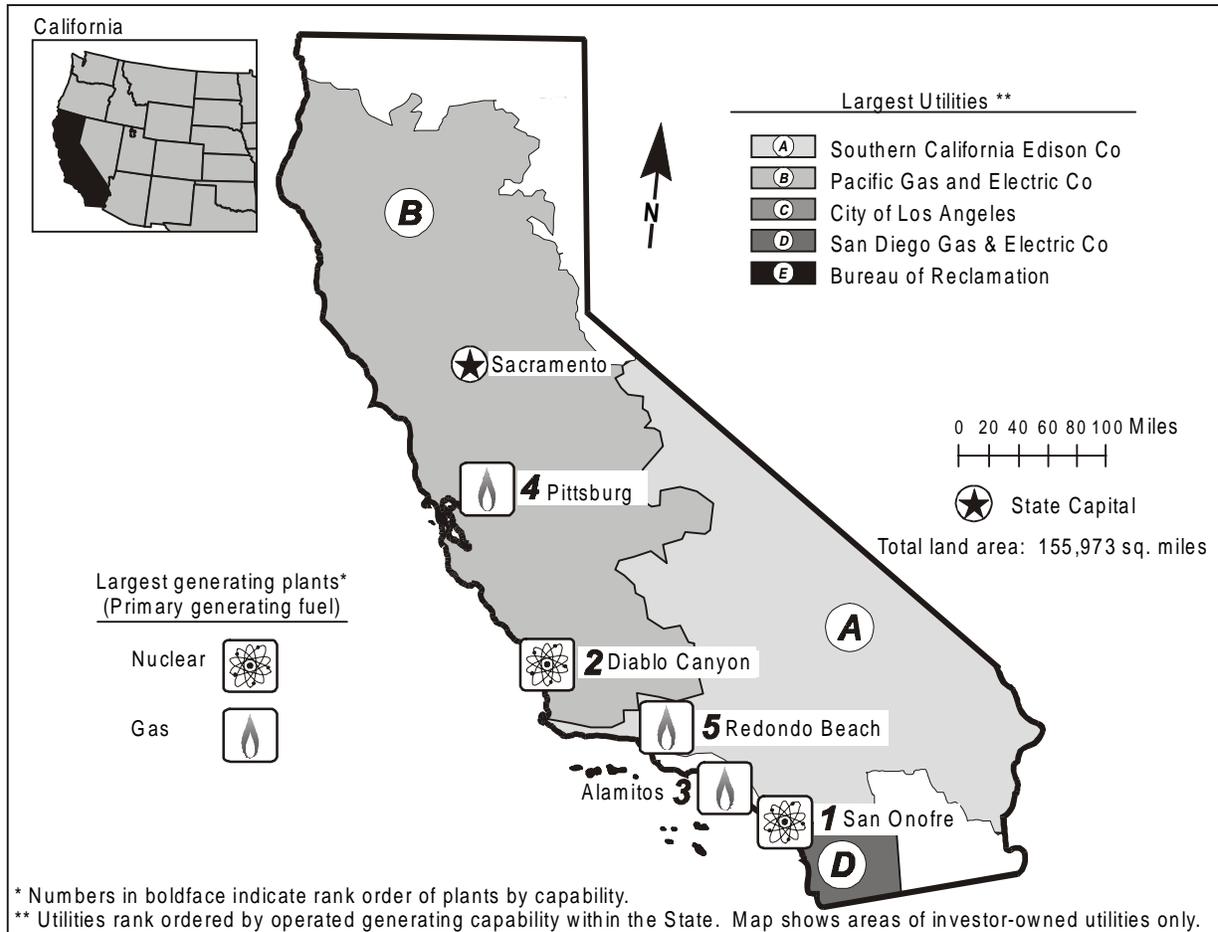


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		WSCC	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	43,934	2
State Primary Generating Fuel		Hydro	Generation (MWh)	114,706,047	7
Population (as of 7/96)	31,857,646	1	Average Age of Coal Plants	--	
Average Revenue (cents/kWh)	9.48	^a 42	Average Age of Oil-fired Plants	30 years	
Industry			Average Age of Gas-fired Plants	30 years	
Capability (MWe)	54,156	^b 2	Average Age of Nuclear Plants	13 years	
Generation (MWh)	176,991,280	^b 3	Average Age of Hydroelectric Plants	32 years	
Capability/person			Average Age of Other Plants	16 years	
(KWe/person)	1.70	^b 43	Nonutility^c		
Generation/person			Capability (MWe)	10,222	1
(MWh/person)	5.56	^b 43	Percentage Share		
Sulfur Dioxide Emissions			of Capability	18.9	6
(Thousand Short Tons)	69	34	Generation (MWh)	62,285,233	1
Nitrogen Oxide Emissions			Percentage Share of Generation	35.2	5
(Thousand Short Tons)	162	19			
Carbon Dioxide Emissions			-- = Not applicable.		
(Thousand Short Tons)	63,763	17			
Sulfur Dioxide/sq. mile (Tons)	0.44	44			
Nitrogen Oxides/sq. mile (Tons)	1.04	41			
Carbon Dioxide/sq. mile (Tons)	408.81	39			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. San Onofre	Nuclear	Southern California Edison	2,586
2. Diablo Canyon	Nuclear	Pacific Gas and Electric	2,160
3. Alamos	Gas	Southern California Edison	2,083
4. Pittsburg	Gas/Oil	Pacific Gas and Electric	2,022
5. Redondo Beach	Gas	Southern California Edison	1,602

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996 (Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Southern California Edison Co . .	14,046	--	149	10,155	2,586	1,157
B. Pacific Gas and Electric Co	13,603	--	1,069	5,237	2,160	5,137
C. City of Los Angeles	5,062	--	--	3,298	--	1,764
D. San Diego Gas & Electric Co	2,203	--	284	1,919	--	--
E. Bureau of Reclamation	1,972	--	--	--	--	1,972
Total	36,886	--	1,502	20,609	4,746	10,030
Percentage of Industry Capability	68.1	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

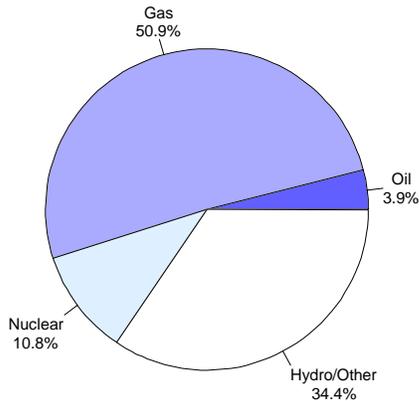


Figure 2. Utility Generation by Primary Energy Source, 1996

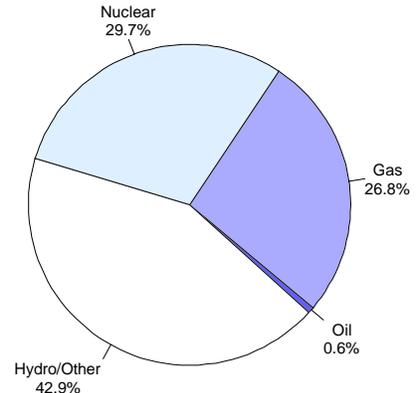


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

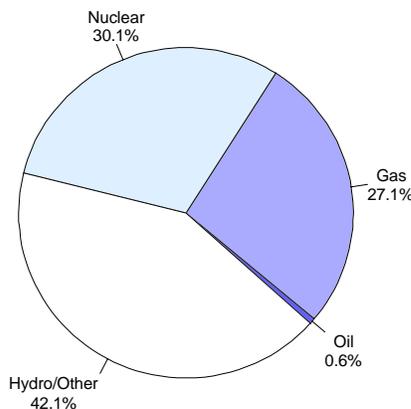


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	3,216	2,874	1,692	6.7	5.4	3.1
Gas	21,716	21,673	22,365	45.1	41.1	41.3
Nuclear	5,611	4,746	4,746	11.7	9.0	8.8
Hydro/Other	13,733	14,305	15,132	28.5	27.1	27.9
Total Utility	44,276	43,599	43,934	92.0	82.6	81.1
Total Nonutility	3,873	9,189	10,222	8.0	17.4	18.9
Industry	48,149	52,788	54,156	100.0	100.0	100.0

-- = Not applicable.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	2,976,097	598,489	674,899	2.1	0.4	0.4
Gas	41,049,503	43,940,427	30,768,135	29.1	28.0	17.4
Nuclear	26,215,288	31,541,799	34,096,860	18.6	20.1	19.3
Hydro/Other	51,624,435	28,887,223	49,166,153	36.6	18.4	27.8
Total Utility	121,865,323	104,967,938	114,706,047	86.5	66.9	64.8
Total Nonutility	19,075,503	51,950,241	62,285,233	13.5	33.1	35.2
Industry	140,940,826	156,918,179	176,991,280	100.0	100.0	100.0

-- = Not applicable.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	0.035	0.006	0.007	1.9	0.4	0.4
Gas	0.464	0.462	0.326	25.0	28.0	17.6
Nuclear	0.283	0.339	0.362	15.2	20.5	19.5
Hydro/Other	0.539	0.299	0.506	29.0	18.1	27.3
Total Utility	1.322	1.106	1.202	71.2	67.0	64.7
Total Nonutility	0.535	0.544	0.656	28.8	33.0	35.3
Industry	1.856	1.650	1.858	100.0	100.0	100.0

-- = Not applicable.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

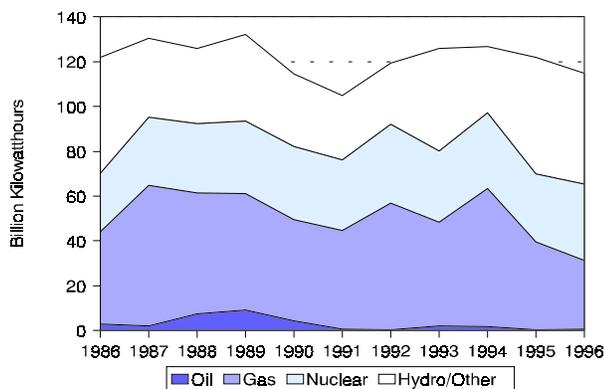


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

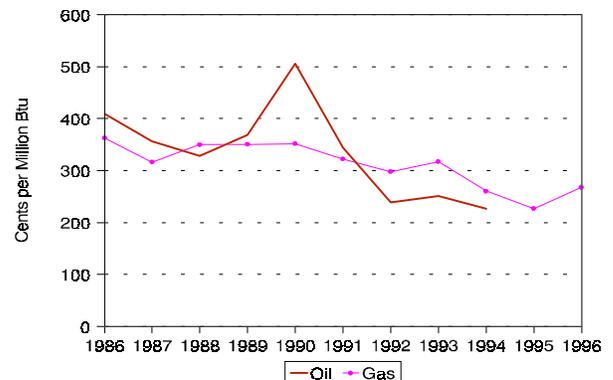


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	--	--	--	--
Oil	408.7	344.2	--	--
Gas	362.8	322.5	267.9	-3.0

-- = Not applicable.

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

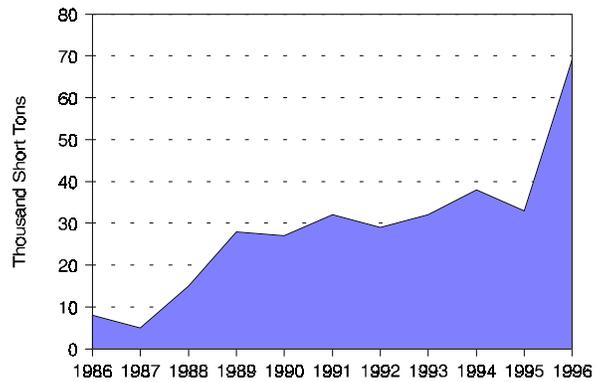


Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	8	32	69	24.0
Nitrogen Oxides ^d . .	75	140	162	8.0
Carbon Dioxide ^d . .	31,354	65,703	63,763	7.4

Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

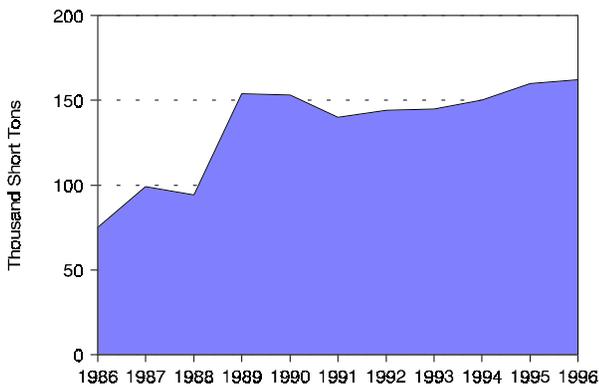


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

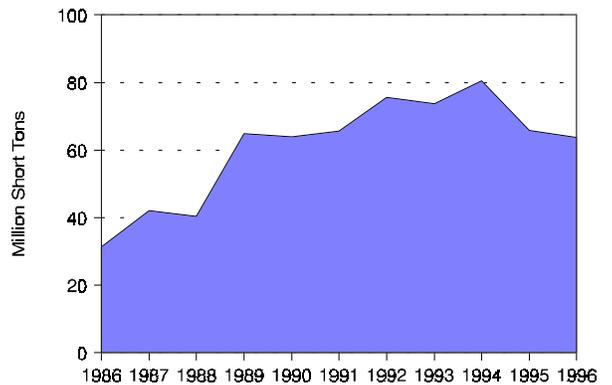


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential	57,542,286	66,016,700	71,396,104	2.2	31.0	31.6	32.7
Commercial	63,082,512	78,424,653	83,391,860	2.8	34.0	37.6	38.2
Industrial	52,884,177	56,191,047	57,682,712	0.9	28.5	26.9	26.4
Other	11,910,157	8,018,089	5,641,809	-7.2	6.4	3.8	2.6
Total	185,419,127	208,650,489	218,112,485	1.6	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1985-1996

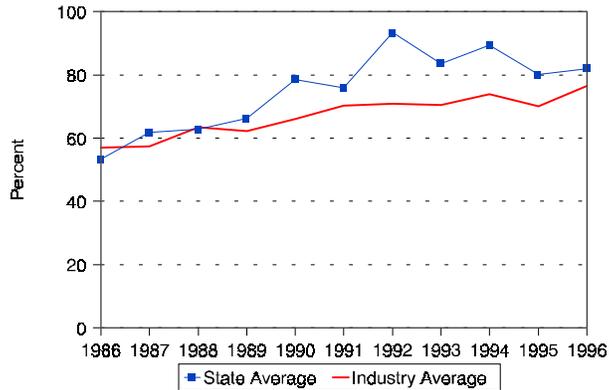


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	7	33	3	5	48
Number of Retail Customers	8,369,579	2,419,356	255	10,393	10,799,583
Retail Sales (MWh)	134,251,192	44,647,973	6,365,747	154,215	185,419,127
Percentage of Retail Sales	72.4	24.1	3.4	0.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	14,809,664	3,796,442	82,778	13,802	18,726,775
Percentage of Revenue	79.1	20.3	0.6	0.1	100.0
	1991				
Number of Utilities	6	34	1	4	45
Number of Retail Customers	9,485,519	2,707,466	94	11,923	12,205,002
Retail Sales (MWh)	155,088,784	49,314,953	4,051,493	195,259	208,650,489
Percentage of Retail Sales	74.3	23.6	1.9	0.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	17,600,705	4,399,602	72,994	16,776	22,099,128
Percentage of Revenue	79.6	19.9	0.4	0.1	100.0
	1996				
Number of Utilities	6	34	1	4	45
Number of Retail Customers	9,901,823	2,756,678	61	12,969	12,671,531
Retail Sales (MWh)	164,507,081	51,539,469	1,830,983	234,952	218,112,485
Percentage of Retail Sales	75.4	23.6	0.8	0.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	16,264,353	4,342,303	42,976	18,677	20,668,309
Percentage of Revenue	78.7	21.0	0.2	0.1	100.0

Colorado

Most of the electricity in Colorado is generated at coal-fired plants. In fact, the five largest plants in the State, including the largest, Craig, are coal-fired plants. Colorado's proximity to the coal of Wyoming and its own coal resources make coal an attractive fuel choice. The coal comes from beds scattered around the State. In 1997, almost two-thirds of the coal burned by Colorado utilities came from Colorado; Wyoming provided the other third. The largest utility in the State is the Public Service Company of Colorado (PSCC). Colorado had the twenty-fifth largest population and the thirty-third largest utility generating capability in 1996. The average price of electricity in Colorado, 6.05 cents per kilowatt-hour, ranked as twenty-first least expensive in the Nation. Colorado is a net importer of electricity.

PSCC operates over half of the utility capability in the State. A large portion of this capability is at the second, third, fourth, and fifth largest plants in the State, Cherokee, Comanche, Pawnee, and Hayden. Cherokee and Pawnee are located northeast of Denver. Comanche is in the east-central part of the State near Pueblo. Hayden and Craig are located in northwestern Colorado. The Tri-State G&T Association operates Craig, the largest Colorado plant.

In 1986, utility coal capability represented 68.9 percent of the State total and utility coal generation accounted for 89.5 percent of net generation. In 1996, the coal share of capability had fallen to 66.5 percent while the net generation share had fallen to 86.0 percent. Utility

hydro/other capability and net generation, on the other hand, were 14.5 percent and 7.9 percent, respectively, in 1986. By 1996, the hydro/other capability share had risen to 14.9 percent while the generation share fell to 4.3 percent. The drops in utility coal and hydroelectric generation shares were offset by the rising share of nonutility generation in the State. Colorado ranks twenty-second in nonutility capability and twenty-fifth in nonutility net generation as a percentage of total net generation. There are no nuclear generating stations in Colorado.

With regard to emissions of sulfur dioxide (SO₂), nitrogen oxides (NO_x), and carbon dioxide from electricity generating units, Colorado is consistently in the middle of national rankings. Like all States west of Kansas, it had no plants that were subject to Phase I requirements of the Environmental Protection Agency's Acid Rain Program for SO₂ and NO_x emissions reductions, although fossil fuel units within the State are mandated to comply with Phase II requirements which will take effect on January 1, 2000.

Colorado has not moved as quickly as some other States toward deregulation. In July 1998, the Colorado electricity advisory panel met for the first time. The panel will study deregulation and report to the legislature by November 1999. Deregulation cannot proceed until the legislature acts. The Public Utility Commission has conducted stakeholder surveys and released a report on restructuring.¹

¹ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

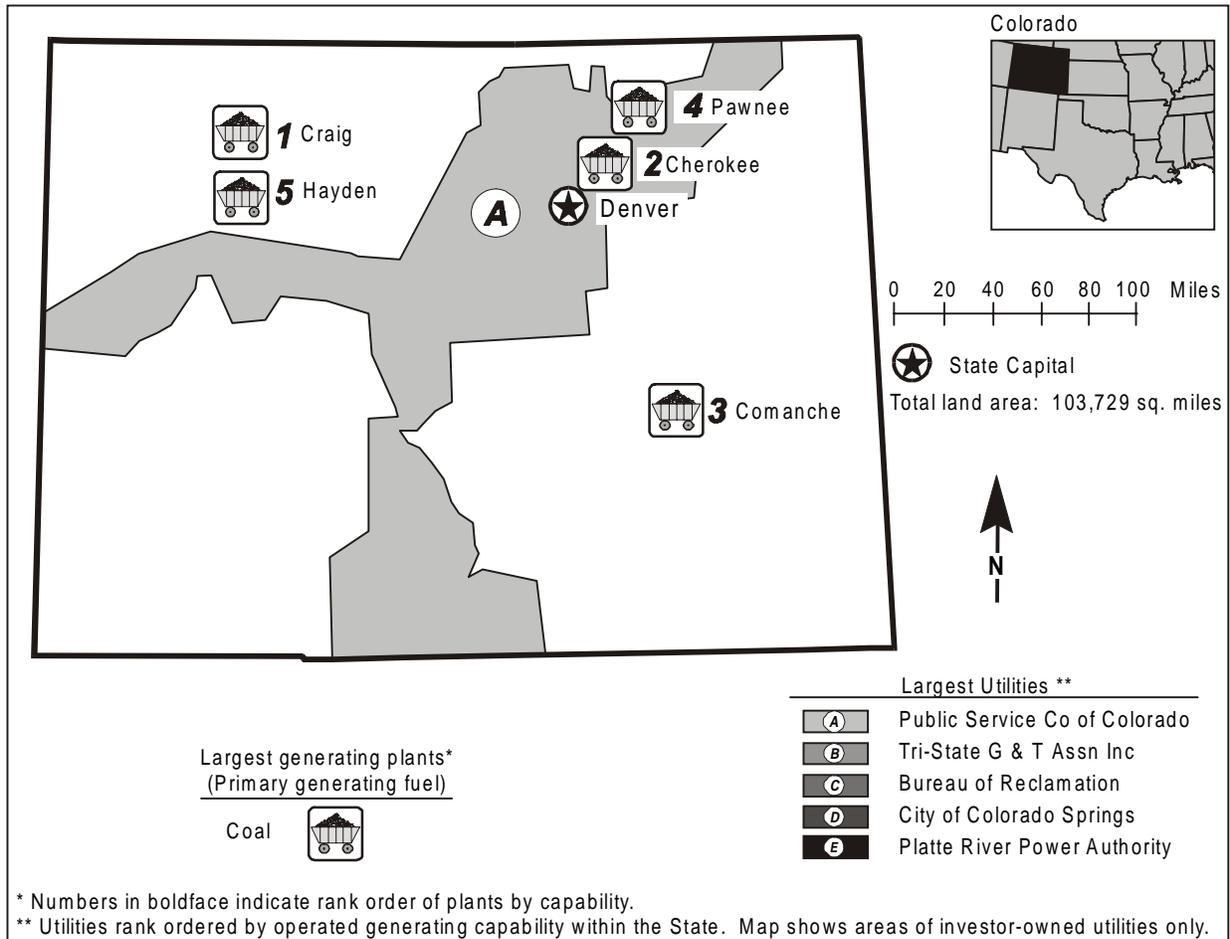


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		WSCC	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	6,794	33
State Primary Generating Fuel		Coal	Generation (MWh)	33,971,688	30
Population (as of 7/96)	3,816,179	25	Average Age of Coal Plants	22 years	
Average Revenue (cents/kWh)	6.05	^a 21	Average Age of Oil-fired Plants	24 years	
Industry			Average Age of Gas-fired Plants	26 years	
Capability (MWe)	7,462	^b 30	Average Age of Nuclear Plants	--	
Generation (MWh)	37,161,443	^b 29	Average Age of		
Capability/person	1.96	^b 41	Hydroelectric Plants	31 years	
(KWe/person)			Average Age of Other Plants . . .	--	
Generation/person	9.74	^b 34	Nonutility^c		
(MWh/person)			Capability (MWe)	668	22
Sulfur Dioxide Emissions			Percentage Share of Capability	9.0	18
(Thousand Short Tons)	96	30	Generation (MWh)	3,189,755	25
Nitrogen Oxide Emissions			Percentage Share of Generation	8.6	20
(Thousand Short Tons)	147	23	-- = Not applicable.		
Carbon Dioxide Emissions					
(Thousand Short Tons)	38,013	26			
Sulfur Dioxide/sq. mile (Tons)	0.93	40			
Nitrogen Oxides/sq. mile (Tons)	1.42	38			
Carbon Dioxide/sq. mile (Tons)	366.46	40			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Craig	Coal	Tri-State G & T Assn Inc	1,264
2. Cherokee	Coal	Public Service Co of Colorado	729
3. Comanche	Coal	Public Service Co of Colorado	660
4. Pawnee	Coal	Public Service Co of Colorado	495
5. Hayden	Coal	Public Service Co of Colorado	446

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Public Service Co of Colorado ...	3,599	2,821	36	375	--	367
B. Tri-State G & T Assn Inc	1,464	1,364	100	--	--	--
C. Bureau of Reclamation	733	--	--	--	--	733
D. City of Colorado Springs	540	467	--	67	--	6
E. Platte River Power Authority	262	262	--	--	--	--
Total	6,598	4,914	136	442	--	1,106
Percentage of Industry Capability	88.4	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

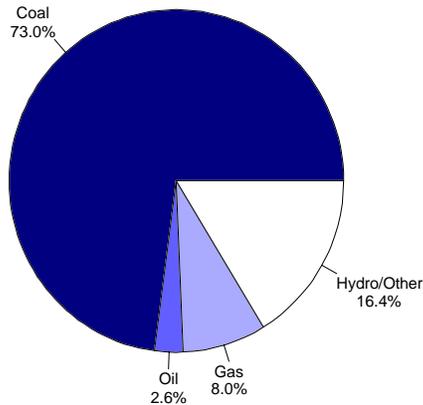


Figure 2. Utility Generation by Primary Energy Source, 1996

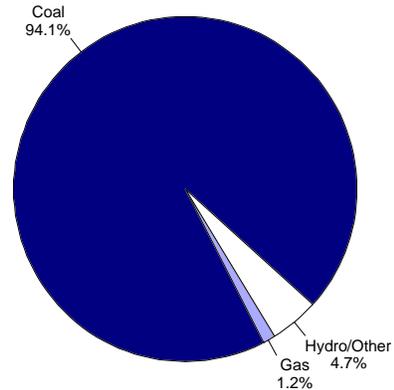


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

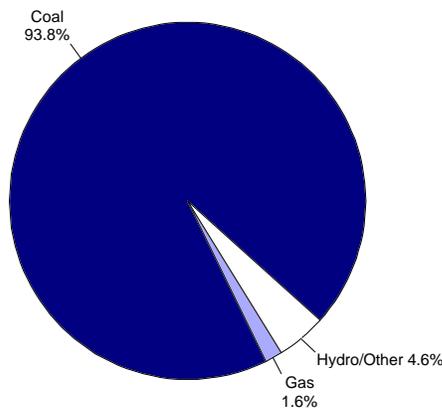


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	4,867	4,944	4,961	68.9	71.9	66.5
Oil	428	221	177	6.1	3.2	2.4
Gas	497	387	542	7.0	5.6	7.3
Nuclear	200	--	--	2.8	--	--
Hydro/Other	1,021	1,057	1,115	14.5	15.4	14.9
Total Utility	7,013	6,610	6,794	99.3	96.2	91.0
Total Nonutility	51	263	668	0.7	3.8	9.0
Industry	7,064	6,873	7,462	100.0	100.0	100.0

-- = Not applicable.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	25,629,652	28,922,906	31,952,337	89.5	89.9	86.0
Oil	23,274	37,883	15,539	0.1	0.1	0.0
Gas	309,496	414,689	418,925	1.1	1.3	1.1
Nuclear	52,007	--	--	0.2	--	--
Hydro/Other	2,267,092	1,662,753	1,584,887	7.9	5.2	4.3
Total Utility	28,281,521	31,038,231	33,971,688	98.8	96.5	91.4
Total Nonutility	345,320	1,142,242	3,189,755	1.2	3.5	8.6
Industry	28,626,841	32,180,473	37,161,443	100.0	100.0	100.0

-- = Not applicable.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.276	0.305	0.334	88.4	87.4	84.6
Oil	0.001	(s)	(s)	0.2	0.1	0.1
Gas	0.005	0.006	0.006	1.5	1.7	1.4
Nuclear	0.001	--	--	0.2	--	--
Hydro/Other	0.024	0.017	0.016	7.6	4.9	4.1
Total Utility	0.306	0.329	0.356	97.9	94.2	90.2
Total Nonutility	0.007	0.020	0.039	2.1	5.8	9.8
Industry	0.313	0.349	0.395	100.0	100.0	100.0

-- = Not applicable. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

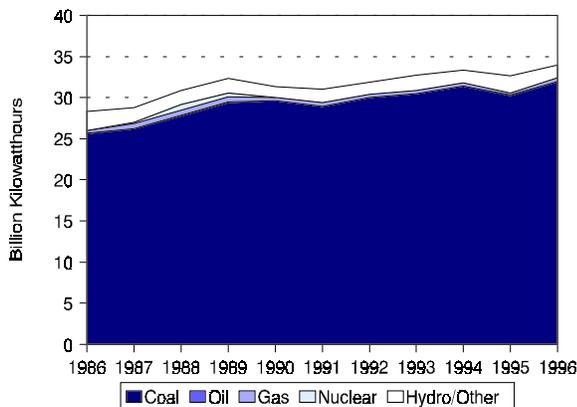


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996

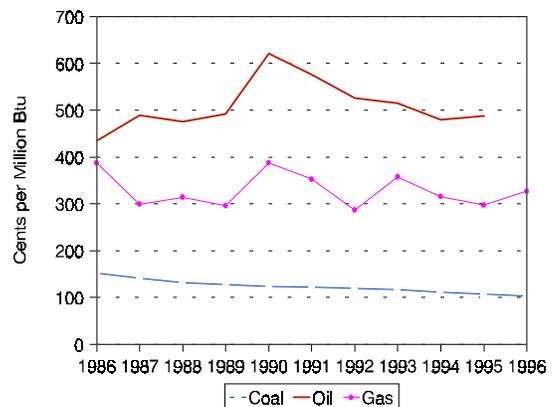


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	151.7	122.1	102.6	-3.8
Oil	434.8	576.1	--	--
Gas	387.6	241.6	209.8	-6.0

-- = Not applicable.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	76	87	96	2.4
Nitrogen Oxides ^d . .	132	139	147	1.1
Carbon Dioxide ^d . .	29,327	33,789	38,013	2.6

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

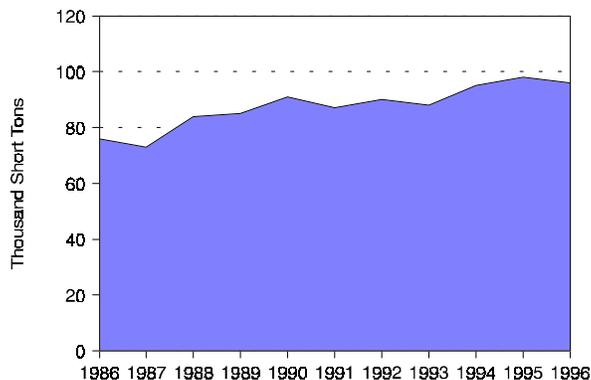


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

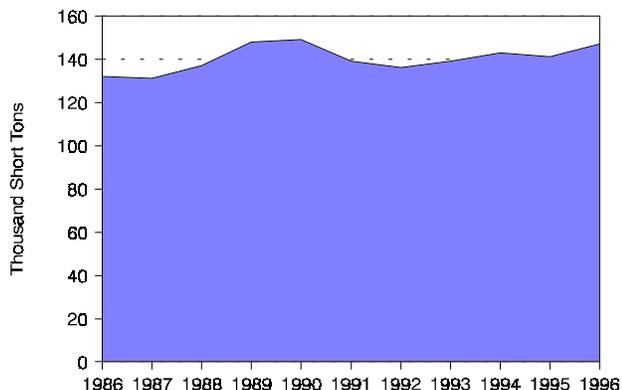


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

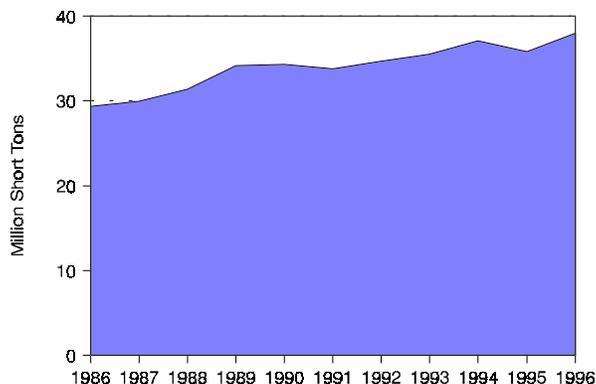


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	8,862,719	10,099,387	11,870,577	3.0	32.6	32.1	32.0
Commercial . .	11,535,371	13,741,501	14,239,275	2.1	42.5	43.7	38.4
Industrial . . .	5,848,193	6,748,179	9,947,015	5.5	21.5	21.5	26.8
Other	914,704	867,621	1,016,108	1.1	3.4	2.8	2.7
Total	27,160,985	31,456,688	37,072,975	3.2	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

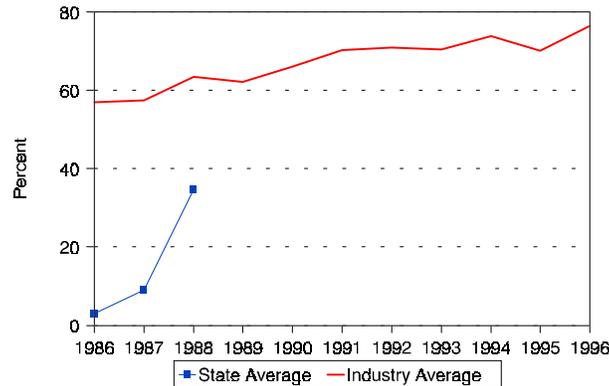


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	3	30	1	26	60
Number of Retail Customers	994,156	269,510	17	273,840	1,537,523
Retail Sales (MWh)	17,584,724	4,401,306	24,356	5,150,599	27,160,985
Percentage of Retail Sales	64.7	16.2	0.1	19.0	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,362,698	275,193	611	463,668	2,102,348
Percentage of Revenue	64.8	13.1	(s)	22.1	100.0
1991					
Number of Utilities	3	29	1	26	59
Number of Retail Customers	1,107,433	284,580	15	307,636	1,699,664
Retail Sales (MWh)	20,002,998	5,318,872	62,255	6,072,563	31,456,688
Percentage of Retail Sales	63.6	16.9	0.2	19.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,325,175	302,287	827	476,503	2,104,895
Percentage of Revenue	63.0	14.4	(s)	22.6	100.0
1996					
Number of Utilities	2	29	1	26	58
Number of Retail Customers	1,195,164	316,383	7	374,347	1,885,901
Retail Sales (MWh)	23,023,230	6,438,507	87,726	7,523,512	37,072,975
Percentage of Retail Sales	62.1	17.4	0.2	20.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,396,611	344,608	1,518	501,023	2,243,760
Percentage of Revenue	62.2	15.4	0.1	22.3	100.0

(s) = Nonzero percentage less than 0.05.

Connecticut

The Connecticut General Assembly gave a charter to the Hartford Electric Light Company in April 1881. The first hydroelectric station in the East was built in 1890 on the Farmington River near Poquonock.¹ Today, most of Connecticut's electricity is generated at nuclear plants; the largest plant in the State, Millstone, is a nuclear plant. Connecticut's largest utility is the Northeast Nuclear Energy Company, which operates the Millstone plant. Connecticut is also very reliant on oil-fired generation. The State had one of the Nation's highest levels of nonutility generation in 1996, at 22 percent. The average price of electricity in Connecticut, 10.51 cents per kilowatt-hour, was fourth highest in the Nation.

In 1996, Connecticut's electricity generator emissions of sulfur dioxide (SO₂) and nitrogen oxides (NO_x) ranked forty-second highest and emissions of carbon dioxide (CO₂) ranked forty-first highest nationally. However, the concentration levels per square mile were higher due to its small size. These rankings were nineteenth, sixteenth, and tenth, respectively, for SO₂, NO_x, and CO₂. It is likely that Connecticut will need to design a State implementation plan (SIP) for reducing ground-level ozone in response to a proposal released by the Environmental Protection Agency (EPA) in October 1998. The EPA proposal does not mandate which sources must reduce pollution. However, EPA states that utilities would be one of the most likely sources of NO_x emissions reductions. Connecticut is also part of the Ozone Transport Commission (OTC).² Each of the 13 OTC members is responsible for enacting regulations in order to achieve region-wide NO_x reductions in a consistent, enforceable manner and for allocating its NO_x Budget Program allowances among NO_x sources in the State. The targets in this program are large industrial boilers and all electricity generating facilities with a rated output of 15 megawatts or more.

In 1986, oil-fired utility capability represented well over two-fifths of Connecticut's total generating capability and over a third of total net generation. In 1996, the oil share of capability fell to just over two-fifths while the net generation share fell to just over a quarter. The nonutility share of net generation climbed from under 1 percent of the total in 1986 to over 20 percent in 1996.

In 1986, utility nuclear net capability and generation were 45.1 percent and 57.6 percent, respectively. By 1996, nuclear shares had fallen to 37.7 percent and 30.8 percent, respectively. The steep decline in nuclear generation was the result of the permanent shutdown of the Connecticut Yankee Atomic Power Company's Haddam Neck plant and the shutdown of the Northeast Nuclear Energy Company's (NEC) Millstone plant in 1995. NEC has recently restarted Millstone 3 and is currently working on restarting Millstone 2. The company, however, has decided to permanently shut down its 660 MWe Millstone Unit 1. The company will proceed with decommissioning Unit 1 upon receiving regulatory approval.³ The cost of decommissioning the unit is expected to be \$640 million (1997 dollars).

Connecticut has been one of the leaders in the move toward a deregulated environment for electricity. In April 1998, legislation was signed by the governor. The law allows retail competition for generation suppliers for 35 percent of consumers by January 2000 and for all consumers by July 2000. Utilities will be required to sell non-nuclear generation assets by January 2000 and nuclear assets by January 2004, making Connecticut the first State to require divestiture of nuclear assets. The bill also provides for the creation of an independent system operator, public interest program funding, renewable energy funding, environmental protections, and a 20 percent rate reduction beginning in January 2000.³

¹ Glenn Weaver, *The Hartford Electric Light Company*, The Hartford Electric Light Company (Hartford, CT, 1969), p. 65.

² The Ozone Transport Region comprises the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Delaware, the northern counties of Virginia, and the District of Columbia.

³ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

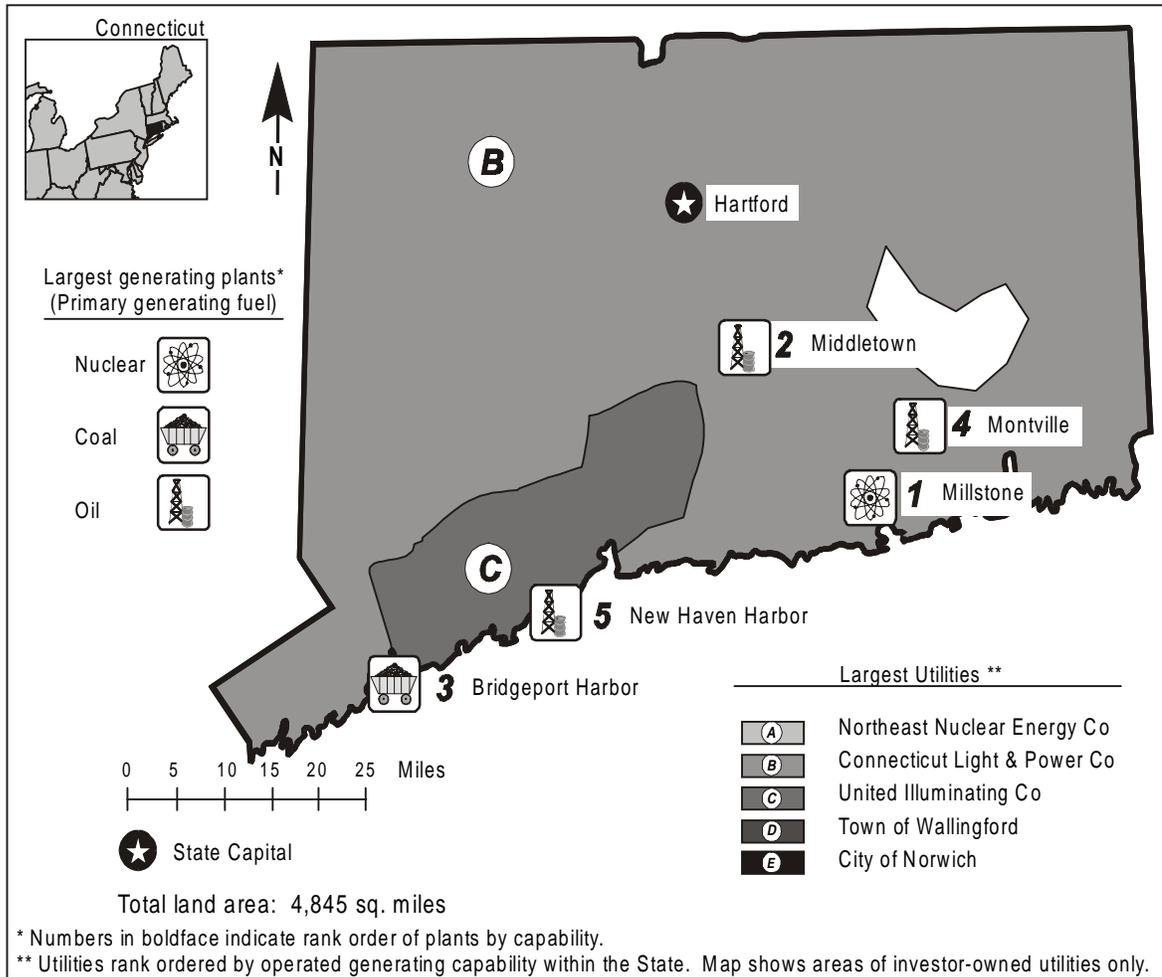


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		NPCC	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	6,321	34
State Primary Generating Fuel		Nuclear	Generation (MWh)	15,773,738	41
Population (as of 7/96)	3,267,293	28	Average Age of Coal Plants	28 years	
Average Revenue (cents/kWh)	10.51	^a 48	Average Age of Oil-fired Plants	29 years	
Industry			Average Age of Gas-fired Plants	22 years	
Capability (MWe)	6,982	^b 31	Average Age of Nuclear Plants	17 years	
Generation (MWh)	20,211,086	^b 35	Average Age of		
Capability/person			Hydroelectric Plants	63 years	
(KWe/person)	2.14	^b 35	Average Age of Other Plants . . .	--	
Generation/person			Nonutility^c		
(MWh/person)	6.19	^b 42	Capability (MWe)	661	23
Sulfur Dioxide Emissions	37		Percentage Share of Capability	9.5	16
(Thousand Short Tons)		42	Generation (MWh)	4,437,348	18
Nitrogen Oxide Emissions	25		Percentage Share of		
(Thousand Short Tons)		42	Generation	22.0	9
Carbon Dioxide Emissions			-- = Not applicable.		
(Thousand Short Tons)	13,214	41			
Sulfur Dioxide/sq. mile (Tons)	7.64	19			
Nitrogen Oxides/sq. mile (Tons)	5.16	16			
Carbon Dioxide/sq. mile (Tons)	2,727.35	10			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Millstone	Nuclear	Northeast Nuclear Energy Co	2,631
2. Middletown	Oil	Connecticut Light & Power Co	837
3. Bridgeport Harbor	Coal/Oil	United Illuminating Co	654
4. Montville	Oil	Connecticut Light & Power Co	489
5. New Haven Harbor	Oil	United Illuminating Co	447

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Northeast Nuclear Energy Co . . .	2,631	--	--	--	2,631	--
B. Connecticut Light & Power Co . . .	2,451	--	1,988	338	--	125
C. United Illuminating Co	1,174	385	789	--	--	--
D. Town of Wallingford	23	--	23	--	--	--
E. City of Norwich	18	--	15	--	--	3
Total	6,297	385	2,815	338	2,631	128
Percentage of Industry Capability	90.2	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

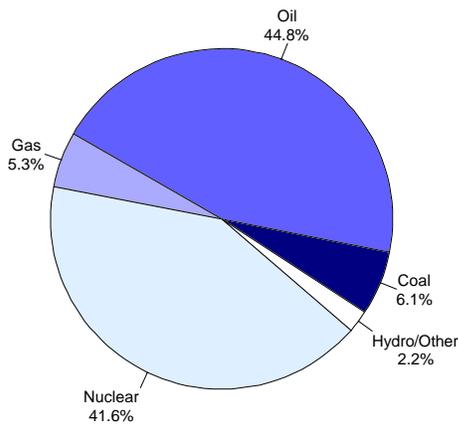


Figure 2. Utility Generation by Primary Energy Source, 1996

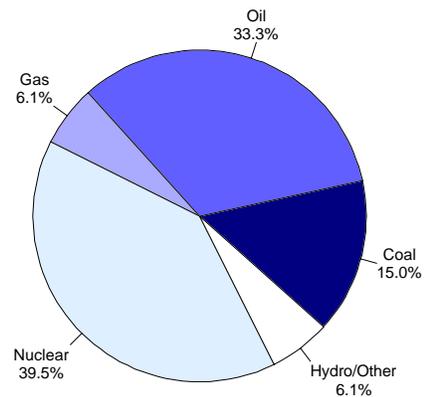


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

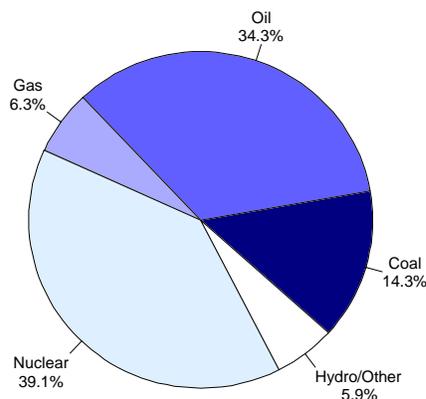


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	375	385	385	5.3	5.1	5.5
Oil	3,347	3,263	2,831	46.9	42.9	40.5
Gas	(s)	(s)	338	--	--	4.8
Nuclear	3,222	3,212	2,631	45.1	42.2	37.7
Hydro/Other	141	201	136	2.0	2.6	1.9
Total Utility	7,085	7,060	6,321	99.3	92.8	90.5
Total Nonutility Industry	53	549	661	0.7	7.2	9.5
	7,138	7,609	6,982	100.0	100.0	100.0

(s) = Nonzero value less than 0.05. -- = Not applicable.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	1,985,418	2,117,781	2,367,889	6.1	7.8	11.7
Oil	11,103,042	7,890,483	5,255,050	34.2	29.2	26.0
Gas	65,007	467,997	958,819	0.2	1.7	4.7
Nuclear	18,667,143	12,242,911	6,225,233	57.6	45.3	30.8
Hydro/Other	367,061	832,910	966,747	1.1	3.1	4.8
Total Utility	32,187,671	23,552,082	15,773,738	99.3	87.2	78.0
Total Nonutility Industry	234,895	3,456,157	4,437,348	0.7	12.8	22.0
	32,422,566	27,008,239	20,211,086	100.0	100.0	100.0

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.020	0.022	0.024	5.3	7.5	10.5
Oil	0.116	0.082	0.058	30.5	27.9	25.1
Gas	0.001	0.005	0.011	0.2	1.6	4.6
Nuclear	0.202	0.131	0.066	53.1	44.4	28.6
Hydro/Other	0.004	0.009	0.010	1.0	2.9	4.3
Total Utility	0.342	0.250	0.169	90.1	84.4	73.0
Total Nonutility Industry	0.037	0.046	0.062	9.9	15.6	27.0
	0.379	0.296	0.231	100.0	100.0	100.0

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

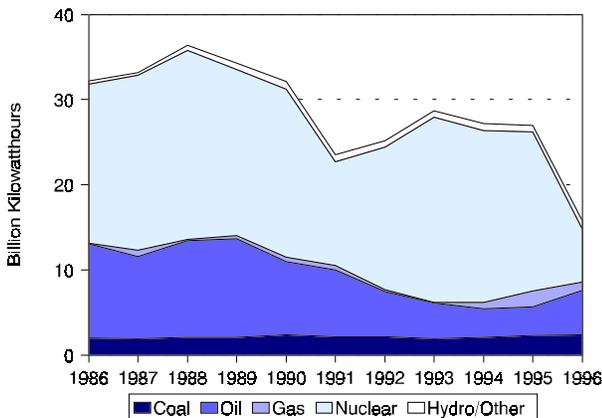


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

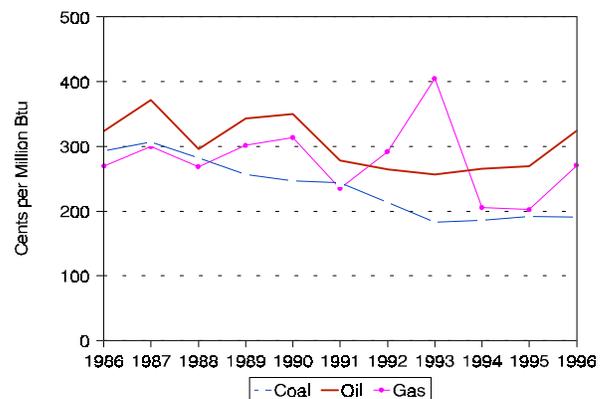


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Growth Rate 1986-1996 (Percent)
Coal	293.2	243.4	191.0	-4.2
Oil	323.8	278.1	324.1	(s)
Gas	269.7	235.0	270.7	(s)

(s) = Nonzero percentage less than 0.05.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	58	51	37	-4.4
Nitrogen Oxides ^d . .	20	29	25	2.3
Carbon Dioxide ^d . .	11,694	14,158	13,214	1.2

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

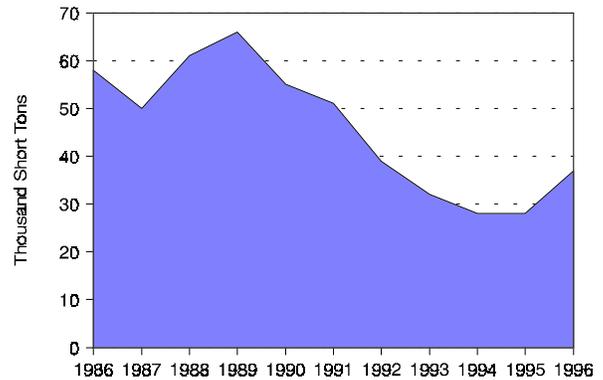


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

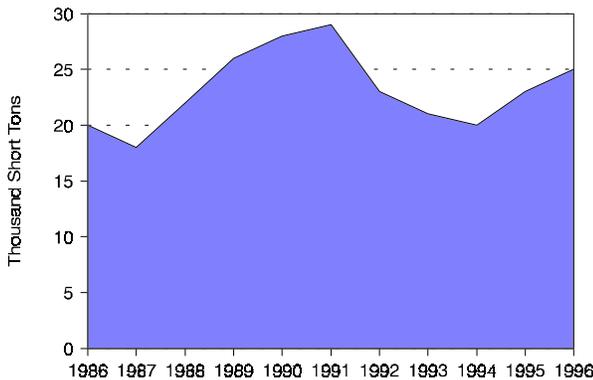


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

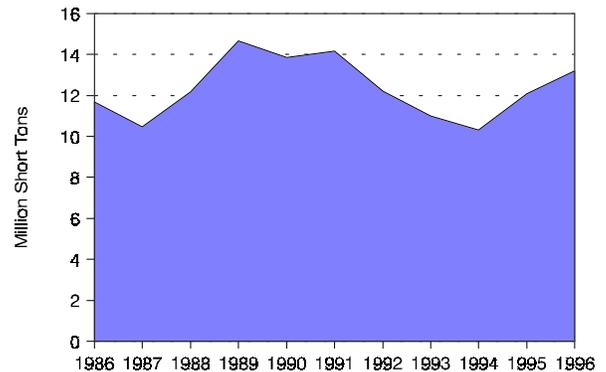


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	9,080,279	10,440,510	10,942,903	1.9	37.0	38.4	38.5
Commercial . .	8,886,191	10,544,097	11,171,958	2.3	36.2	38.8	39.3
Industrial . . .	6,178,081	5,822,464	5,928,241	-0.4	25.2	21.4	20.9
Other	381,084	364,334	373,843	-0.2	1.6	1.3	1.3
Total	24,525,637	27,171,405	28,416,945	1.5	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

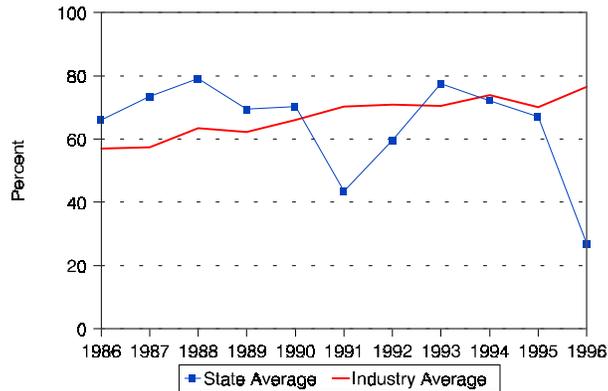


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	5	6	--	--	11
Number of Retail Customers	1,281,877	59,063	--	--	1,340,940
Retail Sales (MWh)	23,152,716	1,372,921	--	--	24,525,637
Percentage of Retail Sales	94.4	5.6	--	--	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,525,996	126,289	--	--	2,652,286
Percentage of Revenue	95.2	4.8	--	--	100.0
1991					
Number of Utilities	5	6	--	--	11
Number of Retail Customers	1,377,818	62,910	--	--	1,440,728
Retail Sales (MWh)	25,625,915	1,545,490	--	--	27,171,405
Percentage of Retail Sales	94.3	5.7	--	--	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,789,614	142,866	--	--	2,932,480
Percentage of Revenue	95.1	4.9	--	--	100.0
1996					
Number of Utilities	3	7	--	--	10
Number of Retail Customers	1,409,794	68,373	--	--	1,478,167
Retail Sales (MWh)	26,597,120	1,819,825	--	--	28,416,945
Percentage of Retail Sales	93.6	6.4	--	--	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,850,933	136,489	--	--	2,987,422
Percentage of Revenue	95.4	4.6	--	--	100.0

-- = Not applicable.

Delaware

Delaware led the Nation in electric generator emissions of sulfur dioxide (SO₂) per square mile in 1996 and ranked second in emissions of carbon dioxide (CO₂) per square mile. In 1996, Delaware had both the forty-sixth largest population and utility generating capability. Most of the electricity in the State is generated at coal-fired plants. The largest plant in the State, Indian River, is coal-fired. The State is also reliant on oil-fired and gas-fired power. There are no nuclear generators in the State. The largest utility is the Delmarva Power and Light Company (DPLC), a member of the PJM power pool, which covers portions of Pennsylvania, New Jersey, Maryland, Virginia, and Delaware. The average price of electricity, 6.88 cents per kilowatthour, ranked as nineteenth most expensive in the Nation.

Four of the five largest plants in the State are operated by DPLC. DPLC is by far the largest electric power entity in the State; the company operates 91.7 percent of the utility capability and 84.8 percent of the total generating capability in the State. McKee Run, operated by the City of Dover, is the only plant among the five largest in the State that is not operated by DPLC. The second, third and fifth largest plants are located in the extreme north of the State in the vicinity of Wilmington, Delaware's largest city. The refineries of Philadelphia are not far away from these plants, two of which are oil-fired. Indian River, the largest plant, is in the extreme south of the State, near the beach resorts of Delaware and Maryland.

Although Delaware had more SO₂ emissions per square mile than any other State, its total emissions were thirty-second highest in the United States. Concentrations of nitrogen oxides (NO_x) and CO₂ per square mile ranked third and second nationally. No Delaware units were mandated by Title IV of the Clean Air Act Amendments of 1990 to begin emissions reductions in 1995 as part of Phase I of the Environmental Protection Agency's (EPA's) Acid Rain Program. However, all fossil fuel-fired units (both utility and nonutility) will be required

to comply with the requirements of Phase II of the program which will commence on January 1, 2000.

It is likely that Delaware will need to design a State implementation plan (SIP) for reducing ground-level ozone in response to a proposal released by the EPA in October 1998. The EPA SIP call proposal does not mandate which sources must reduce pollution. However, EPA states that utilities would be one of the most likely sources of NO_x emissions reductions. Delaware is also in the Ozone Transport Commission (OTC).¹ Each of the 13 OTC members is responsible for enacting regulations in order to achieve region-wide NO_x reductions in a consistent, enforceable manner and for allocating its NO_x Budget Program allowances among NO_x sources in the State. The targets in this program are large industrial boilers and all electricity generating facilities with a rated output of 15 megawatts or more. Delaware is one of seven States to have issued its final rule for the NO_x Budget Program.

In 1986, coal units represented just over half of Delaware's utility generating capability and nearly two-thirds of utility net generation. In 1996, the coal share of capability had fallen to just over two-fifths while the net generation share had fallen to just over half. In 1986, there was no utility gas capability or generation. By 1996, however, gas capability accounted for over a fifth of Delaware's utility capability and a third of its utility net generation as the Hay Road plant, the third largest in the State, came on line unit by unit from 1989 through 1993.

Delaware has not done as much as other States in moving toward a deregulated environment. Although the Public Service Commission has released a report with recommendations including unbundling of rates and stranded cost recovery, the legislature has not passed a restructuring bill. Most recently, a restructuring bill failed when the 1998 session ended in July. The issue is likely to come up again in the 1999 session.² Senator William Roth of Delaware has sponsored a bill in Congress that would give a large tax credit to power plants that burn chicken waste.

¹ The Ozone Transport Region comprises the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Delaware, the northern counties of Virginia, and the District of Columbia.

² Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

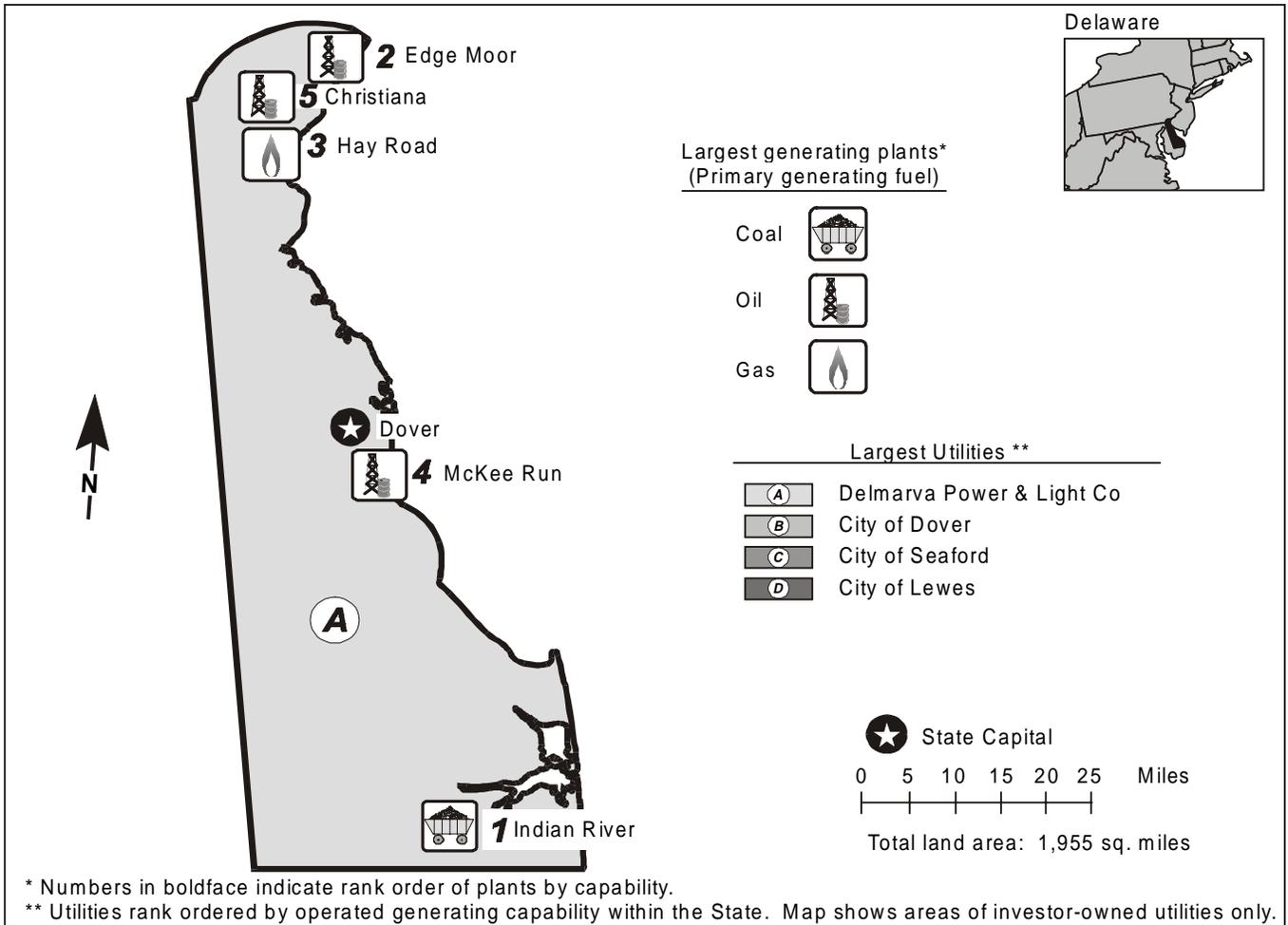


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		MACC	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	2,239	46
State Primary Generating Fuel		Coal	Generation (MWh)	8,121,853	45
Population (as of 7/96)	723,475	46	Average Age of Coal Plants	24 years	
Average Revenue (cents/kWh)	6.88	^a 33	Average Age of Oil-fired Plants	25 years	
Industry			Average Age of Gas-fired Plants	5 years	
Capability (MWe)	2,421	^b 40	Average Age of Nuclear Plants	--	
Generation (MWh)	8,854,448	^b 41	Average Age of		
Capability/person	3.35	^b 16	Hydroelectric Plants	--	
(KWe/person)			Average Age of Other Plants	--	
Generation/person	12.24	^b 26	Nonutility^c		
(MWh/person)			Capability (MWe)	182	38
Sulfur Dioxide Emissions			Percentage Share of Capability	7.5	21
(Thousand Short Tons)	78	32	Generation (MWh)	732,595	39
Nitrogen Oxide Emissions			Percentage Share of Generation	8.3	22
(Thousand Short Tons)	29	41			
Carbon Dioxide Emissions			-- = Not applicable.		
(Thousand Short Tons)	9,835	43			
Sulfur Dioxide/sq. mile (Tons)	39.90	1			
Nitrogen Oxides/sq. mile (Tons)	14.83	3			
Carbon Dioxide/sq. mile (Tons)	5,030.69	2			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Indian River	Coal	Delmarva Power & Light Co	760
2. Edge Moor	Oil/Coal	Delmarva Power & Light Co	699
3. Hay Road	Gas/Other	Delmarva Power & Light Co	511
4. McKee Run	Oil	City of Dover	136
5. Christiana	Oil	Delmarva Power & Light Co	45

Table 3. Top Four Utilities with Largest Generating Capability, and Type, Within the State, 1996 (Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Delmarva Power & Light Co	2,054	910	633	511	--	--
B. City of Dover	175	--	175	--	--	--
C. City of Seaford	8	--	8	--	--	--
D. City of Lewes	2	--	2	--	--	--
Total	2,239	910	818	511	--	--
Percentage of Industry Capability	92.5	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

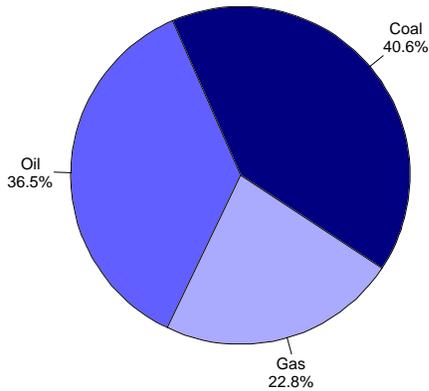


Figure 2. Utility Generation by Primary Energy Source, 1996

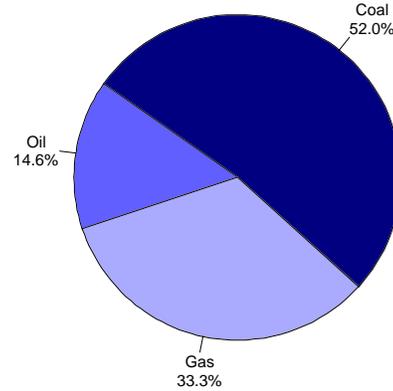


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

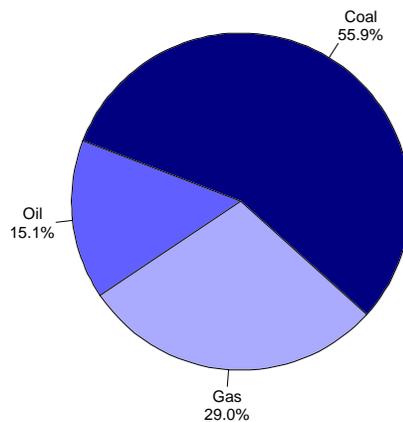


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	919	931	910	52.0	43.1	40.6
Oil	848	904	818	48.0	41.8	36.5
Gas	--	327	511	--	15.1	22.8
Nuclear	--	--	--	--	--	--
Hydro/Other	--	--	--	--	--	--
Total Utility	1,767	2,162	2,239	100.0	100.0	100.0
Total Nonutility	W	W	182	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	5,581,545	4,598,301	4,225,125	66.4	60.5	52.0
Oil	2,623,152	1,899,201	1,188,294	31.2	25.0	14.6
Gas	205,817	1,106,221	2,708,434	2.4	14.5	33.3
Nuclear	--	--	--	--	--	--
Hydro/Other	--	--	--	--	--	--
Total Utility	8,410,514	7,603,723	8,121,853	100.0	100.0	100.0
Total Nonutility	W	W	732,595	--	--	--

-- = Not applicable. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.063	0.058	0.047	71.3	63.6	55.9
Oil	0.024	0.018	0.013	26.6	19.5	15.1
Gas	0.002	0.015	0.024	2.1	16.9	29.0
Nuclear	--	--	--	--	--	--
Hydro/Other	--	--	--	--	--	--
Total Utility	0.089	0.092	0.083	100.0	100.0	100.0
Total Nonutility	W	W	0.020	--	--	--

-- = Not applicable. W = Withheld.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

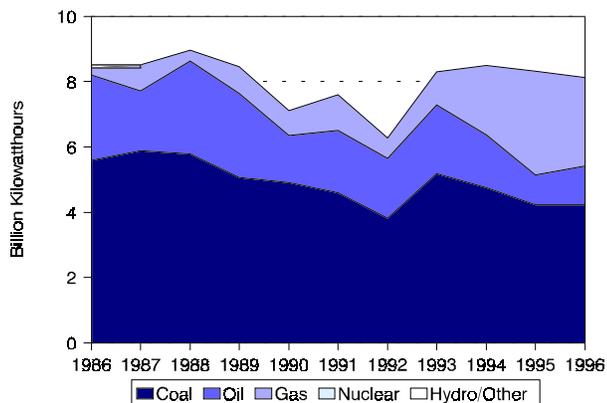


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

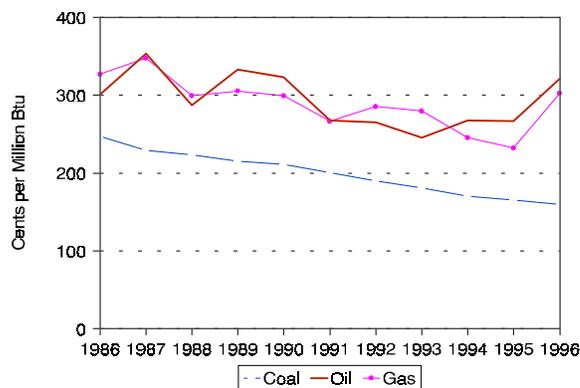


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	247.0	200.2	159.4	-4.3
Oil	301.0	267.4	321.2	0.7
Gas	326.9	266.3	302.5	-0.8

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	59	55	78	2.8
Nitrogen Oxides ^d . .	32	31	29	-1.0
Carbon Dioxide ^d . .	9,828	9,706	9,835	0.0

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

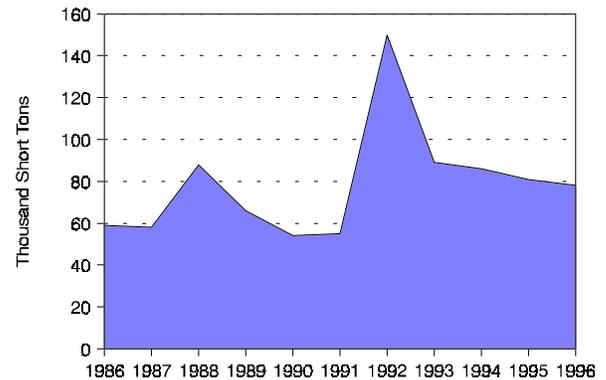


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

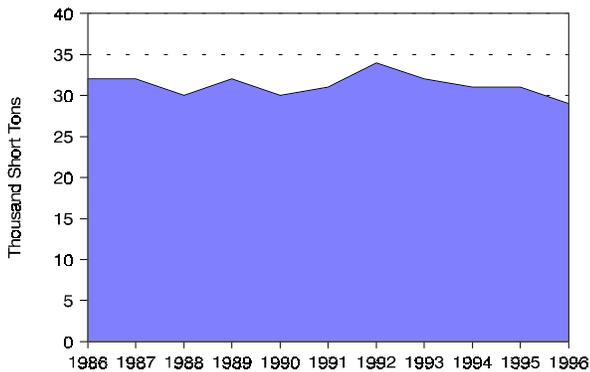


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

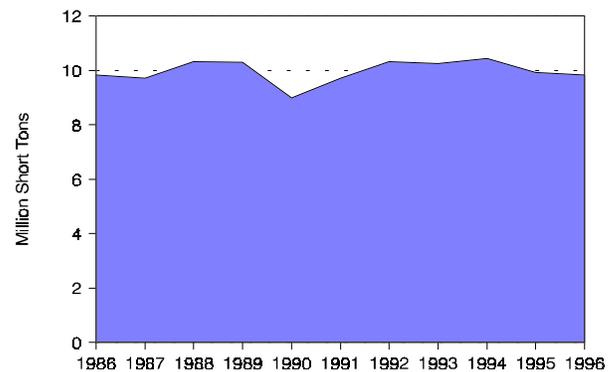


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential .	2,121,154	2,824,340	3,271,209	4.4	31.1	33.1	33.9
Commercial	1,818,581	2,419,529	2,910,775	4.8	26.6	28.3	30.2
Industrial . .	2,838,708	3,240,945	3,399,404	1.8	41.6	38.0	35.3
Other	45,820	51,050	59,312	2.6	0.7	0.6	0.6
Total	6,824,261	8,535,864	9,640,700	3.5	100.0	100.0	100.0

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	1	9	--	1	11
Number of Retail Customers	202,009	39,016	--	36,942	277,967
Retail Sales (MWh)	5,574,173	873,050	--	377,038	6,824,261
Percentage of Retail Sales	81.7	12.8	--	5.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	446,964	82,061	--	39,774	568,799
Percentage of Revenue	78.6	14.4	--	7.0	100.0
1991					
Number of Utilities	1	9	--	1	11
Number of Retail Customers	231,698	43,724	--	45,398	320,820
Retail Sales (MWh)	6,918,170	1,094,806	--	522,888	8,535,864
Percentage of Retail Sales	81.1	12.8	--	6.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	501,981	91,347	--	49,893	643,221
Percentage of Revenue	78.0	14.2	--	7.8	100.0
1996					
Number of Utilities	1	9	--	1	11
Number of Retail Customers	251,580	48,167	--	52,212	351,959
Retail Sales (MWh)	7,667,461	1,299,123	--	674,116	9,640,700
Percentage of Retail Sales	79.5	13.5	--	7.0	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	506,857	97,407	--	59,347	663,611
Percentage of Revenue	76.4	14.7	--	8.9	100.0

-- = Not applicable.

District of Columbia

The District of Columbia had both the second smallest population and second smallest utility capability in 1996. All of the electricity generated in the District is from two oil-fired plants, Benning, the largest, and Buzzard Point. Both plants are operated by the Potomac Electric Power Company and serve the utility as peaking units. The average price of electricity in the District, 7.35 cents per kilowatt-hour, was the Nation's fifteenth highest in 1996. The District of Columbia is a net importer of electricity.

Neither Benning nor Buzzard Point was designated by the Clean Air Act Amendments of 1990 as a unit mandated to begin sulfur dioxide (SO₂) and nitrogen oxides (NO_x) emissions reductions in 1995. However, it is likely that the D.C. government will need to design a State implementation plan (SIP) for reducing ground-level ozone in response to a proposal released by the Environmental Protection Agency (EPA) in October 1998. The EPA proposal does not mandate which sources must reduce pollution. However, EPA states that utilities would be one of the most likely sources of NO_x emissions reductions. The District of Columbia is also part of the Ozone Transport Commission (OTC).¹ Each of the thirteen OTC members is responsible for enacting regulations in order to achieve region-wide NO_x reductions in a consistent, enforceable manner and

for allocating its NO_x Budget Program allowances among NO_x sources in the State. The targets in this program are large industrial boilers and all electricity generating facilities with a rated output of 15 megawatts or more. As of November 1998, the District of Columbia had issued a draft rule for the NO_x Budget Program. The District's emissions of SO₂ and NO_x were the second lowest nationally and its emissions of carbon dioxide were the lowest in the Nation. The concentrations per square mile, were tenth, twenty-fourth, and twelfth highest, respectively, however, because of its size.

Both Benning and Buzzard Point sit on the eastern side of the Anacostia River. In 1986, these utility oil units represented 99.6 percent of total generating capability and all of the net generation in the District. In 1996, their shares of both capability and generation were 100 percent. In 1986, 0.4 percent of total capability was nonutility capability. Currently, there is no nonutility capability or generation in the District of Columbia.

The District of Columbia has not moved as quickly as some States toward competition. The Public Service Commission continues to study restructuring and issued a notice of inquiry for issues to investigate on retail competition. A report was to have been released in late 1998.²

¹ The Ozone Transport Region comprises the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Delaware, the northern counties of Virginia, and the District of Columbia.

² Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

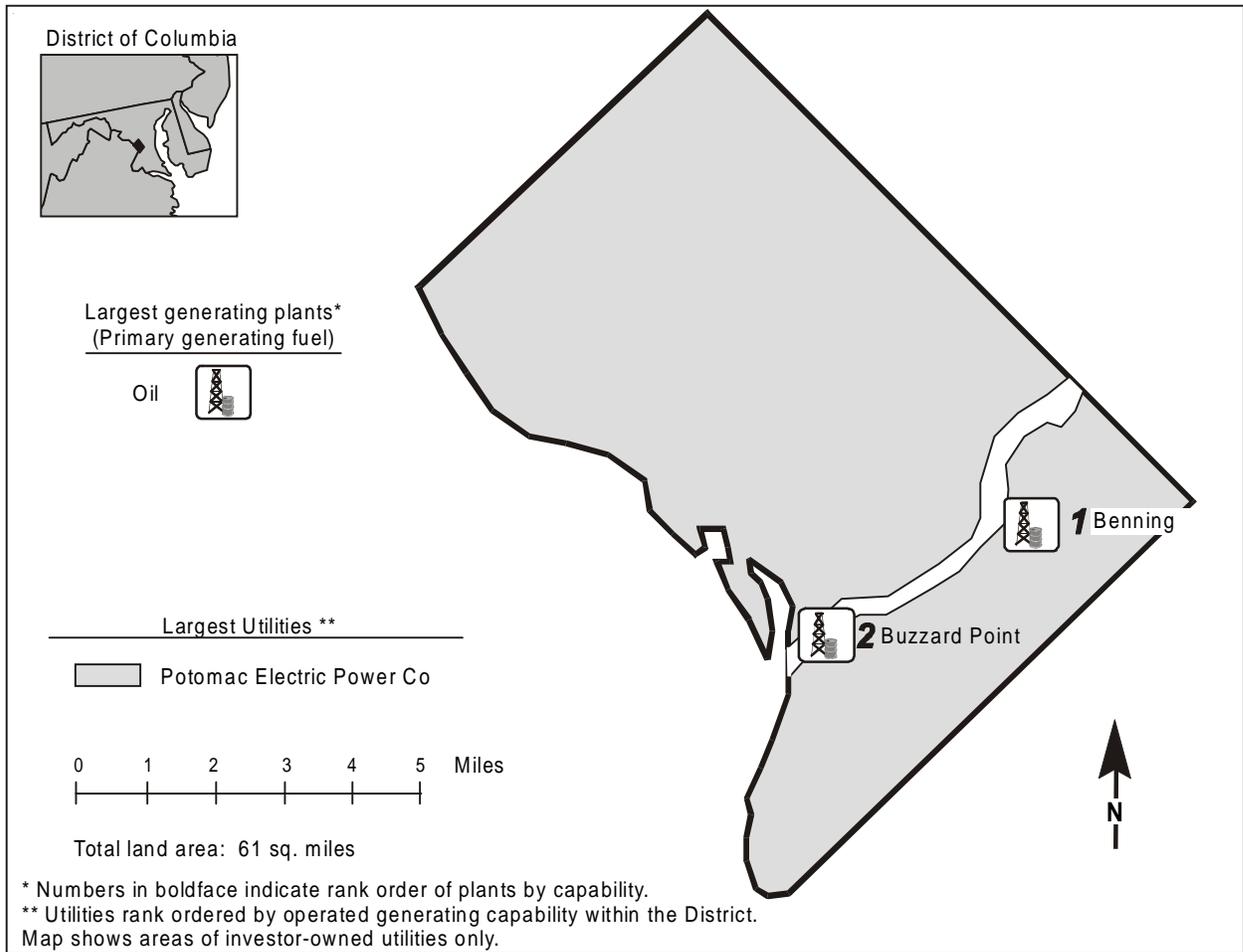


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		MAAC	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	806	50
Primary Generating Fuel		Oil	Generation (MWh)	109,809	51
Population (as of 7/96)	539,279	50	Average Age of Coal Plants	--	
Average Revenue (cents/kWh)	7.35	^a 37	Average Age of Oil-fired Plants	27 years	
Industry			Average Age of Gas-fired Plants	--	
Capability (MWe)	806	^b 45	Average Age of Nuclear Plants	--	
Generation (MWh)	109,809	^b 45	Average Age of Hydroelectric Plants	--	
Capability/person			Average Age of Other Plants	--	
(KWe/person)	1.49	^b 44	Nonutility ^c		
Generation/person			Capability (MWe)	--	45
(MWh/person)	0.20	^b 45	Percentage Share of Capability	--	45
Sulfur Dioxide Emissions	1	50	Generation (MWh)	--	45
(Thousand Short Tons)			Percentage Share of Generation	--	45
Nitrogen Oxide Emissions					
(Thousand Short Tons)	(s)	50	-- = Not applicable. (s) = Nonzero value less than 0.5.		
Carbon Dioxide Emissions					
(Thousand Short Tons)	154	51			
Sulfur Dioxide/sq. mile (Tons)	16.39	10			
Nitrogen Oxides/sq. mile (Tons)	0.00	24			
Carbon Dioxide/sq. mile (Tons)	2,524.59	12			

Table 2. Two Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Benning	Oil	Potomac Electric Power Co	550
2. Buzzard Point	Oil	Potomac Electric Power Co	256

Table 3. Utility Generating Capability and Type, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Potomac Electric Power Co	806	--	806	--	--	--
Total	806	--	806	--	--	--
Percentage of Industry Capability	100.0	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

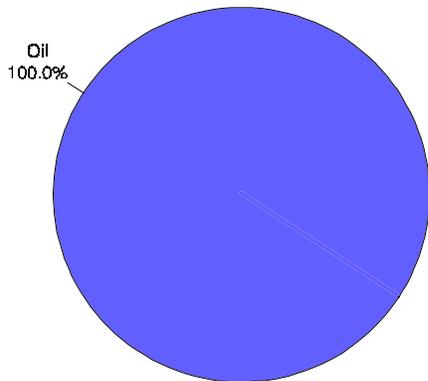


Figure 2. Utility Generation by Primary Energy Source, 1996

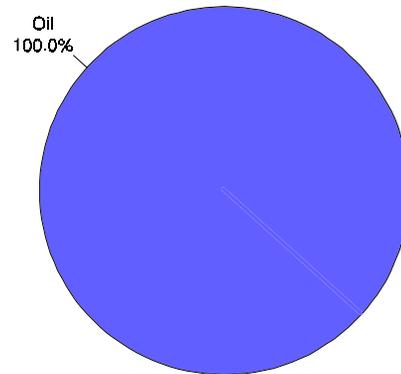


Figure 3. Energy Consumed at the Electric Utility by Primary Energy Source, 1996

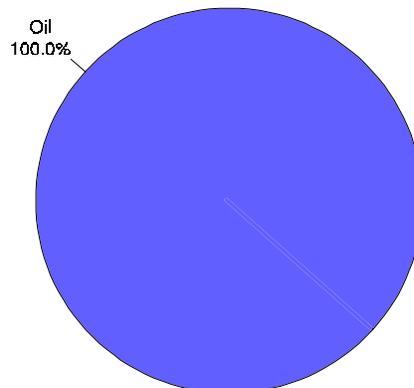


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	806	806	806	99.6	99.6	100.0
Gas	--	--	--	--	--	--
Nuclear	--	--	--	--	--	--
Hydro/Other	--	--	--	--	--	--
Total Utility	806	806	806	99.6	99.6	100.0
Total Nonutility	3	3	--	0.4	0.4	--
Industry	809	809	806	100.0	100.0	100.0

-- = Not applicable.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	165,000	179,814	109,809	100.0	100.0	100.0
Gas	--	--	--	--	--	--
Nuclear	--	--	--	--	--	--
Hydro/Other	--	--	--	--	--	--
Total Utility	165,000	179,814	109,809	100.0	100.0	100.0
Total Nonutility	--	--	--	--	--	--
Industry	165,000	179,814	109,809	100.0	100.0	100.0

-- = Not applicable.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	0.003	0.003	0.002	100.0	100.0	100.0
Gas	--	--	--	--	--	--
Nuclear	--	--	--	--	--	--
Hydro/Other	--	--	--	--	--	--
Total Utility	0.003	0.003	0.002	100.0	100.0	100.0
Total Nonutility	--	--	--	--	--	--
Industry	0.003	0.003	0.002	100.0	100.0	100.0

-- = Not applicable.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

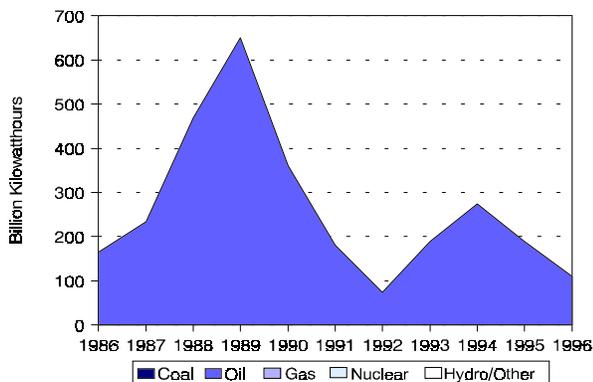


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

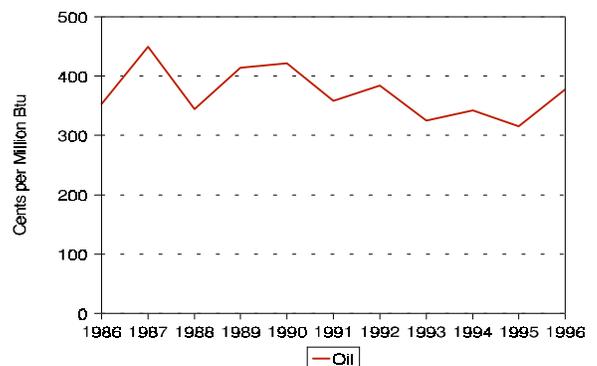


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	--	--	--	--
Oil	352.9	358.2	378.2	0.7
Gas	--	--	--	--

-- = Not applicable.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	2	2	1	-6.7
Nitrogen Oxides ^d ...	(s)	(s)	(s)	--
Carbon Dioxide ^d ...	253	251	154	-4.8

-- = Not applicable. (s) = Nonzero value less than 0.05.

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

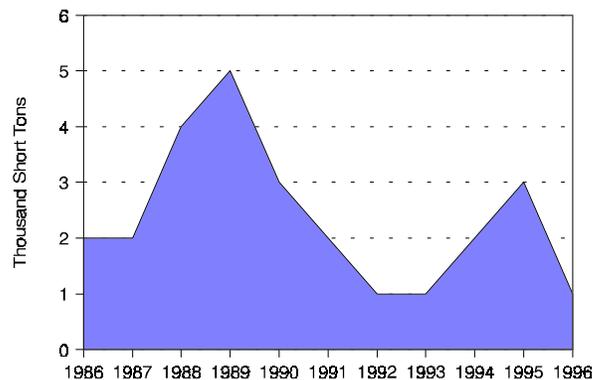


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

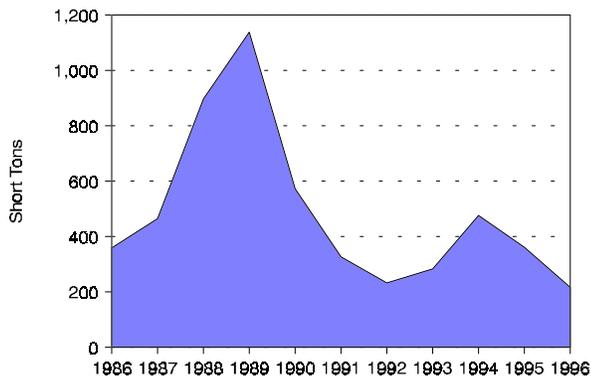


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

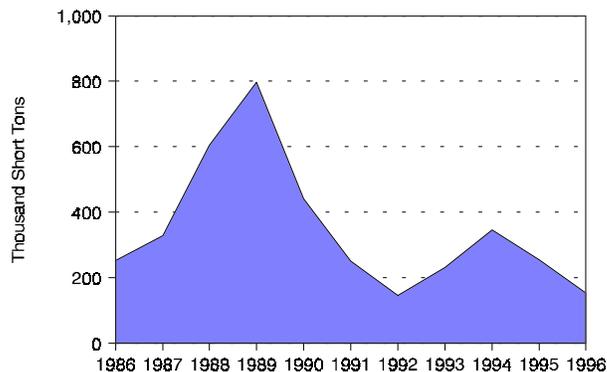


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	1,331,502	1,580,079	1,614,293	1.9	15.5	15.5	15.9
Commercial .	4,344,515	5,238,080	7,904,611	6.2	50.6	51.4	78.0
Industrial ...	2,605,645	3,053,128	251,644	-20.8	30.3	29.9	2.5
Other	306,608	323,876	366,119	1.8	3.6	3.2	3.6
Total	8,588,270	10,195,163	10,136,667	1.7	100.0	100.0	100.0

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	1	--	--	--	1
Number of Retail Customers	208,271	--	--	--	208,271
Retail Sales (MWh)	8,588,270	--	--	--	8,588,270
Percentage of Retail Sales	100.0	--	--	--	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	757,849	--	--	--	757,849
Percentage of Revenue	100.0	--	--	--	100.0
1991					
Number of Utilities	1	--	--	--	1
Number of Retail Customers	219,971	--	--	--	219,971
Retail Sales (MWh)	10,195,163	--	--	--	10,195,163
Percentage of Retail Sales	100.0	--	--	--	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	716,584	--	--	--	716,584
Percentage of Revenue	100.0	--	--	--	100.0
1996					
Number of Utilities	1	--	--	--	1
Number of Retail Customers	218,979	--	--	--	218,979
Retail Sales (MWh)	10,136,667	--	--	--	10,136,667
Percentage of Retail Sales	100.0	--	--	--	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	744,568	--	--	--	744,568
Percentage of Revenue	100.0	--	--	--	100.0

-- = Not applicable.

Florida

Florida had the fourth largest population and the third largest utility generating capability in 1996. The largest portion of electricity generated in Florida comes from coal-fired plants. Florida is also very reliant on nuclear power and power from oil-fired and gas-fired plants. Two of the three largest plants in the State, Crystal River and Turkey Point, have nuclear generating capability. The largest utility in the State is the Florida Power and Light Company, which operates three of the State's five largest plants. Florida has an insignificant amount of hydropower capability and generation. The average price of electricity, 7.18 cents per kilowatt-hour, was sixteenth most expensive in the Nation. Florida is a net importer of electricity although it is a long peninsula with significant population centers at the southern end, making importing opportunities limited.

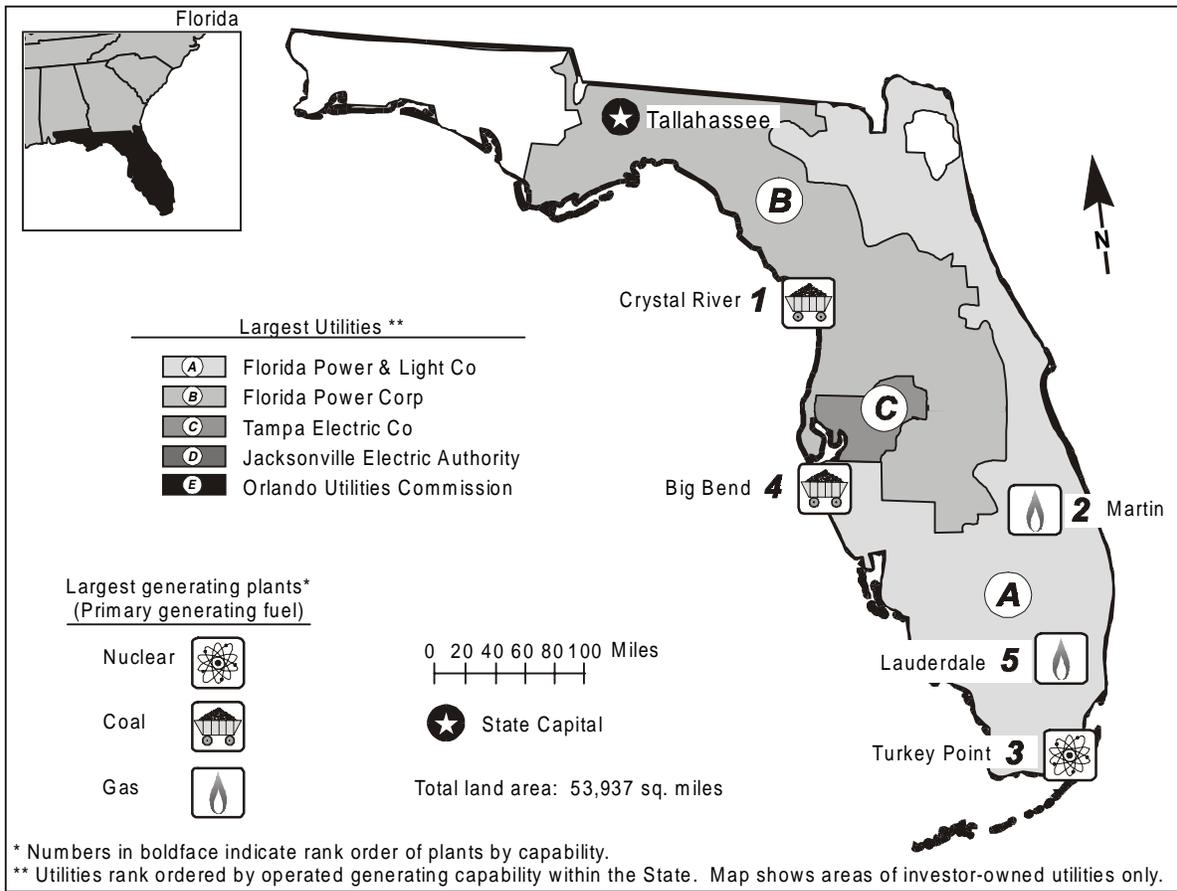
The Clean Air Act Amendments of 1990 specified a number of utility plants to begin compliance with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x) in 1995. These plants included 2,286 megawatts of nameplate capacity at Gulf Power's Crist plant and the Tampa Electric Company's Big Bend plant. Emissions of SO₂ from Florida electric power generation rose from 1986 to 1991, but declined from 1991 to 1996. Both emissions of NO_x and carbon dioxide (CO₂), however, increased over both periods. Florida's SO₂, NO_x, and CO₂ emissions were all among the top 7 nationally in 1996. Its concentration rankings were all also high, among the top 12. Although Florida participated in the Ozone Transport Assessment Group process like all the other States east of the Rocky Mountains, Florida generators are not subject to the recently announced proposal from the Environmental

Protection Agency (EPA) requiring submission of State implementation plans to address the regional transport of ground-level ozone. However, Florida fossil-fuel fired units will be subject to emissions reductions requirements of Phase II of EPA's Acid Rain Program, which takes effect on January 1, 2000.

Florida Power's Crystal River, a nuclear and coal facility, the largest in the State, is on the Gulf Coast north of Tampa. The three Florida Power and Light plants mentioned earlier are all in South Florida on the Atlantic coast. Two, Lauderdale and Martin, are primarily gas units, while Turkey Point is a nuclear plant. The Tampa Electric Company operates Florida's fourth largest plant, Big Bend, a coal plant. In 1986, Florida's utility coal plants represented over a quarter of Florida's generating capability and over a third of its net generation. In 1996, the coal share of capability declined slightly while the net generation share rose slightly. Utility nuclear capability and generation as shares of the State's totals both declined over the same period. Utility oil capability and net generation, on the other hand, were just over a third and just under a quarter, respectively, in 1986. By 1996, the capability share had fallen slightly while the generation share declined to just over one-eighth. Nonutility generation as a percentage of the State total more than doubled from 1986 to 1996, rising from 5.0 percent to 13.2 percent.

Florida has not done much to restructure its electric power industry. The most recent deregulation bill died in committee in April 1998 without a hearing, reflecting both the strong opposition from utilities and lack of consumer interest.¹

¹ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.



* Numbers in boldface indicate rank order of plants by capability.
 ** Utilities rank ordered by operated generating capability within the State. Map shows areas of investor-owned utilities only.

Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		FRCC/SERC	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	36,898	3
State Primary Generating Fuel		Coal	Generation (MWh)	145,140,217	3
Population (as of 7/96)	14,418,917	4	Average Age of Coal Plants	18 years	
Average Revenue (cents/kWh)	7.18	^a 36	Average Age of Oil-fired Plants	25 years	
Industry			Average Age of Gas-fired Plants	18 years	
Capability (MWe)	40,774	^b 3	Average Age of Nuclear Plants	20 years	
Generation (MWh)	167,122,728	^b 4	Average Age of Hydroelectric Plants	31 years	
Capability/person (KWe/person)	2.83	^b 26	Average Age of Other Plants	--	
Generation/person (MWh/person)	11.59	^b 29	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	700	7	Capability (MWe)	3,876	4
Nitrogen Oxide Emissions (Thousand Short Tons)	395	4	Percentage Share of Capability	9.5	15
Carbon Dioxide Emissions (Thousand Short Tons)	137,506	4	Generation (MWh)	21,982,511	4
Sulfur Dioxide/sq. mile (Tons)	12.98	12	Percentage Share of Generation	13.2	16
Nitrogen Oxides/sq. mile (Tons)	7.32	11			
Carbon Dioxide/sq. mile (Tons)	2,549.38	11			

-- = Not applicable.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Crystal River	Coal/Nuclear	Florida Power Corp	3,039
2. Martin	Other/Gas	Florida Power & Light Co	2,482
3. Turkey Point	Nuclear/Oil	Florida Power & Light Co	2,210
4. Big Bend	Coal	Tampa Electric Co	1,856
5. Lauderdale	Gas/Other	Florida Power & Light Co	1,736

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Florida Power & Light Co	15,611	--	7,178	5,369	3,064	--
B. Florida Power Corp	7,323	2,227	4,029	255	812	--
C. Tampa Electric Co	3,545	3,132	399	14	--	--
D. Jacksonville Electric Auth	3,088	1,248	1,840	--	--	--
E. Orlando Utilities Comm	1,780	882	--	898	--	--
Total	31,347	7,489	13,446	6,536	3,876	--
Percentage of Industry Capability	76.9	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

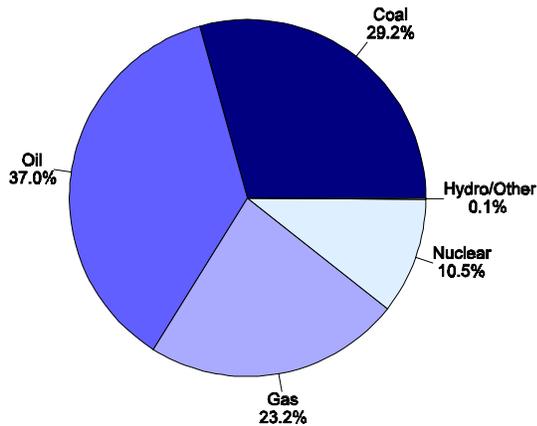


Figure 2. Utility Generation by Primary Energy Source, 1996

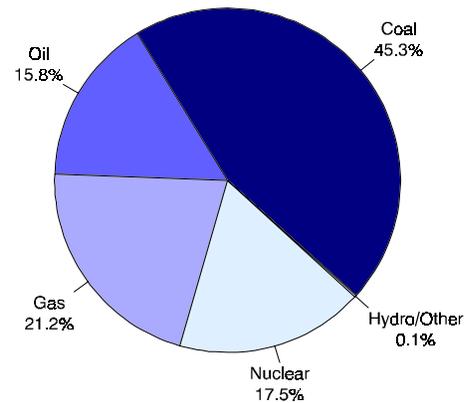


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

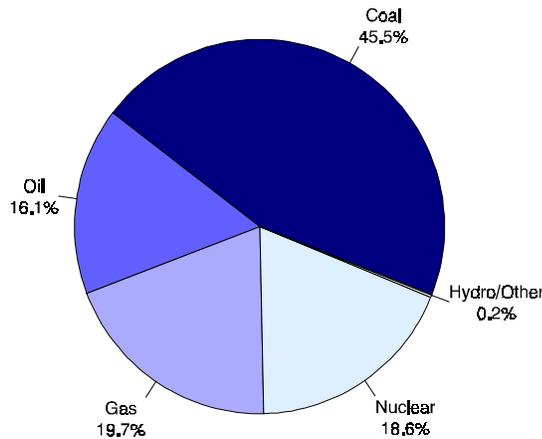


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	8,875	10,001	10,763	27.4	29.2	26.4
Oil	11,472	11,171	13,653	35.4	32.6	33.5
Gas	7,163	7,658	8,560	22.1	22.3	21.0
Nuclear	3,798	3,830	3,876	11.7	11.2	9.5
Hydro/Other	45	48	47	0.1	0.1	0.1
Total Utility	31,353	32,708	36,898	96.9	95.4	90.5
Total Nonutility	1,014	1,587	3,876	3.1	4.6	9.5
Industry	32,367	34,295	40,774	100.0	100.0	100.0

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	42,632,445	61,122,819	65,782,399	37.3	43.9	39.4
Oil	27,415,899	30,115,618	22,890,565	24.0	21.6	13.7
Gas	16,167,993	18,734,892	30,781,402	14.2	13.4	18.4
Nuclear	22,036,001	20,507,569	25,470,291	19.3	14.7	15.2
Hydro/Other	212,294	263,066	215,560	0.2	0.2	0.1
Total Utility	108,464,632	130,743,964	145,140,217	95.0	93.9	86.8
Total Nonutility	5,724,281	8,563,613	21,982,511	5.0	6.1	13.2
Industry	114,188,913	139,307,577	167,122,728	100.0	100.0	100.0

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.440	0.615	0.662	35.3	38.4	36.4
Oil	0.281	0.307	0.234	22.6	19.2	12.9
Gas	0.172	0.204	0.286	13.8	12.8	15.7
Nuclear	0.238	0.220	0.271	19.1	13.8	14.9
Hydro/Other	0.002	0.003	0.002	0.2	0.2	0.1
Total Utility	1.133	1.348	1.454	90.9	84.3	80.0
Total Nonutility	0.113	0.252	0.363	9.1	15.7	20.0
Industry	1.246	1.600	1.817	100.0	100.0	100.0

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

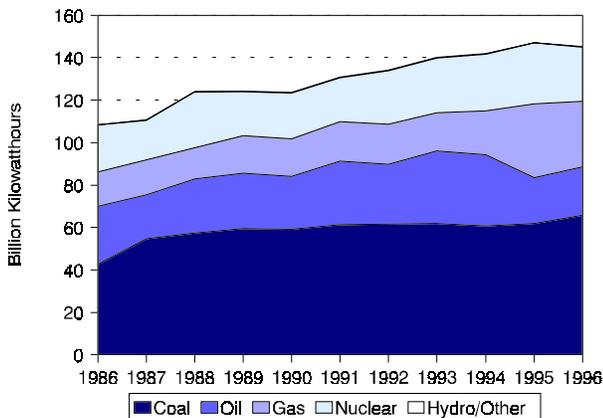


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

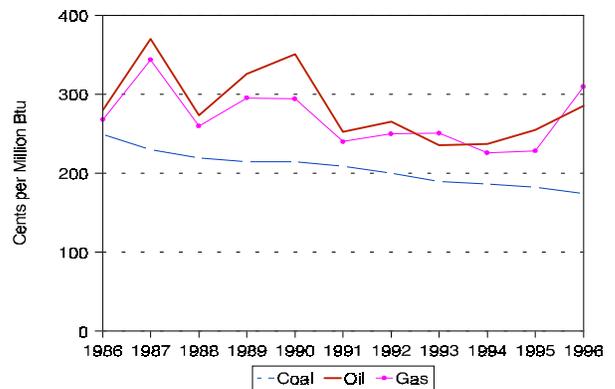


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	249.0	208.7	173.9	-3.5
Oil	280.0	252.7	285.4	0.2
Gas	268.0	240.0	309.7	1.5

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	575	781	700	2.0
Nitrogen Oxides ^d . .	267	329	395	4.0
Carbon Dioxide ^d . .	79,853	119,212	137,506	5.6

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

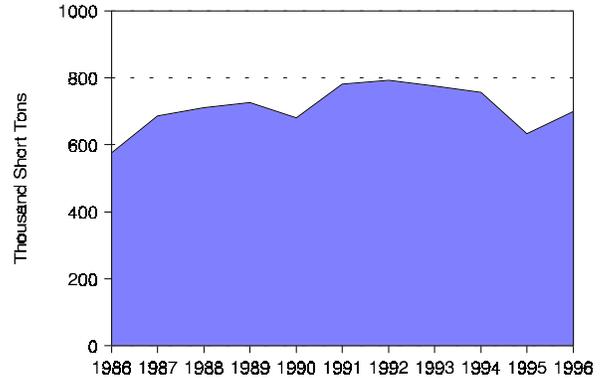


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

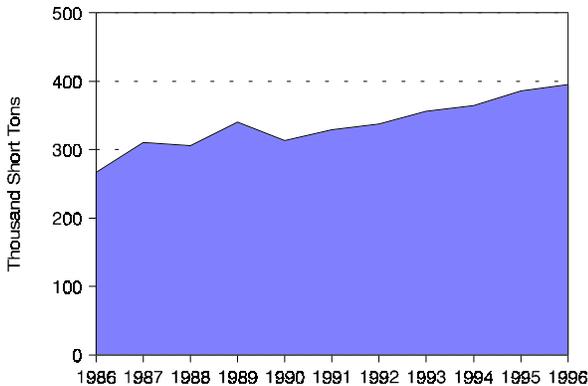


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

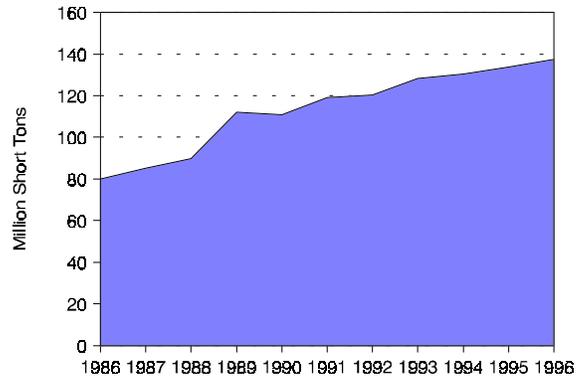


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	57,672,284	72,813,985	88,314,752	4.4	49.4	49.8	51.4
Commercial	40,317,552	52,440,505	60,988,112	4.2	34.6	35.8	35.5
Industrial . . .	14,975,716	16,482,264	17,212,028	1.4	12.8	11.3	10.0
Other	3,709,366	4,599,487	5,317,130	3.7	3.2	3.1	3.1
Total	116,674,919	146,336,241	171,832,022	3.9	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

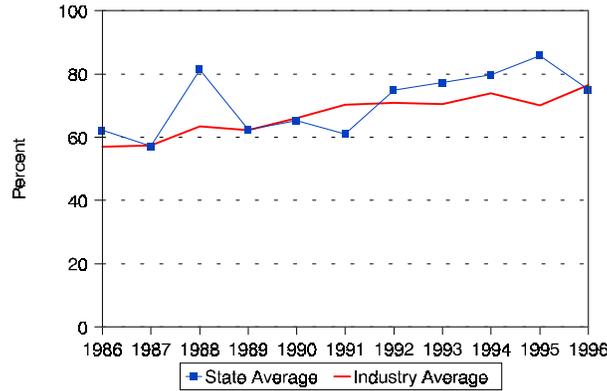


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	6	33	--	16	55
Number of Retail Customers	4,394,124	856,325	--	515,242	5,765,691
Retail Sales (MWh)	91,849,873	18,248,682	--	6,576,364	116,674,919
Percentage of Retail Sales	78.7	15.6	--	5.6	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	8,529,512	1,641,490	--	741,476	10,912,477
Percentage of Revenue	78.2	15.0	--	6.8	100.0
1991					
Number of Utilities	5	34	--	16	55
Number of Retail Customers	5,162,770	1,008,287	--	632,342	6,803,399
Retail Sales (MWh)	114,063,971	23,378,291	--	8,893,979	146,336,241
Percentage of Retail Sales	78.0	16.0	--	6.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	9,047,167	1,895,263	--	836,419	11,778,849
Percentage of Revenue	76.8	16.1	--	7.1	100.0
1996					
Number of Utilities	5	33	--	16	54
Number of Retail Customers	5,702,522	1,050,198	--	719,942	7,472,662
Retail Sales (MWh)	132,578,578	27,596,798	--	11,656,646	171,832,022
Percentage of Retail Sales	77.2	16.1	--	6.8	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	9,513,459	1,919,614	--	910,387	12,343,460
Percentage of Revenue	77.1	15.6	--	7.4	100.0

Georgia

In 1996, Georgia had the tenth largest population and the ninth largest utility generating capability. Most of the electricity in Georgia is generated at coal-fired plants. Georgia is also very reliant on nuclear power. Two of the five largest plants in the Nation, Georgia Power's Scherer and Bowen plants, are in Georgia. The Georgia Power Company (GPC), a subsidiary of Atlanta-based Southern Company, the largest utility in the State, is the fifth largest in the Nation. The average price of electricity, 6.43 cents per kilowatthour, was twenty-third most expensive in the Nation. Georgia is a net exporter of electricity.

The Clean Air Act Amendments of 1990 specified a number of utility plants to begin compliance with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x). Almost eight and one-half gigawatts of nameplate capacity at five Georgia plants were named in the law. Emissions of SO₂ from Georgia utilities declined substantially from 1986 to 1991 and then did so again from 1991 to 1996. NO_x emissions went up slightly from 1986 to 1991 and then declined slightly below 1986 levels in 1996. Carbon dioxide (CO₂) emissions increased steadily in both periods. In 1996, emissions of SO₂ and CO₂ were among the top ten in the Nation. It is likely that Georgia will need to design a State implementation plan (SIP) for reducing ground-level ozone in response to a proposal released by the Environmental Protection Agency (EPA) in October 1998. The EPA SIP call proposal does not mandate which sources must reduce pollution. However, EPA

states that utilities would be one of the most likely sources of NO_x emissions reductions.

GPC operates the five largest plants in the State. Four of the five are coal-fired plants. All five are in the northern two-thirds of the State, of which only Bowen is north of Atlanta. In 1986, utility coal plants represented almost two-thirds of Georgia's generating capability and over four-fifths of total net generation. In 1996, the coal share of capability had fallen to just over half while the net generation share had fallen to just over three-fifths. Between 1986 and 1996, the decline of the coal share was made up for by the increase in the nuclear share which increased from 9.1 percent to 28.7 percent. Vogtle, the third largest plant in the State, is one of the least expensive nuclear plants in the Nation.¹ Vogtle, which came fully on-line in 1989, is in Burke County, near Augusta, along the South Carolina border. After 1986, Georgia's nuclear capacity factor remained higher than the national average capacity factor. The nonutility share of Georgia's generation was stable over the 11 years examined, declining from 5.5 percent of the total to 5.4 percent.

Georgia has not moved as quickly as other States toward deregulation. In January 1998, the Public Service Commission issued a report on restructuring. Recommendations include market-based rates, unbundled services, and stranded cost recovery. A docket has been established for comments.²

¹ Energy Information Administration, *Challenges of Electric Power Industry Restructuring for Fuel Suppliers*, DOE/EIA-0623 (Washington, DC, September 1998), Chapter 2.

² Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

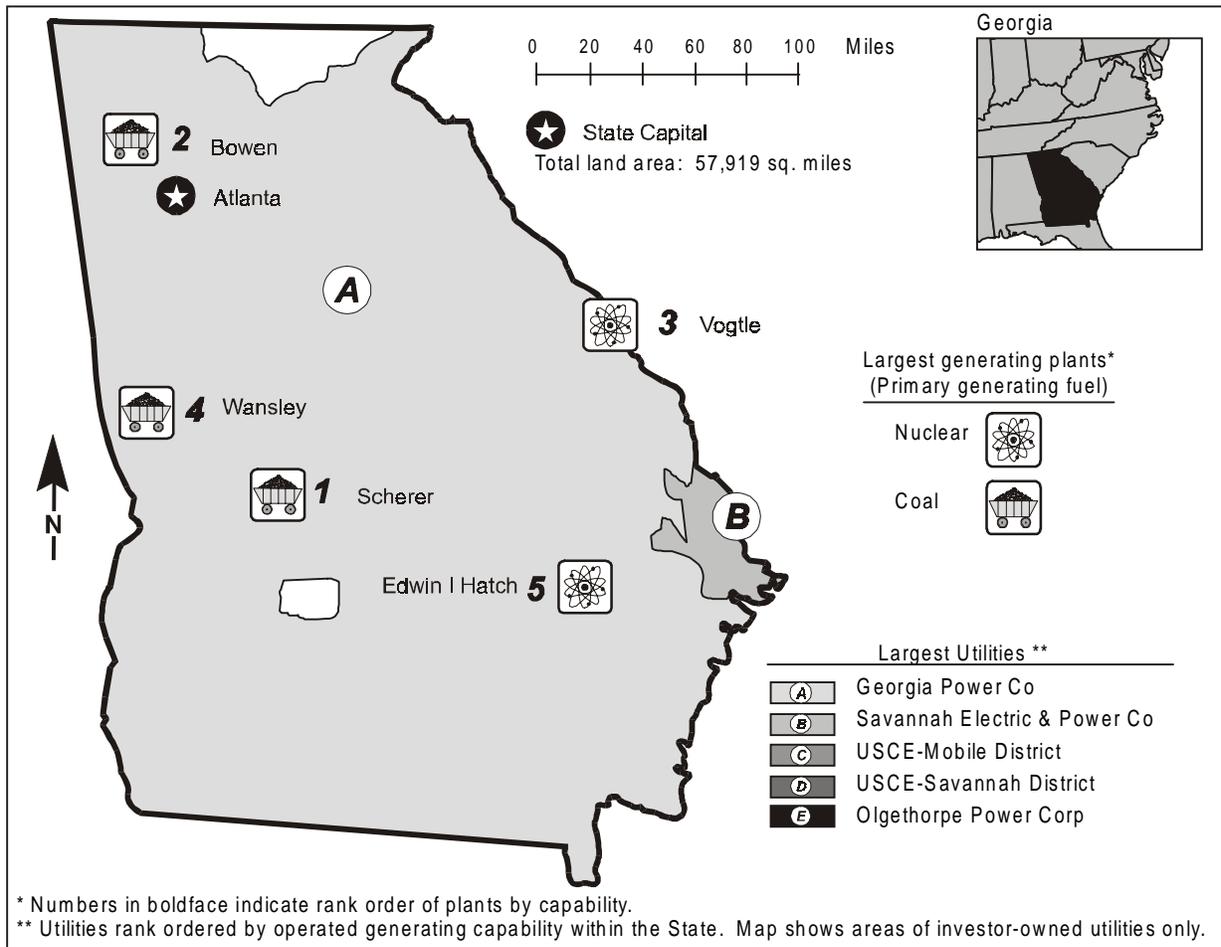


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		SERC	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	22,782	9
State Primary Generating Fuel		Coal	Generation (MWh)	98,729,242	12
Population (as of 7/96)	7,334,274	10	Average Age of Coal Plants	23 years	
Average Revenue (cents/kWh)	6.43	^a 29	Average Age of Oil-fired Plants	26 years	
Industry			Average Age of Gas-fired Plants	16 years	
Capability (MWe)	24,189	^b 10	Average Age of Nuclear Plants	13 years	
Generation (MWh)	104,393,589	^b 13	Average Age of Hydroelectric Plants	24 years	
Capability/person (KWe/person)	3.30	^b 18	Average Age of Other Plants	--	
Generation/person (MWh/person)	14.23	^b 20	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	550	9	Capability (MWe)	1,407	12
Nitrogen Oxide Emissions (Thousand Short Tons)	224	13	Percentage Share of Capability	5.8	25
Carbon Dioxide Emissions (Thousand Short Tons)	98,211	8	Generation (MWh)	5,664,347	15
Sulfur Dioxide/sq. mile (Tons)	9.50	16	Percentage Share of Generation	5.4	27
Nitrogen Oxides/sq. mile (Tons)	3.87	19	-- = Not applicable.		
Carbon Dioxide/sq. mile (Tons)	1,695.66	17			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Scherer	Coal	Georgia Power Co	3,352
2. Bowen	Coal	Georgia Power Co	3,248
3. Vogtle	Nuclear	Georgia Power Co	2,328
4. Wansley	Coal	Georgia Power Co	1,784
5. Edwin I Hatch	Nuclear	Georgia Power Co	1,622

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Georgia Power Co	19,183	12,832	1,228	341	3,950	832
B. Savannah Electric & Power Co ..	1,317	389	--	928	--	--
C. USCE-Mobile District	965	--	--	--	--	965
D. USCE-Savannah District	684	--	--	--	--	684
E. Oglethorpe Power Corp	566	--	--	--	--	566
Total	22,715	13,221	1,228	1,269	3,950	3,047
Percentage of Industry Capability	93.9	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

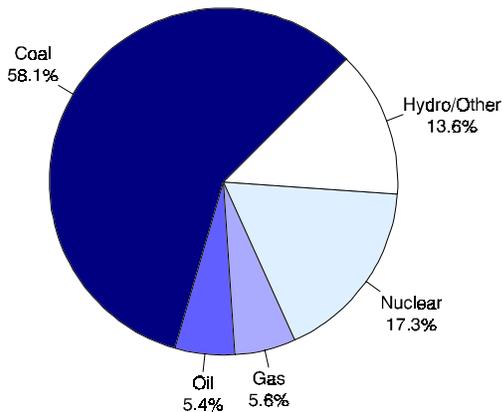


Figure 2. Utility Generation by Primary Energy Source, 1996

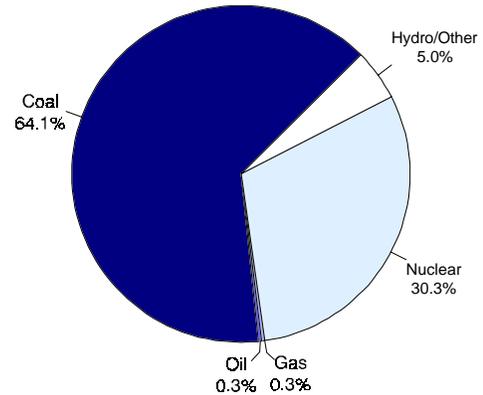


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

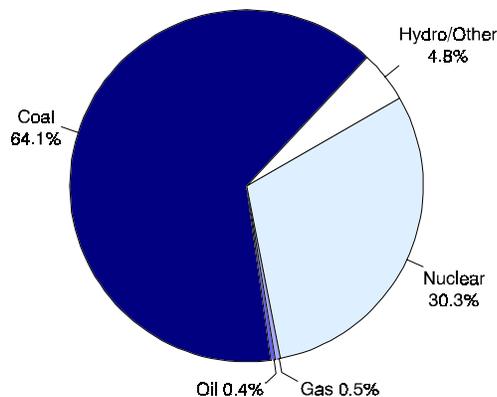


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	12,095	12,972	13,233	65.7	59.7	54.7
Oil	1,507	1,493	1,228	8.2	6.9	5.1
Gas	67	103	1,276	0.4	0.5	5.3
Nuclear	1,524	3,714	3,950	8.3	17.1	16.3
Hydro/Other	2,485	2,470	3,094	13.5	11.4	12.8
Total Utility	17,678	20,752	22,782	96.0	95.5	94.2
Total Nonutility	745	977	1,407	4.0	4.5	5.8
Industry	18,423	21,729	24,189	100.0	100.0	100.0

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	64,882,947	59,985,395	63,230,856	81.8	62.4	60.6
Oil	269,702	107,662	292,018	0.3	0.1	0.3
Gas	421,281	60,984	344,990	0.5	0.1	0.3
Nuclear	7,238,319	26,016,023	29,925,001	9.1	27.1	28.7
Hydro/Other	2,097,137	4,639,352	4,936,377	2.6	4.8	4.7
Total Utility	74,909,386	90,809,416	98,729,242	94.5	94.4	94.6
Total Nonutility	4,362,701	5,341,740	5,664,347	5.5	5.6	5.4
Industry	79,272,087	96,151,156	104,393,589	100.0	100.0	100.0

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.645	0.592	0.673	69.7	51.8	52.1
Oil	0.003	0.001	0.004	0.3	0.1	0.3
Gas	0.006	0.001	0.005	0.6	0.1	0.4
Nuclear	0.078	0.279	0.318	8.5	24.4	24.6
Hydro/Other	0.022	0.048	0.051	2.4	4.2	3.9
Total Utility	0.754	0.921	1.050	81.5	80.6	81.3
Total Nonutility	0.171	0.222	0.241	18.5	19.4	18.7
Industry	0.925	1.143	1.292	100.0	100.0	100.0

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

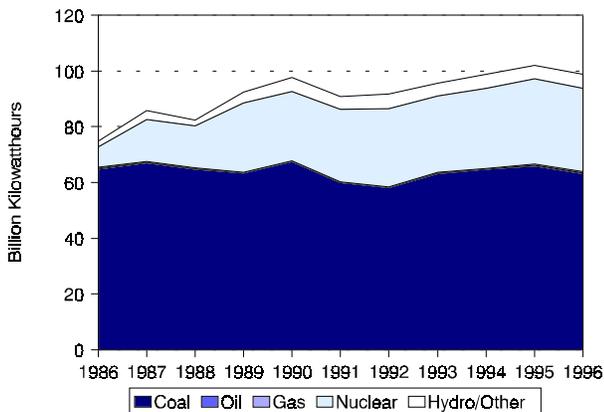


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

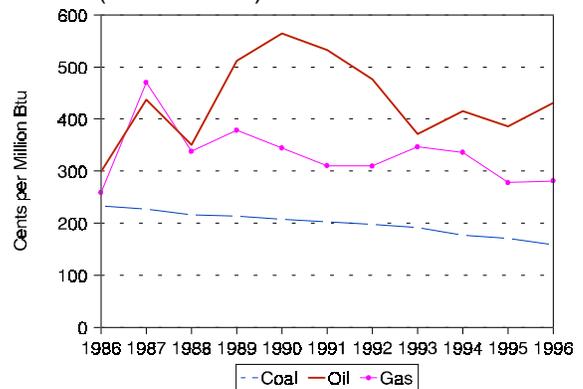


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	233.6	202.2	157.8	-3.8
Oil	299.2	532.5	430.5	3.7
Gas	258.7	310.5	281.3	0.8

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	919	840	550	-5.0
Nitrogen Oxides ^d . .	224	232	224	-0.2
Carbon Dioxide ^d . .	67,082	82,242	98,211	3.9

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

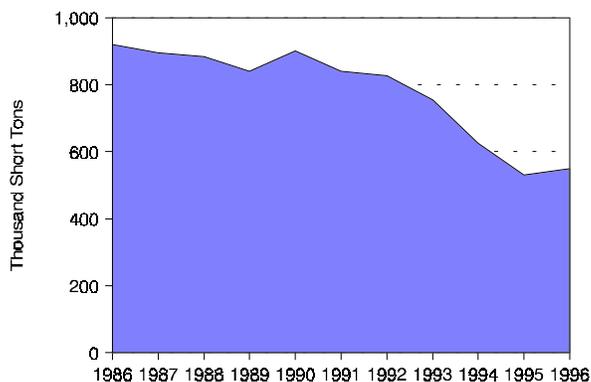


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

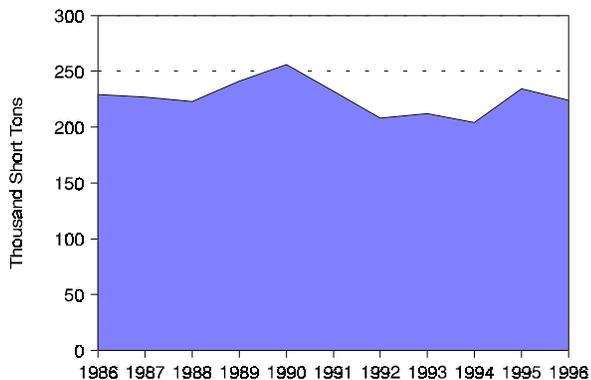


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

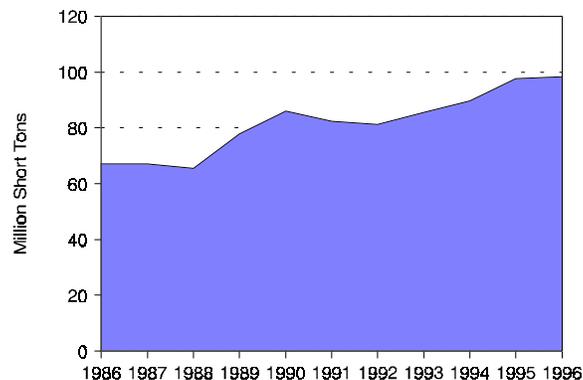


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	25,807,775	30,186,631	37,762,979	3.9	37.7	37.0	37.3
Commercial	17,511,855	23,240,750	29,139,733	5.2	25.6	28.5	28.8
Industrial . . .	24,366,764	27,193,100	33,175,253	3.1	35.6	33.3	32.7
Other	803,783	918,605	1,229,171	4.3	1.2	1.1	1.2
Total	68,490,178	81,539,086	101,307,136	4.0	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

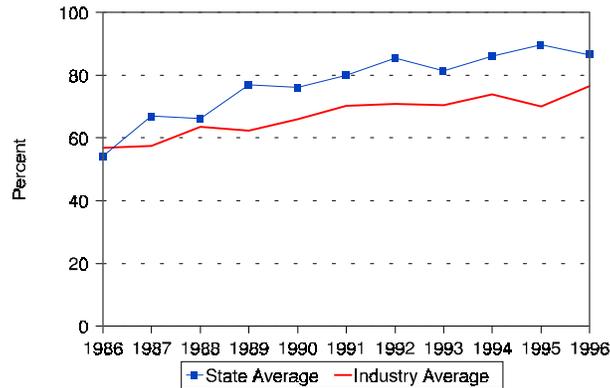


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	2	53	--	43	98
Number of Retail Customers	1,525,097	284,115	--	845,272	2,654,484
Retail Sales (MWh)	49,277,379	6,808,911	--	12,403,888	68,490,178
Percentage of Retail Sales	72.0	9.9	--	18.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	3,652,506	491,410	--	1,090,188	5,234,104
Percentage of Revenue	69.8	9.4	--	20.8	100.0
1991					
Number of Utilities	2	53	--	43	98
Number of Retail Customers	1,690,820	295,054	--	1,039,738	3,025,612
Retail Sales (MWh)	57,481,308	7,935,575	--	16,122,203	81,539,086
Percentage of Retail Sales	70.5	9.7	--	19.8	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	4,087,622	577,484	--	1,351,210	6,016,316
Percentage of Revenue	67.9	9.6	--	22.5	100.0
1996					
Number of Utilities	2	53	--	43	98
Number of Retail Customers	1,851,335	311,829	--	1,255,884	3,419,048
Retail Sales (MWh)	68,940,249	10,102,676	--	22,264,211	101,307,136
Percentage of Retail Sales	68.1	10.0	--	22.0	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	4,245,990	620,999	--	1,646,703	6,513,692
Percentage of Revenue	65.2	9.5	--	25.3	100.0

-- = Not applicable.

Hawaii

The first demonstration of electricity in the Hawaiian Islands was sanctioned by King David Kalakaua on the grounds of the Iolani Palace in Honolulu on July 21, 1886. On October 13, 1886, the Hawaiian Electric Company was formed.¹ One hundred ten years later, Hawaii had the forty-eighth largest utility generating capability and the third highest share of nonutility generating capability in the United States. Almost all of the utility electricity in the State is generated at oil-fired plants. The five largest plants in the State, including the Hawaiian Electric Company's Kahe plant on Oahu, the largest, are oil-fired. There is no nuclear or coal-fired capability and generation. Three of the five largest plants are on Oahu. The third largest is on Maui and the fifth largest is on Kauai. Due to its unique geographic circumstances, Hawaii is neither an importer nor exporter of electricity, and it had the highest average price of electricity in the United States, 12.12 cents per kilowatt-hour, in 1996.

It is not surprising that the State's generating capability is heavily based on oil. Hawaii uses oil for about 90 percent of its energy needs, while the rest of the United States meets only 36 percent of its needs through the use of oil.² Clearly, there are no gas pipelines running to the State. The State has no other fossil-fuel resources and oil is the most economical of those that are commonly transported by ship. In 1986, utility oil units represented

85.8 percent of Hawaii's generating capability and 87.5 percent of its net generation. In 1996, these shares had fallen to 60.7 percent and 60.2 percent, respectively. Over the same time period, nonutility shares of capability and generation rose from 13.1 percent and 12.1 percent to 32.0 percent and 39.6 percent, respectively.

While Hawaii has some of the lowest totals for emissions of sulfur dioxide (SO₂), nitrogen oxides (NO_x), and carbon dioxide (CO₂), the concentrations per square mile are much higher. In 1996, Hawaii ranked forty-first nationally in SO₂ emissions, forty-third in NO_x, and forty-second in CO₂. On the other hand, because of its small area, the concentrations per square mile were twenty-second, twentieth, and fifteenth, respectively, for SO₂, NO_x, and CO₂. Emissions of all three pollutants increased from 1986 to 1991 and then did so again from 1991 to 1996.

Hawaii has not been a leader in the move toward a deregulated environment for electricity. In 1997, several competition bills did not pass in the State Legislature. However, a bill passed in December 1997 requesting the Public Utility Commission (PUC) to provide recommendations for legislation to implement economical electric power industry competition. The PUC has begun to develop a draft restructuring a plan and a formal investigation into the issues.³

¹ *The Electric Century*, Signature Publishing (Honolulu, Hawaii, 1991), p. xx.

² Hakes, Jay, Administrator of the Energy Information Administration, speaking before the Hawaii Energy Emergency Seminar, May 7, 1998.

³ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

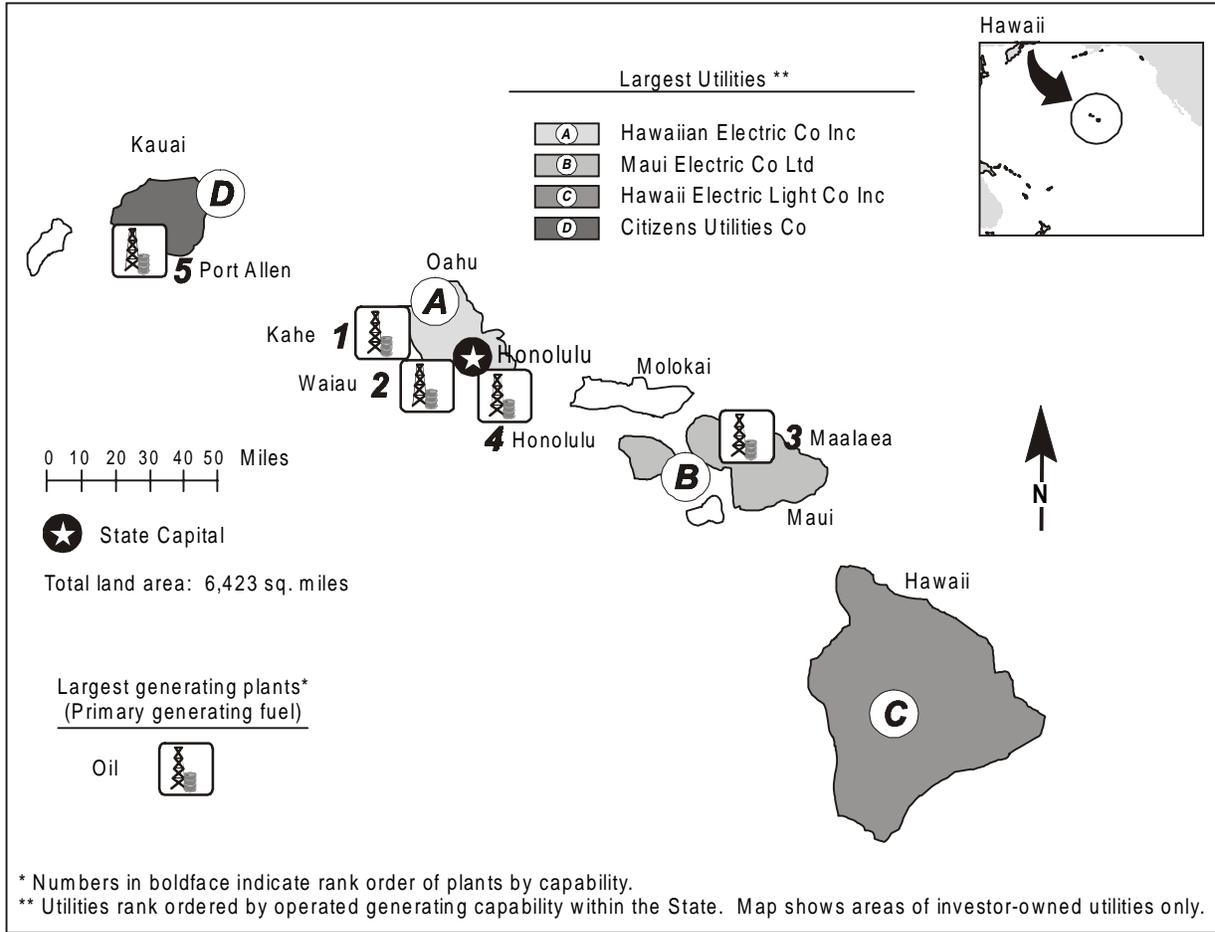


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		--	Utility		
Net Exporter or Importer		--	Capability (MWe)	1,610	48
State Primary Generating Fuel		Oil	Generation (MWh)	6,420,195	47
Population (as of 7/96)	1,182,948	41	Average Age of Coal Plants	--	
Average Revenue (cents/kWh)	12.12	^a 51	Average Age of Oil-fired Plants	26 years	
Industry			Average Age of Gas-fired Plants	3 years	
Capability (MWe)	2,367	^b 41	Average Age of Nuclear Plants	--	
Generation (MWh)	10,628,106	^b 39	Average Age of		
Capability/person			Hydroelectric Plants	66 years	
(KWe/person)	2.00	^b 38	Average Age of Other Plants . . .	--	
Generation/person			Nonutility^c		
(MWh/person)	8.98	^b 38	Capability (MWe)	757	20
Sulfur Dioxide Emissions			Percentage Share of Capability	32.0	3
(Thousand Short Tons)	38	41	Generation (MWh)	4,207,911	21
Nitrogen Oxide Emissions			Percentage Share of Generation	39.6	4
(Thousand Short Tons)	23	43	-- = Not applicable.		
Carbon Dioxide Emissions					
(Thousand Short Tons)	11,244	42			
Sulfur Dioxide/sq. mile (Tons)	5.92	22			
Nitrogen Oxides/sq. mile (Tons)	3.58	20			
Carbon Dioxide/sq. mile (Tons)	1,750.58	15			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Kahe	Oil	Hawaiian Electric Co Inc	582
2. Waiau	Oil	Hawaiian Electric Co Inc	457
3. Maalaea	Oil/Other	Maui Electric Co Ltd	154
4. Honolulu	Oil	Hawaiian Electric Co Inc	100
5. Port Allen	Oil	Citizens Utilities Co	100

Table 3. Top Four Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Hawaiian Electric Co Inc	1,139	--	1,139	--	--	--
B. Maui Electric Co Ltd	215	--	197	18	--	--
C. Hawaii Electric Light Co Inc	156	--	152	--	--	3
D. Citizens Utilities Co	100	--	100	--	--	--
Total	1,610	--	1,588	18	--	3
Percentage of Industry Capability	68.0	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

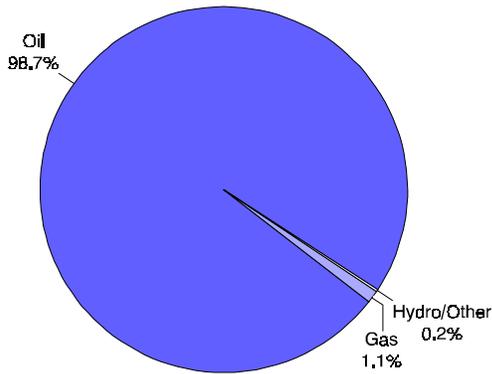


Figure 2. Utility Generation by Primary Energy Source, 1996

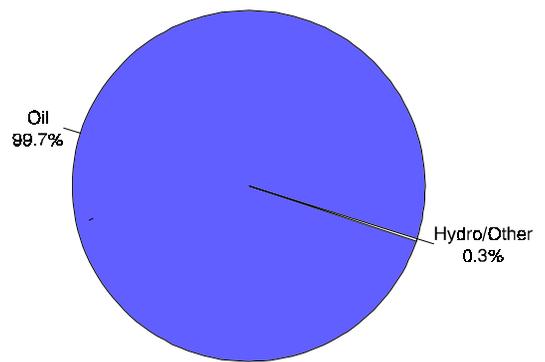


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

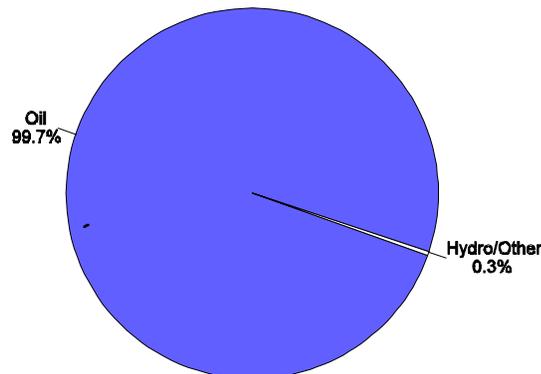


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	1,410	1,518	1,589	85.8	73.4	67.1
Gas	8	--	18	0.5	--	0.8
Nuclear	--	--	--	--	--	--
Hydro/Other	10	3	3	0.6	0.1	0.1
Total Utility	1,428	1,521	1,610	86.9	73.5	68.0
Total Nonutility	215	548	757	13.1	26.5	32.0
Industry	1,643	2,069	2,367	100.0	100.0	100.0

-- = Not applicable.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	6,829,122	7,312,791	6,402,329	87.5	81.7	60.2
Gas	--	--	--	--	--	--
Nuclear	--	--	--	--	--	--
Hydro/Other	29,173	20,401	17,866	0.4	0.2	0.2
Total Utility	6,858,295	7,333,192	6,420,195	87.9	81.9	60.4
Total Nonutility	946,863	1,622,547	4,207,911	12.1	18.1	39.6
Industry	7,805,158	8,955,739	10,628,106	100.0	100.0	100.0

-- = Not applicable.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	0.072	0.079	0.068	63.0	73.2	56.0
Gas	--	--	--	--	--	--
Nuclear	--	--	--	--	--	--
Hydro/Other	(s)	(s)	(s)	0.3	0.2	0.2
Total Utility	0.073	0.079	0.068	63.3	73.4	56.2
Total Nonutility	0.042	0.029	0.053	36.7	26.6	43.8
Industry	0.115	0.108	0.121	100.0	100.0	100.0

-- = Not applicable. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

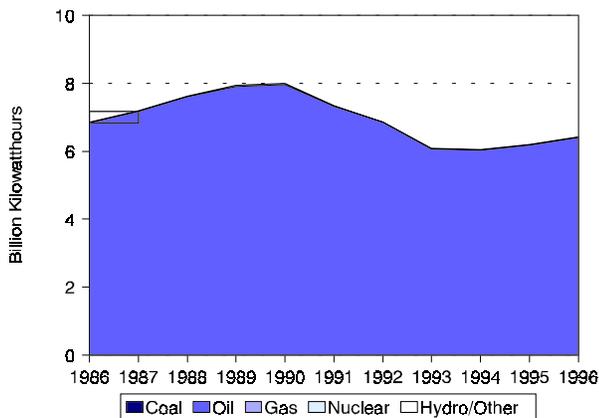


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

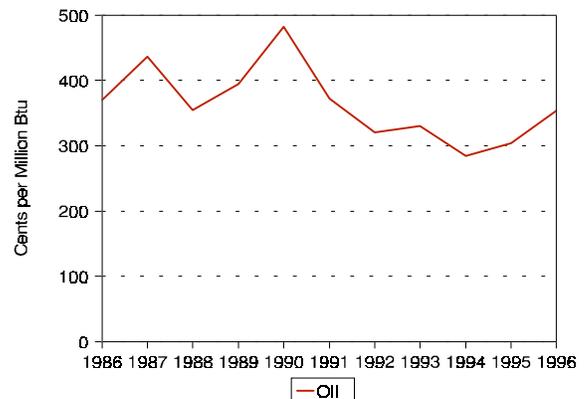


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	--	--	--	--
Oil	370.1	371.6	353.5	-0.5
Gas	--	--	--	--

-- = Not applicable.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	26	36	38	3.9
Nitrogen Oxides ^d	11	16	23	7.7
Carbon Dioxide ^d	6,152	9,903	11,244	6.2

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

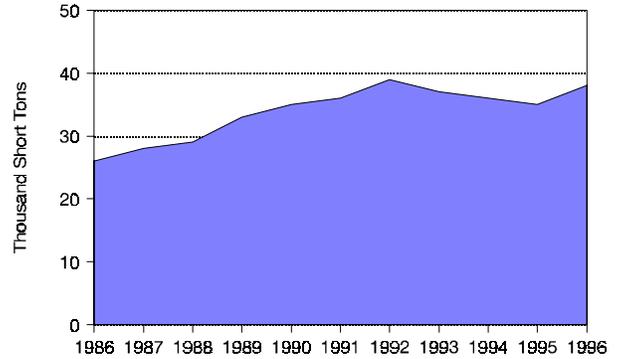


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

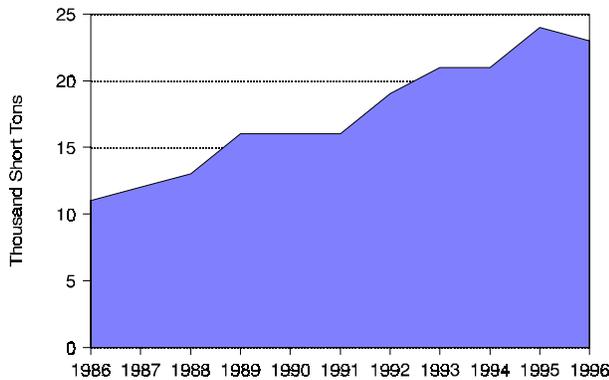


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

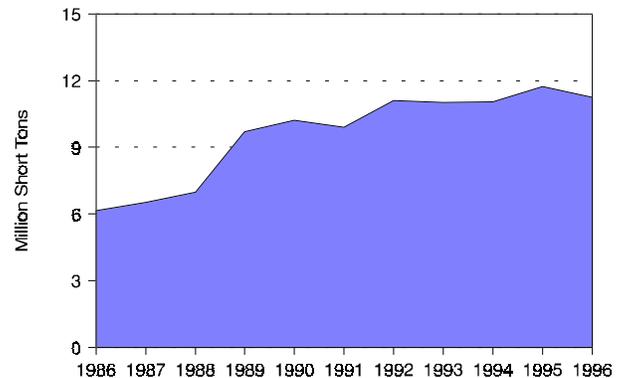


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	1,962,049	2,395,661	2,675,881	3.2	27.9	28.1	28.5
Commercial	1,773,332	2,297,841	2,761,274	4.5	25.2	27.0	29.4
Industrial . . .	3,239,363	3,773,038	3,884,280	1.8	46.1	44.3	41.4
Other	57,427	57,547	57,526	0.0	0.8	0.7	0.6
Total	7,032,170	8,524,087	9,378,961	2.9	100.0	100.0	100.0

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	5	--	--	--	5
Number of Retail Customers	333,714	--	--	--	333,714
Retail Sales (MWh)	7,032,170	--	--	--	7,032,170
Percentage of Retail Sales	100.0	--	--	--	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	726,116	--	--	--	726,116
Percentage of Revenue	100.0	--	--	--	100.0
	1991				
Number of Utilities	4	--	--	--	4
Number of Retail Customers	377,533	--	--	--	377,533
Retail Sales (MWh)	8,524,087	--	--	--	8,524,087
Percentage of Retail Sales	100.0	--	--	--	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	883,348	--	--	--	883,348
Percentage of Revenue	100.0	--	--	--	100.0
	1996				
Number of Utilities	4	--	--	--	4
Number of Retail Customers	411,691	--	--	--	411,691
Retail Sales (MWh)	9,378,961	--	--	--	9,378,961
Percentage of Retail Sales	100.0	--	--	--	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,137,044	--	--	--	1,137,044
Percentage of Revenue	100.0	--	--	--	100.0

-- = Not applicable.

Idaho

Idaho utilities serve a population of slightly over one million, (national rank of 40) and generated 14.1 billion kilowatthours of electricity in 1996. In 1996, the average price of electricity in Idaho, 3.96 cents per kilowatthour, was the lowest in the Nation. Almost all of the electricity in Idaho is generated at utility hydroelectric plants (86.8 percent in 1996). It is not surprising that Idaho's generating capability is heavily based on hydropower. There are numerous dams on the Snake River which winds through Idaho. Because hydropower is such a large player in the Idaho electric power market, Idaho ranked almost last in total emissions and emissions per square mile of sulfur dioxide, nitrogen oxides, and carbon dioxide. As a result, no Idaho generating capability was cited by Title IV of the Clean Air Act Amendments of 1990 for emissions reductions.

The four largest plants in Idaho are hydroelectric plants and are operated by the four largest utilities with capability within the State. Idaho Power, the largest utility in the State, operates the largest plant in the State, the hydroelectric Brownlee plant, which is on the Oregon border. Idaho's five largest utilities—Idaho Power Company, USCE-North Pacific Division, Washington Water Power Company, Bureau of Reclamation, and PacifiCorp—operated over 80 percent of the net summer capability within the State.

Overall electricity sales increased between 1986 and 1996 at an average annual rate of 3.0 percent. In 1996, utility

retail sales were 21.1 billion kilowatthours with the industrial sector accounting for 39.7 percent followed by the residential sector with 30.8 percent and the commercial sector at 27.9 percent. Over 12 percent of retail sales were provided by the 11 public utilities and 17 cooperatives. Idaho is a net importer of electricity with a net difference of 7 billion kilowatthours between generation and sales.

The most salient aspect of Idaho's fuel mix composition over time is that, with the exception of the more than doubling gas share of capability (in absolute terms, still not much), hydroelectric power generation remained quite stable. Nonutility capability and net generation were 6.5 percent and 5.9 percent, respectively, in 1986. By 1996, the nonutility shares had risen to 14.5 percent and 13.2 percent, respectively.

Idaho has been investigating the benefits of electricity deregulation. In 1997, the Idaho House passed a bill directing the Public Utility Commission (PUC) to establish a committee to obtain information on the costs of supplying electricity to consumers. In January 1998, the PUC issued the "Electric Costs Report" to the governor and legislature. The report contains the findings on the unbundled average costs for utilities in Idaho compared to national averages.¹

¹ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

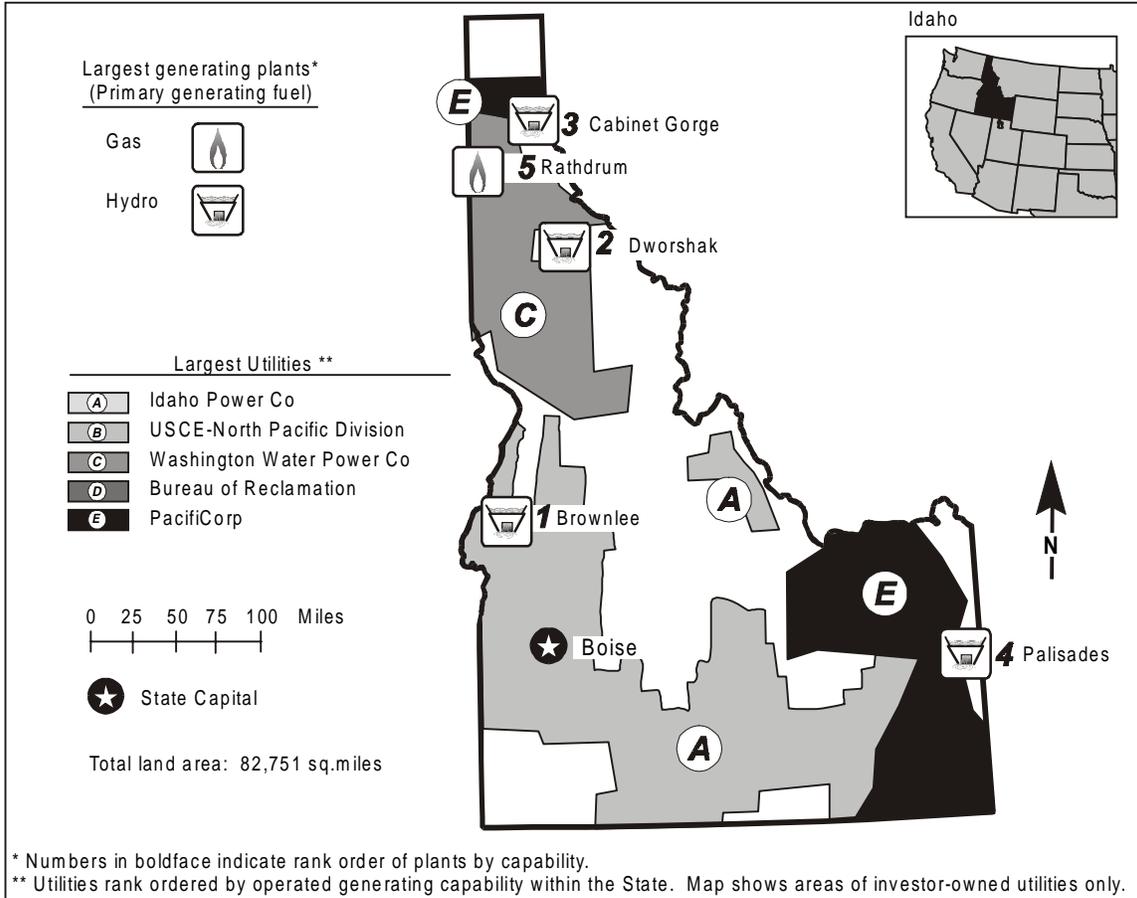


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		WSCC	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	2,553	43
State Primary Generating Fuel		Hydro	Generation (MWh)	12,230,805	43
Population (as of 7/96)	1,187,597	40	Average Age of Coal Plants	--	
Average Revenue (cents/kWh)	3.96	^a 1	Average Age of Oil-fired Plants	29 years	
Industry			Average Age of Gas-fired Plants	1 year	
Capability (MWe)	2,987	^b 37	Average Age of Nuclear Plants	--	
Generation (MWh)	14,087,774	^b 38	Average Age of Hydroelectric Plants	33 years	
Capability/person (KWe/person)	2.52	^b 29	Average Age of Other Plants	--	
Generation/person (MWh/ person)	11.86	^b 28	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	9	48	Capability (MWe)	434	30
Nitrogen Oxide Emissions (Thousand Short Tons)	4	49	Percentage Share of Capability	14.5	10
Carbon Dioxide Emissions (Thousand Short Tons)	2,466	49	Generation (MWh)	1,856,969	32
Sulfur Dioxide/sq. mile (Tons)	0.11	48	Percentage Share of Generation	13.2	15
Nitrogen Oxides/sq. mile (Tons)	0.05	51			
Carbon Dioxide/sq. mile (Tons)	29.80	50	-- = Not applicable.		

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Brownlee	Hydro	Idaho Power Co	728
2. Dworshak	Hydro	USCE-North Pacific Division	460
3. Cabinet Gorge	Hydro	Washington Water Power Co	241
4. Palisades	Hydro	Bureau of Reclamation	177
5. Rathdrum	Gas	Washington Water Power Co	136

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Idaho Power Co	1,267	--	6	--	--	1,261
B. USCE-North Pacific Division	500	--	--	--	--	500
C. Washington Water Power Co	395	--	--	136	--	259
D. Bureau of Reclamation	233	--	--	--	--	233
E. PacifiCorp	92	--	--	--	--	92
Total	2,487	--	6	136	--	2,345
Percentage of Industry Capability	83.3	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

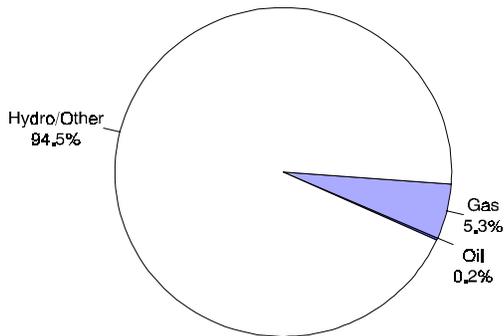


Figure 2. Utility Generation by Primary Energy Source, 1996

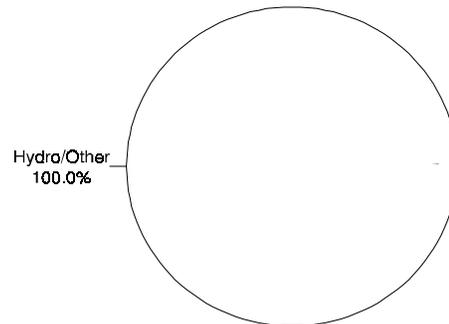


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

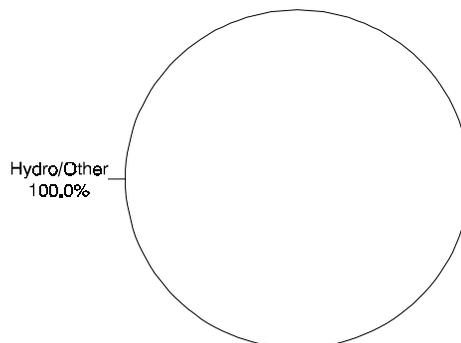


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	8	56	6	0.3	2.1	0.2
Gas	50	--	136	2.1	--	4.6
Nuclear	--	--	--	--	--	--
Hydro/Other	2,164	2,226	2,412	91.1	84.9	80.7
Total Utility	2,222	2,282	2,553	93.5	87.1	85.5
Total Nonutility Industry	154	339	434	6.5	12.9	14.5
Industry	2,376	2,621	2,987	100.0	100.0	100.0

-- = Not applicable.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	317	311	245	(s)	(s)	(s)
Gas	381	--	--	(s)	--	--
Nuclear	--	--	--	--	--	--
Hydro/Other	12,152,613	8,281,191	12,230,560	94.1	87.6	86.8
Total Utility	12,153,311	8,281,502	12,230,805	94.1	87.6	86.8
Total Nonutility Industry	760,144	1,171,164	1,856,969	5.9	12.4	13.2
Industry	12,913,455	9,452,666	14,087,774	100.0	100.0	100.0

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	(s)	(s)	(s)	--	--	--
Gas	(s)	--	--	--	--	--
Nuclear	--	--	--	--	--	--
Hydro/Other	0.127	0.086	0.126	80.7	78.0	80.1
Total Utility	0.127	0.086	0.126	80.8	78.0	80.1
Total Nonutility Industry	0.030	0.024	0.031	19.2	22.0	19.9
Industry	0.151	0.110	0.157	100.0	100.0	100.0

-- = Not applicable. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

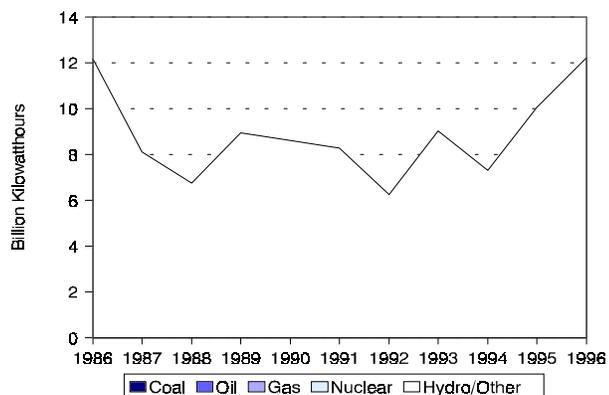


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

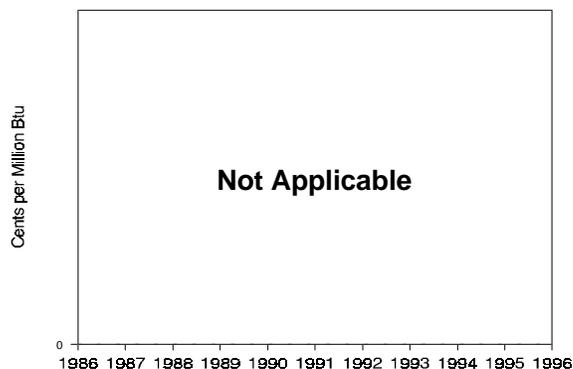


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	--	--	--	--
Oil	--	--	--	--
Gas	--	--	--	--

-- = Not applicable.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	--	4	9	--
Nitrogen Oxides ^d . .	--	2	4	--
Carbon Dioxide ^d . .	1	2,092	2,466	118.4

-- = Not applicable.

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

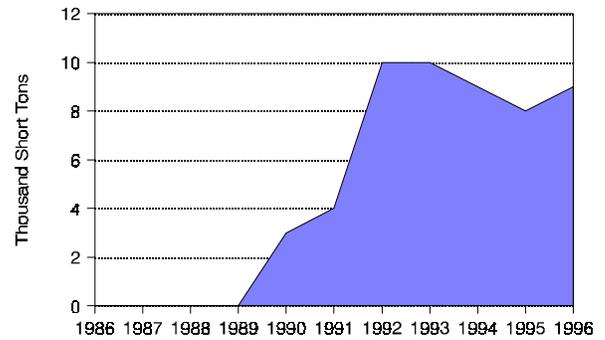


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

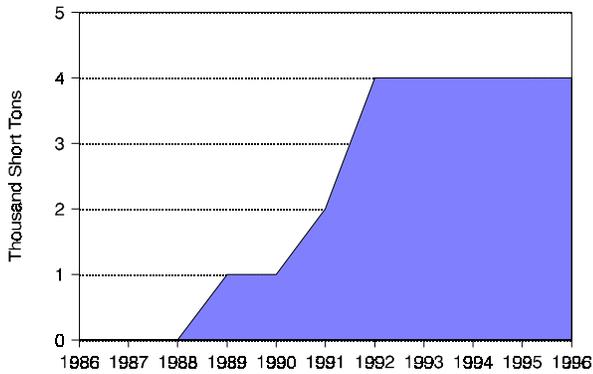


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

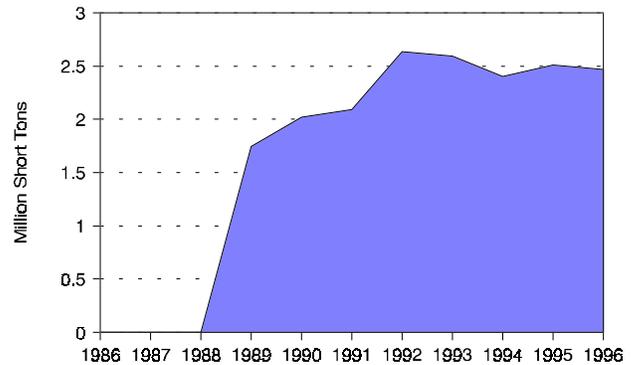


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential	5,432,760	5,971,037	6,507,968	1.8	34.4	33.1	30.8
Commercial	4,177,662	4,865,137	5,883,266	3.5	26.5	27.0	27.9
Industrial	5,923,017	6,908,837	8,380,114	3.5	37.5	38.3	39.7
Other	257,624	300,593	347,905	3.0	1.6	1.7	1.6
Total	15,791,068	18,045,604	21,119,253	3.0	100.0	100.0	100.0

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	7	12	--	17	36
Number of Retail Customers	378,098	32,478	--	44,028	454,604
Retail Sales (MWh)	13,904,191	862,230	--	1,024,647	15,791,068
Percentage of Retail Sales	88.1	5.5	--	6.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	657,452	41,683	--	59,923	759,058
Percentage of Revenue	86.6	5.5	--	7.9	100.0
1991					
Number of Utilities	6	11	--	17	34
Number of Retail Customers	406,948	34,336	--	47,338	488,622
Retail Sales (MWh)	15,896,696	998,180	--	1,150,728	18,045,604
Percentage of Retail Sales	88.1	5.5	--	6.4	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	670,366	45,171	--	64,346	779,883
Percentage of Revenue	86.0	5.8	--	8.3	100.0
1996					
Number of Utilities	4	11	--	17	32
Number of Retail Customers	473,594	36,829	--	57,757	568,180
Retail Sales (MWh)	18,486,239	1,104,631	--	1,528,383	21,119,253
Percentage of Retail Sales	87.5	5.2	--	7.2	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	705,864	49,302	--	80,237	835,403
Percentage of Revenue	84.5	5.9	--	9.6	100.0

-- = Not applicable.

Illinois

Illinois' electricity generation comes predominantly from coal-fired power plants which produced 71.5 billion kilowatthours of utility generated electricity (49.6 percent share) in 1996. Four of the five largest power plants in Illinois are nuclear powered, while the largest plant, Collins, is gas-fired. All five plants are operated by the second largest utility in the United States, Commonwealth Edison Company (ComEd). ComEd, along with Illinois Power, Central Illinois Public Service, Central Illinois Light, and Electric Energy Inc, operate more than 90 percent of the net summer capability. Combined, Illinois utilities generated 144.1 billion kilowatthours of electricity in 1996 for a population of almost 12 million, twice that of its neighbor Indiana, with a population of 5.8 million.

Illinois' generation mix is significantly different from its neighboring States—Indiana, Iowa, Kentucky, Missouri, and Wisconsin. Whereas these States use coal almost exclusively, ComEd began ordering nuclear power units in the late 1960's and early 1970's.¹ This early commitment has made Illinois the nuclear capital of the United States. In 1997, Illinois had more nuclear units (11) than any other State in the Nation, with a combined net capability of more than 11 gigawatts.² The nuclear plants each have two nuclear reactors and are located in northern Illinois, serving the most densely populated areas in and around Chicago.

ComEd's purchase of so many nuclear plants has been met with much public opposition because of cost and safety concerns. The average price of electricity is much higher than neighboring States, at 7.69 cents per kilowatthour. Missouri, the State with the second highest cost among the five States that border Illinois, has an average electricity cost that is 1.5 cents lower per kilowatthour than Illinois. This difference in cost can be attributed partly to the State's expensive nuclear plants, of which all but one (Clinton, operated by Illinois Power) are operated by ComEd. In 1998, ComEd paid more

than \$6 million in fines for problems at its nuclear plants. The plants at Dresden, LaSalle and Zion are or have been on the Nuclear Regulatory Commission's watch list because of safety and maintenance problems.³ Over the past 11 years, Illinois' annual aggregate nuclear capacity factor was below the national average 8 times, posting an average of 63.2 percent in 1996 as compared to a national average of 76.5. As a result of poor performance and deregulation plans, ComEd announced the permanent shutdown of its Zion nuclear plant in 1998.⁴

Although a large coal bed underlies most of the State, the coal is high in sulfur content and must be cleaned to meet air quality standards. Still, the sulfur content remains relatively high after cleaning, averaging 2 to 3 percent (by weight).⁵ As a result, Illinois ranks sixth in sulfur dioxide (SO₂) emissions. The Clean Air Act Amendments of 1990 cited 6,010 megawatts of nameplate capacity at eight Illinois plants to begin complying with stricter emissions standards for SO₂ and nitrogen oxides in 1995. Recently, Illinois utilities have begun to purchase low sulfur coal from Wyoming. Since 1991, SO₂ emissions have been reduced by an average annual rate of 2.7 percent.

High electricity generation costs have been the main reason Illinois has embraced electric utility restructuring while its neighbors have moved at a much slower pace. In December 1997, a bill was enacted that provides rate cuts for ComEd and Illinois Power customers and accords residential customers full choice for their generation supplier by May 2002. Customers who choose an alternative supplier will pay transition charges until 2006. In June 1998, the Illinois Commerce Commission issued a ruling that prohibits utility affiliates from exploiting the name, reputation, or logo of the utility in advertising or marketing campaigns. The rule will protect ratepayers from cross-subsidization of utility affiliates.⁶

¹ Energy Information Administration, *Nuclear Power Generation and Fuel Cycle Report*, DOE/EIA-0436(97) (Washington, DC, January 1994), pp. 61-69.

² *Ibid.*, pp. 81-84.

³ <http://www.sddt.com/files/librarywire/98/01/16/fd.html>.

⁴ Energy Information Administration, *Challenges of Electric Power Industry Restructuring for Fuel Suppliers*, DOE/EIA-0623 (Washington, DC, September 1998), Chapter 2.

⁵ Energy Information Administration, *State Coal Profiles*, DOE/EIA-0576 (Washington, DC, January 1994), p. 27.

⁶ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

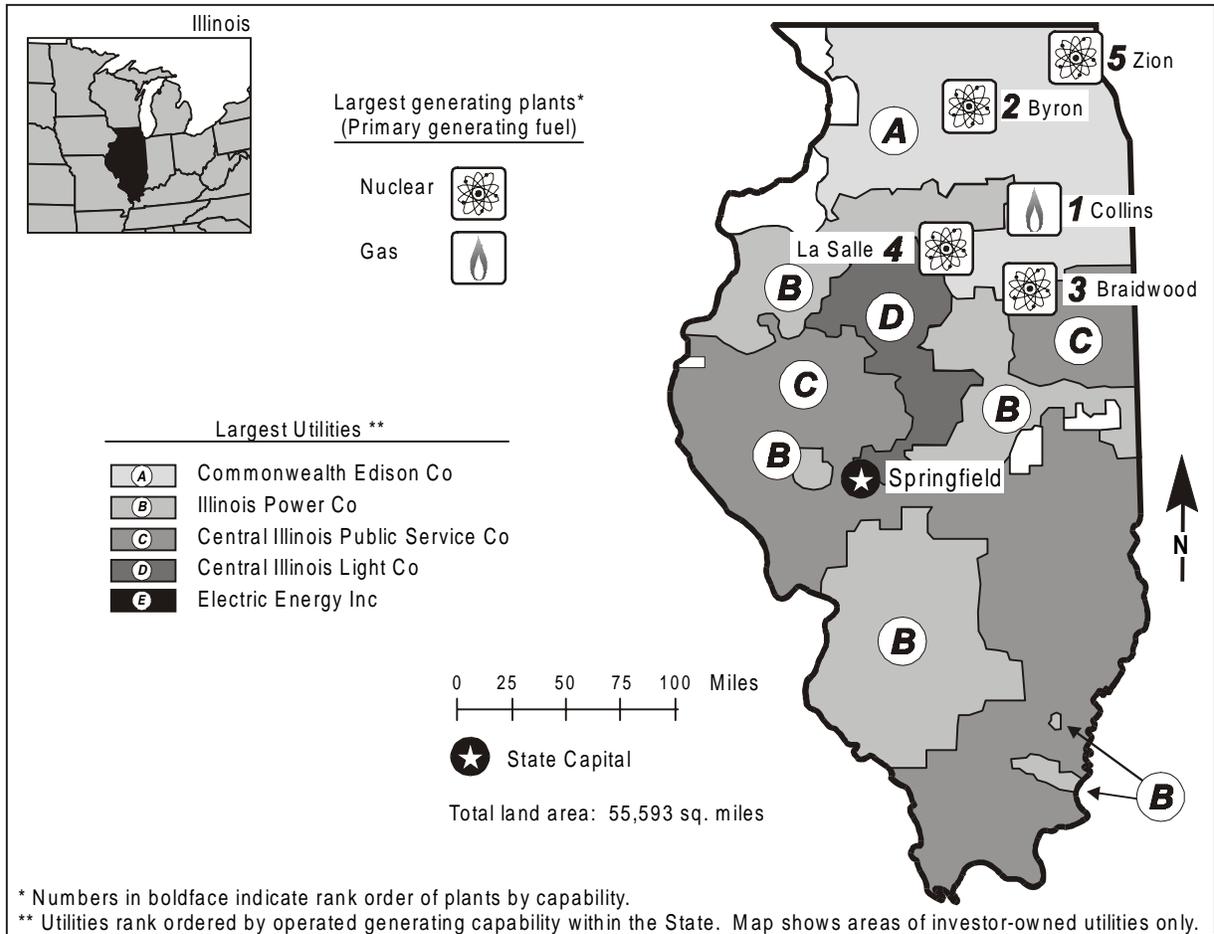


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		MAIN/MAPP	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	33,164	5
State Primary Generating Fuel		Coal	Generation (MWh)	144,116,009	4
Population (as of 7/96)	11,845,316	6	Average Age of Coal Plants	29 years	
Average Revenue (cents/kWh)	7.69	^a 39	Average Age of Oil-fired Plants	28 years	
Industry			Average Age of Gas-fired Plants	24 years	
Capability (MWe)	33,927	^b 6	Average Age of Nuclear Plants	15 years	
Generation (MWh)	148,009,801	^b 5	Average Age of Hydroelectric Plants	20 years	
Capability/person (KWe/person)	2.86	^b 25	Average Age of Other Plants	--	
Generation/person (MWh/person)	12.50	^b 24	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	785	6	Capability (MWe)	763	19
Nitrogen Oxide Emissions (Thousand Short Tons)	386	6	Percentage Share of Capability	2.2	39
Carbon Dioxide Emissions (Thousand Short Tons)	90,095	10	Generation (MWh)	3,893,792	22
Sulfur Dioxide/sq. mile (Tons)	14.12	8	Percentage Share of Generation	2.6	39
Nitrogen Oxides/sq. mile (Tons)	6.94	12			
Carbon Dioxide/sq. mile (Tons)	1,620.62	19			

-- = Not applicable.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Collins	Gas/Oil	Commonwealth Edison Co	2,698
2. Byron	Nuclear	Commonwealth Edison Co	2,240
3. Braidwood	Nuclear	Commonwealth Edison Co	2,180
4. La Salle	Nuclear	Commonwealth Edison Co	2,096
5. Zion	Nuclear	Commonwealth Edison Co	2,080

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996 (Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Commonwealth Edison Co	21,939	6,450	1,600	2,210	11,679	--
B. Illinois Power Co	4,571	2,936	253	452	930	--
C. Central Illinois Pub Serv Co	2,859	2,688	171	--	--	--
D. Central Illinois Light Co	1,152	1,106	--	46	--	--
E. Electric Energy Inc	1,014	1,014	--	--	--	--
Total	31,535	14,194	2,024	2,708	12,609	--
Percentage of Industry Capability	92.9	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

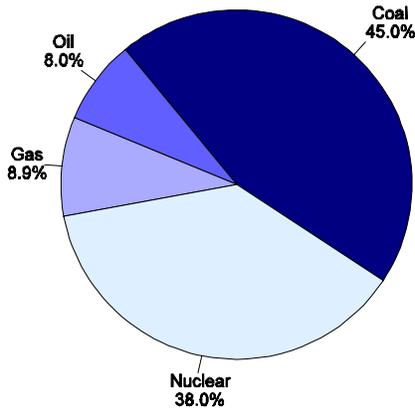


Figure 2. Utility Generation by Primary Energy Source, 1996

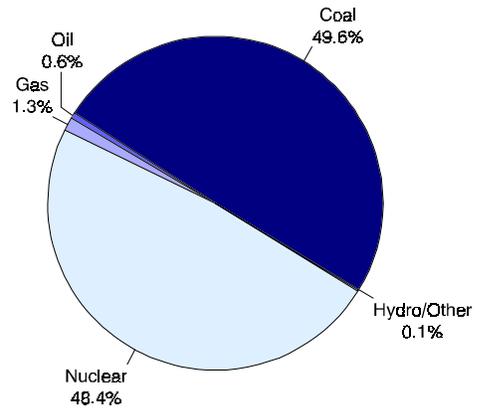


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

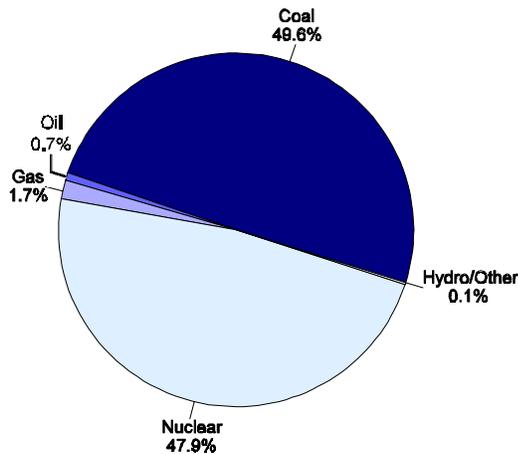


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	15,112	14,916	14,931	51.7	45.0	44.0
Oil	4,541	4,207	2,648	15.5	12.7	7.8
Gas	999	901	2,963	3.4	2.7	8.7
Nuclear	8,379	12,609	12,609	28.6	38.1	37.2
Hydro/Other	14	10	13	(s)	(s)	(s)
Total Utility	29,044	32,643	33,164	99.3	98.6	97.8
Total Nonutility	207	475	763	0.7	1.4	2.2
Industry	29,251	33,118	33,927	100.0	100.0	100.0

(s) = Nonzero percentage less than 0.05.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	61,634,155	53,955,009	71,514,607	57.2	41.4	48.3
Oil	2,036,181	905,501	795,771	1.9	0.7	0.5
Gas	483,287	1,072,070	1,875,248	0.4	0.8	1.3
Nuclear	42,613,603	71,866,091	69,774,356	39.6	55.2	47.1
Hydro/Other	124,371	52,704	156,027	0.1	(s)	0.1
Total Utility	106,891,597	127,851,375	144,116,009	99.2	98.1	97.4
Total Nonutility	851,045	2,429,238	3,893,792	0.8	1.9	2.6
Industry	107,742,642	130,280,613	148,009,801	100.0	100.0	100.0

(s) = Nonzero percentage less than 0.05.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.659	0.595	0.768	52.0	40.4	46.1
Oil	0.029	0.019	0.011	2.3	1.3	0.6
Gas	0.006	0.013	0.026	0.5	0.9	1.6
Nuclear	0.460	0.772	0.741	36.3	52.4	44.5
Hydro/Other	0.001	0.001	0.002	0.1	(s)	0.1
Total Utility	1.156	1.400	1.548	91.1	95.1	92.9
Total Nonutility	0.113	0.072	0.119	8.9	4.9	7.1
Total Industry	1.269	1.472	1.667	100.0	100.0	100.0

(s) = Nonzero percentage less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

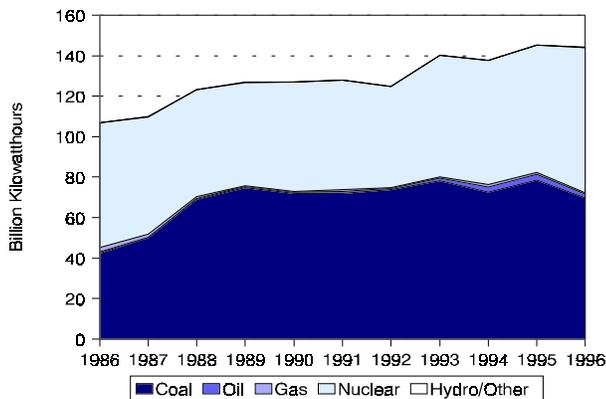


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

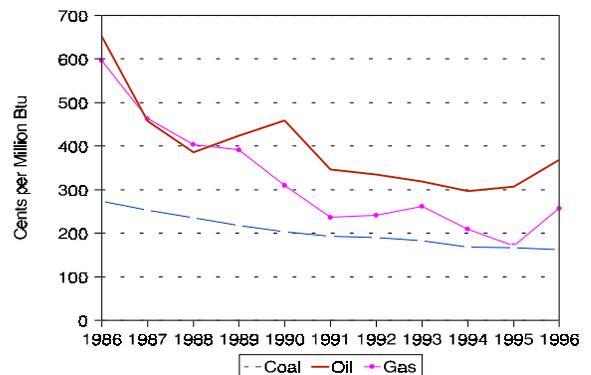


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	273.9	192.7	162.7	-5.1
Oil	651.0	347.1	368.1	-5.5
Gas	596.5	236.5	257.2	-8.1

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	999	900	785	-2.4
Nitrogen Oxides ^d . .	327	310	386	1.7
Carbon Dioxide ^d . .	84,280	68,570	90,095	0.7

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

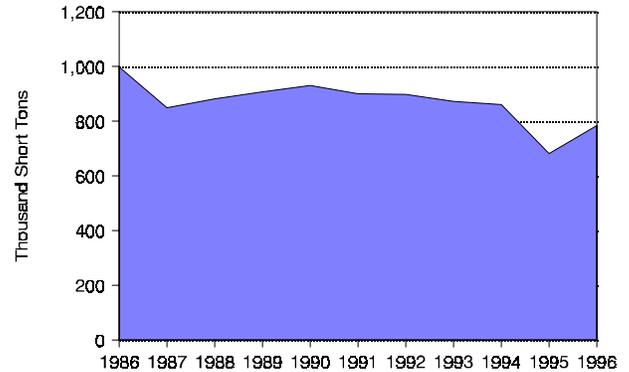


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

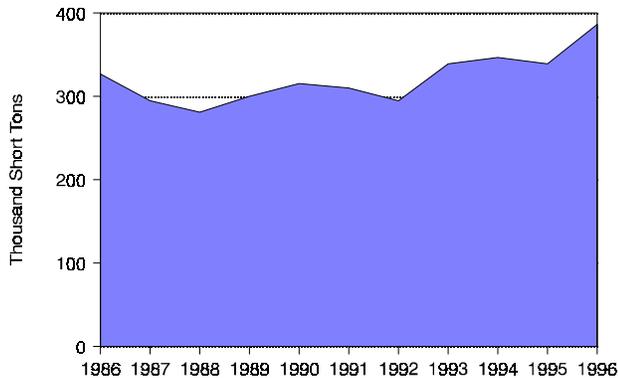


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

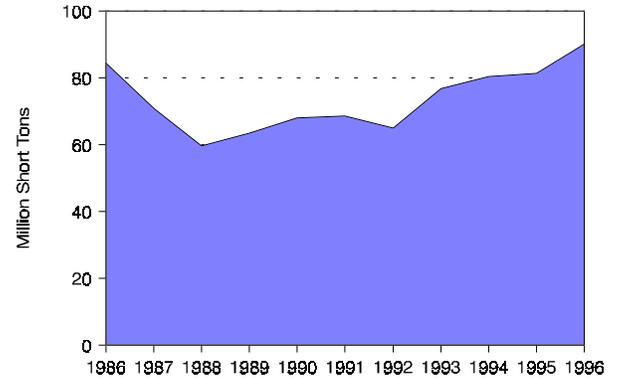


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . . .	30,964,794	35,963,792	37,534,693	1.9	30.4	30.8	29.9
Commercial . .	27,146,337	33,118,784	37,431,971	3.3	26.7	28.3	29.8
Industrial	36,785,563	39,712,089	42,050,306	1.3	36.2	34.0	33.5
Other	6,860,921	8,073,893	8,572,154	2.3	6.7	6.9	6.8
Total	101,757,613	116,868,558	125,589,124	2.1	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

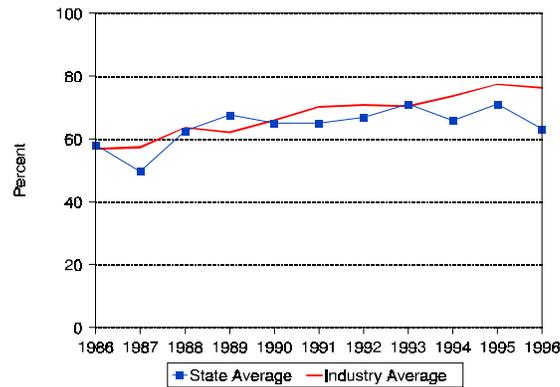


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	9	41	--	28	78
Number of Retail Customers	4,244,199	188,340	--	207,405	4,639,944
Retail Sales (MWh)	95,141,405	3,538,742	--	3,077,466	101,757,613
Percentage of Retail Sales	93.5	3.5	--	3.0	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	9,331,827	306,660	--	357,514	9,996,001
Percentage of Revenue	93.4	3.1	--	3.6	100.0
1991					
Number of Utilities	9	41	--	28	78
Number of Retail Customers	4,454,148	207,104	--	216,964	4,878,216
Retail Sales (MWh)	108,976,259	4,447,207	--	3,445,092	116,868,558
Percentage of Retail Sales	93.3	3.8	--	3.0	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	9,339,113	325,513	--	353,924	10,018,549
Percentage of Revenue	93.2	3.3	--	3.5	100.0
1996					
Number of Utilities	9	41	--	28	78
Number of Retail Customers	4,637,874	228,426	--	232,649	5,098,949
Retail Sales (MWh)	116,451,934	5,257,382	--	3,879,808	125,589,124
Percentage of Retail Sales	92.7	4.2	--	3.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	8,974,676	329,778	--	350,827	9,655,281
Percentage of Revenue	93.0	3.4	--	3.6	100.0

-- = Not applicable.

Indiana

Almost all of the electricity generated by utilities in Indiana, 104.4 billion kilowatthours, comes from coal-fired power plants. The five largest plants in the State are coal-fired and each are operated by a different utility. The largest utility, PSI Energy, operates the largest plant in the State, Tibson. Like Kentucky, Indiana's extensive use of coal is based on its own large reserves which compose the eastern part of the Illinois basin, a large geologic depression that also underlies parts of Illinois and Kentucky. Its proximity to large coal deposits in Ohio, West Virginia, and Pennsylvania make coal an obvious fuel of choice.¹ The Ohio River makes barge deliveries from each of these States possible. It follows that four of the five largest plants are located in the southern part of the State, near the Ohio.

The five largest utilities with capability within the State - PSI Energy, Indiana Michigan Power, Northern Indiana Public Service, Indianapolis Power and Light, and Hoosier Energy REC Inc - operate 80 percent of the net summer capability. Combined, these five investor-owned utilities (IOUs) along with two smaller IOUs accounted for about 84 percent of the retail sales within the State. Together, the IOUs and the State's 72 public utilities and 43 cooperatives generated 105.6 billion kilowatthours of electricity in 1996. In 1996, the average price of electricity was 5.23 cents per kilowatthour, eighth lowest in the Nation.

Over the 11-year period examined in this report, utility electricity retail sales have increased at an average annual growth rate of 3.3 percent, reaching 88.9 billion kilowatthours in 1996. Indiana is an exporter of

electricity with a net difference of 16.7 billion kilowatthours between generation and sales.

Like other States along the Ohio River that use an extensive amount of Illinois Basin coal, Indiana's heavy use of coal comes at a price of high sulfur dioxide (SO₂) emissions. Indiana's coal is high in sulfur content and, depending on its use, must be cleaned to meet air quality standards. Even so, the sulfur content remains relatively high after cleaning, averaging more than 2 percent by weight.² In 1996, Indiana ranked third highest in SO₂ emissions and second for both nitrogen oxides (NO_x) and carbon dioxide. The Clean Air Act Amendments of 1990 required 11,192 megawatts of nameplate capacity at 15 Indiana plants to begin compliance with stricter emissions standards for SO₂ and NO_x. Only Ohio had more affected capability than Indiana. Recently, SO₂ emissions, although still high, declined by an average annual rate of 9.6 percent between 1991 and 1996.

Electricity industry restructuring has been slow for States in this region, and Indiana is no exception. As recently as 1998, a deregulation bill was defeated. Indiana's major utilities and other groups promised to begin meeting this Spring to work out differences over how deregulation should be implemented. New legislation is expected to be written in the 1999 legislative session. Customers of Indianapolis Power and Light were offered three billing options in July 1998. They have the option of a fixed rate, a fixed monthly bill based on last year's average bill, or a "green power" rate under an alternative pricing plan approved in March by the Indiana Utilities Regulatory Commission.³

¹ Energy Information Administration, *State Coal Profiles*, DOE/EIA-0576 (Washington, DC, January 1994), p. 27.

² Energy Information Administration, *State Coal Profiles*, DOE/EIA-0576 (Washington, DC, January 1994), p. 31.

³ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

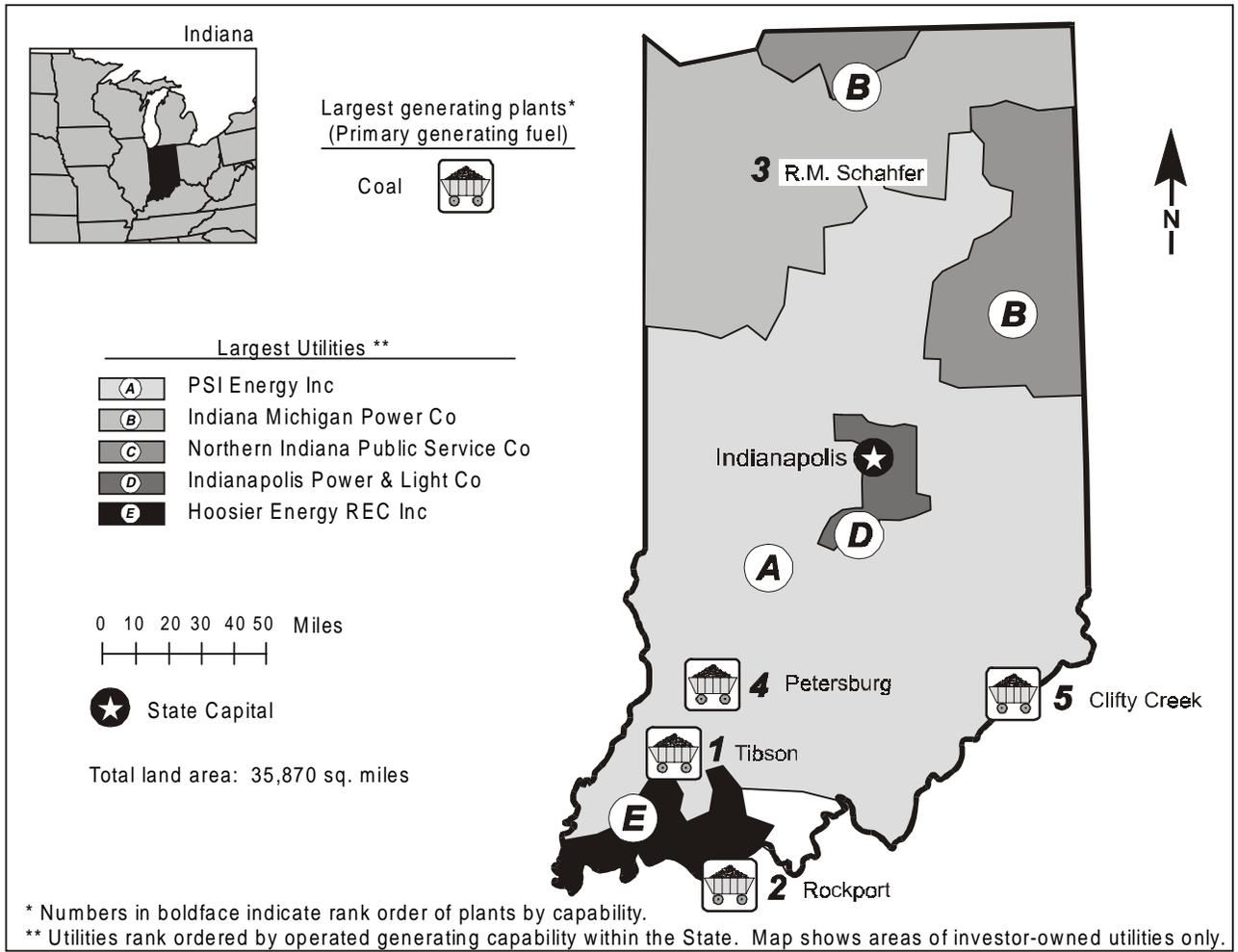


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		ECAR	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	20,681	13
State Primary Generating Fuel		Coal	Generation (MWh)	105,557,018	9
Population (as of 7/96)	5,828,090	14	Average Age of Coal Plants	23 years	
Average Revenue (cents/kWh)	5.23	^a 8	Average Age of Oil-fired Plants	35 years	
Industry			Average Age of Gas-fired Plants	18 years	
Capability (MWe)	21,581	^b 13	Average Age of Nuclear Plants	--	
Generation (MWh)	109,971,063	^b 12	Average Age of		
Capability/person			Hydroelectric Plants	38 years	
(KWe/person)	3.70	^b 13	Average Age of Other Plants . . .	--	
Generation/person			Nonutility^c		
(MWh/person)	18.87	^b 6	Capability (MWe)	900	17
Sulfur Dioxide Emissions			Percentage Share of Capability	4.2	31
(Thousand Short Tons)	884	3	Generation (MWh)	4,414,045	19
Nitrogen Oxide Emissions			Percentage Share of Generation	4.0	32
(Thousand Short Tons)	672	2	-- = Not applicable.		
Carbon Dioxide Emissions					
(Thousand Short Tons)	162,504	2			
Sulfur Dioxide/sq. mile (Tons)	24.64	5			
Nitrogen Oxides/sq. mile (Tons)	18.73	2			
Carbon Dioxide/sq. mile (Tons)	4,530.36	3			

Table 2. Five Largest Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Tibson	Coal	PSI Energy Inc	3,124
2. Rockport	Coal	Indiana Michigan Power Co	2,600
3. R M Schahfer	Coal	Northern Indiana Pub Serv Co	1,780
4. Petersburg	Coal	Indianapolis Power & Light Co	1,672
5. Clifty Creek	Coal	Indiana-Kentucky Electric Corp	1,217

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. PSI Energy Inc	6,144	5,764	236	99	--	45
B. Indiana Michigan Power Co	3,602	3,580	15	--	--	7
C. Northern Indiana Pub Serv Co	3,392	2,934	--	448	--	10
D. Indianapolis Power & Light Co	2,973	2,594	222	157	--	--
E. Hoosier Energy REC Inc.	1,243	1,243	--	--	--	--
Total	17,354	16,115	473	704	--	62
Percentage of Industry Capability	80.4	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

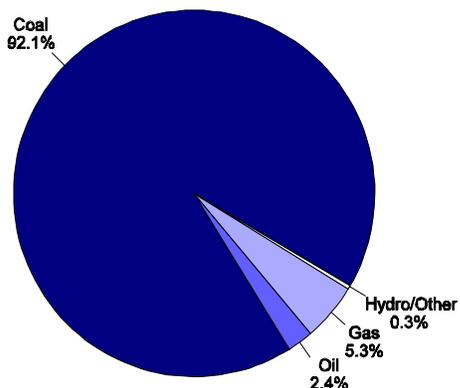


Figure 2. Utility Generation by Primary Energy Source, 1996

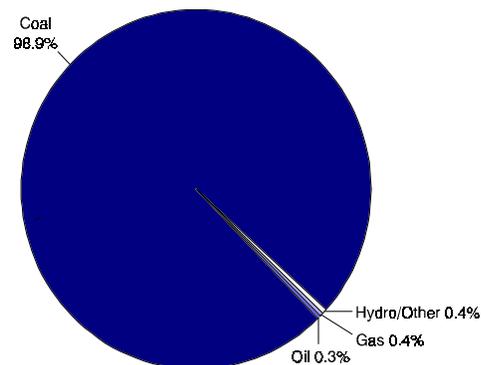


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

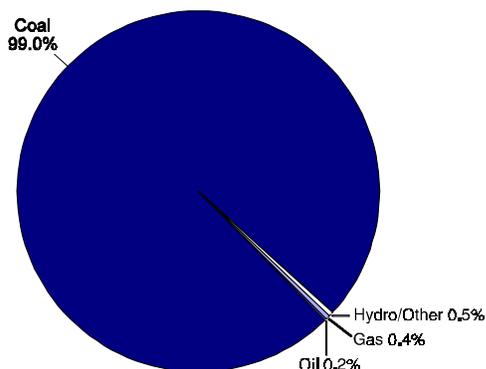


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	18,330	19,588	19,045	95.1	94.3	92.1
Oil	662	490	487	3.4	2.4	2.4
Gas	210	628	1,087	1.1	3.0	5.3
Nuclear	--	--	--	--	--	--
Hydro/Other	74	66	62	0.4	0.3	0.3
Total Utility	19,276	20,773	20,681	100.0	100.0	100.0
Total Nonutility	W	755	900	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	76,445,671	96,526,976	104,413,600	98.8	98.3	98.9
Oil	294,674	354,297	320,566	0.4	0.4	0.3
Gas	95,595	919,662	374,488	0.1	0.9	0.4
Nuclear	--	--	--	--	--	--
Hydro/Other	505,967	399,051	448,364	0.7	0.4	0.4
Total Utility	77,341,908	98,199,986	105,557,018	100.0	100.0	100.0
Total Nonutility	W	3,733,459	4,414,045	--	--	--

-- = Not applicable. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.798	1.009	1.098	99.0	98.4	99.0
Oil	0.002	0.002	0.002	0.2	0.2	0.2
Gas	0.001	0.010	0.004	0.1	1.0	0.4
Nuclear	--	--	--	--	--	--
Hydro/Other	0.005	0.004	0.005	0.7	0.4	0.4
Total Utility	0.806	1.025	1.110	100.0	100.0	100.0
Total Nonutility	W	0.116	0.140	--	--	--

-- = Not applicable. W = Withheld.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

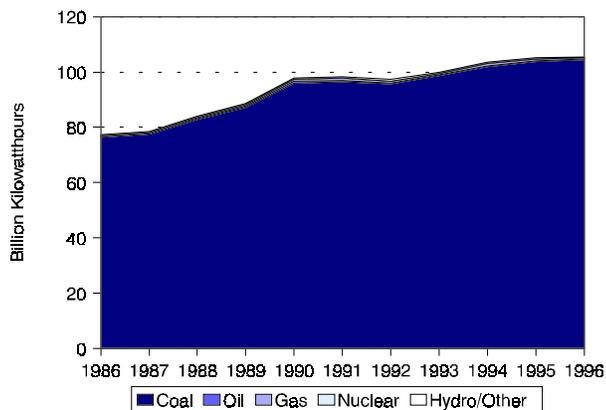


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

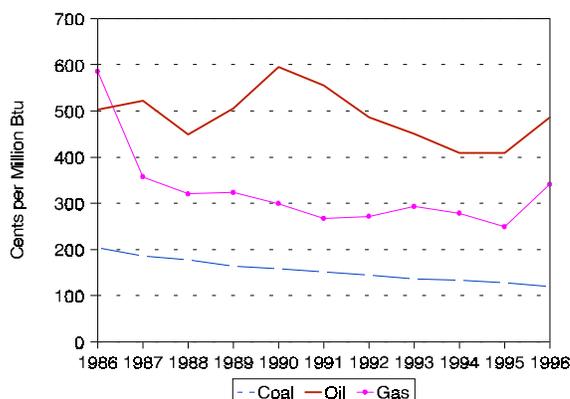


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	203.7	151.0	119.1	-5.2
Oil	502.3	555.1	486.9	-0.3
Gas	585.6	267.2	341.2	-5.3

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	1,460	1,468	884	-4.9
Nitrogen Oxides ^d . .	404	634	672	5.2
Carbon Dioxide ^d . . .	95,850	143,923	162,504	5.4

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

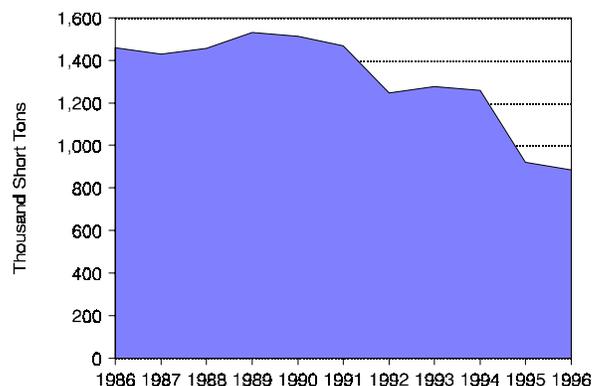


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

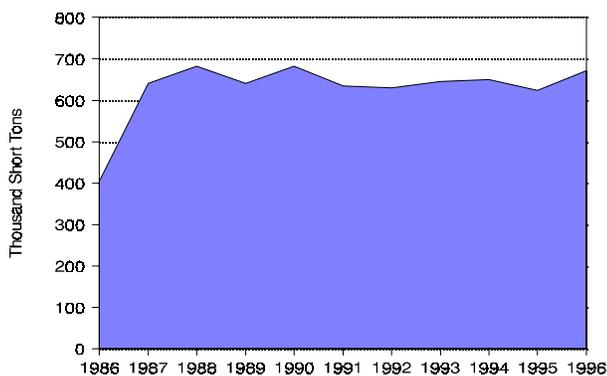


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

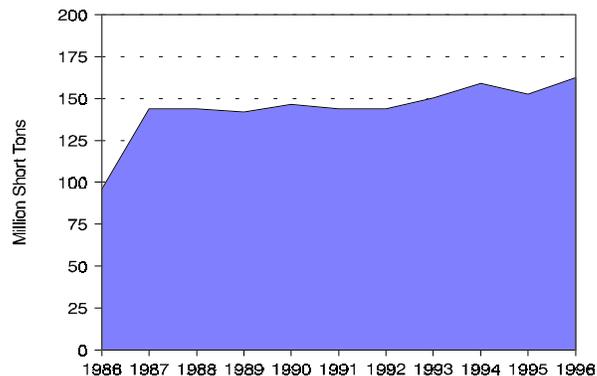


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . . .	20,507,830	24,220,121	26,860,496	2.7	31.8	31.4	30.2
Commercial . .	12,291,204	16,381,408	18,291,938	4.1	19.1	21.3	20.6
Industrial	30,950,223	35,786,821	43,203,154	3.4	48.1	46.5	48.6
Other	641,442	645,386	545,784	-1.6	1.0	0.8	0.6
Total	64,390,702	77,033,736	88,901,372	3.3	100.0	100.0	100.0

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	7	71	--	44	122
Number of Retail Customers	1,760,678	219,677	--	338,266	2,318,621
Retail Sales (MWh)	54,964,626	4,439,253	--	4,986,823	64,390,702
Percentage of Retail Sales	85.4	6.9	--	7.7	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	4,063,605	326,453	--	479,626	4,869,683
Percentage of Revenue	83.5	6.7	--	9.9	100.0
1991					
Number of Utilities	7	72	--	44	123
Number of Retail Customers	1,885,623	232,561	--	373,690	2,491,874
Retail Sales (MWh)	65,463,074	5,408,848	--	6,161,814	77,033,736
Percentage of Retail Sales	85.0	7.0	--	8.0	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	3,777,474	334,445	--	496,779	4,608,698
Percentage of Revenue	82.0	7.3	--	10.8	100.0
1996					
Number of Utilities	7	72	--	43	122
Number of Retail Customers	2,020,028	243,155	--	416,364	2,679,547
Retail Sales (MWh)	74,675,170	6,669,957	--	7,556,245	88,901,372
Percentage of Retail Sales	84.0	7.5	--	8.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	3,806,905	356,087	--	488,228	4,651,220
Percentage of Revenue	81.9	7.7	--	10.5	100.0

-- = Not applicable.

Iowa

Iowa's electricity generation comes predominantly from coal-fired power plants. Over 90 percent of the coal purchased for electricity generation in Iowa is mined in the Powder River Basin in Wyoming.¹ Very little coal comes from within the State. Although Iowa's coal has a relatively high heat content, averaging around 20 million Btu per short ton, its use is limited because of its high sulfur content, which averages more than 3 percent by weight.² Given the State's large coal purchases, it follows that the five largest plants in Iowa, including George Neal North, the largest, are coal-fired plants. Three of the largest plants are along the banks of the Missouri River in western Iowa. The largest utility in the State is the MidAmerican Energy Corporation, which operates four of the five largest plants including George Neal North.

The five largest utilities in the State, the MidAmerican Energy Company, IES Utilities Inc., Interstate Power Company, the City of Muscatine, and Central Iowa Power Cooperative, operated 85 percent of Iowa's net summer capability in 1996. These utilities along with one other investor-owned utility, 137 public utilities, and 47 cooperatives, serve a population of almost 3 million at an average price of 5.94 cents per kilowatt-hour of electricity, the eighteenth lowest in the Nation. Over the 11-year period examined in this report, the fuel mix and capability and generation shares in Iowa remained quite stable.

In 1996, Iowa utilities generated 33.4 billion kilowatt-hours of electricity. The industrial sector accounted for

over 40 percent of retail sales in 1996, while the residential sector accounted for 33 percent, and the commercial sector accounted for 21 percent. From 1986 to 1996, utility electricity retail sales have increased at an average annual rate of 2.9 percent, reaching 35 billion kilowatt-hours in 1996.

In spite of its largely coal-based generation, Iowa also produces a significant amount of electricity from its only nuclear plant, Duane Arnold, which is operated by the Iowa Electric Light and Power Company. In 1996, the plant produced 11.8 percent of utility electricity generated in the State. Over the 11-year period, Duane Arnold's capacity factor was equal to or higher than the national average.

The Clean Air Act Amendments of 1990 cited 977 megawatts of nameplate capacity at six Iowa plants to begin compliance with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x) in 1995. In 1996, Iowa's electricity generator emissions ranked twenty-first, twenty-first, and twenty-eighth for SO₂, NO_x, and carbon dioxide (CO₂), respectively. Concentrations per square mile ranked twenty-seventh for SO₂ and NO_x and thirty-first for CO₂.

Iowa has taken some action toward deregulating its electric power industry. In April 1998, a bill was drafted to introduce retail competition, but its introduction is not planned until the 1999 session. In September 1997, the Iowa Utilities Board adopted an action plan to develop a competitive model.³

¹ Energy Information Administration, *Cost and Quality of Fuels for Electric Utility Plants 1997 Tables*, DOE/EIA-0191(97) (Washington, DC, May 1998), p. 31.

² Energy Information Administration, *State Coal Profiles*, DOE/EIA-0576 (Washington, DC, January 1994), p. 35.

³ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

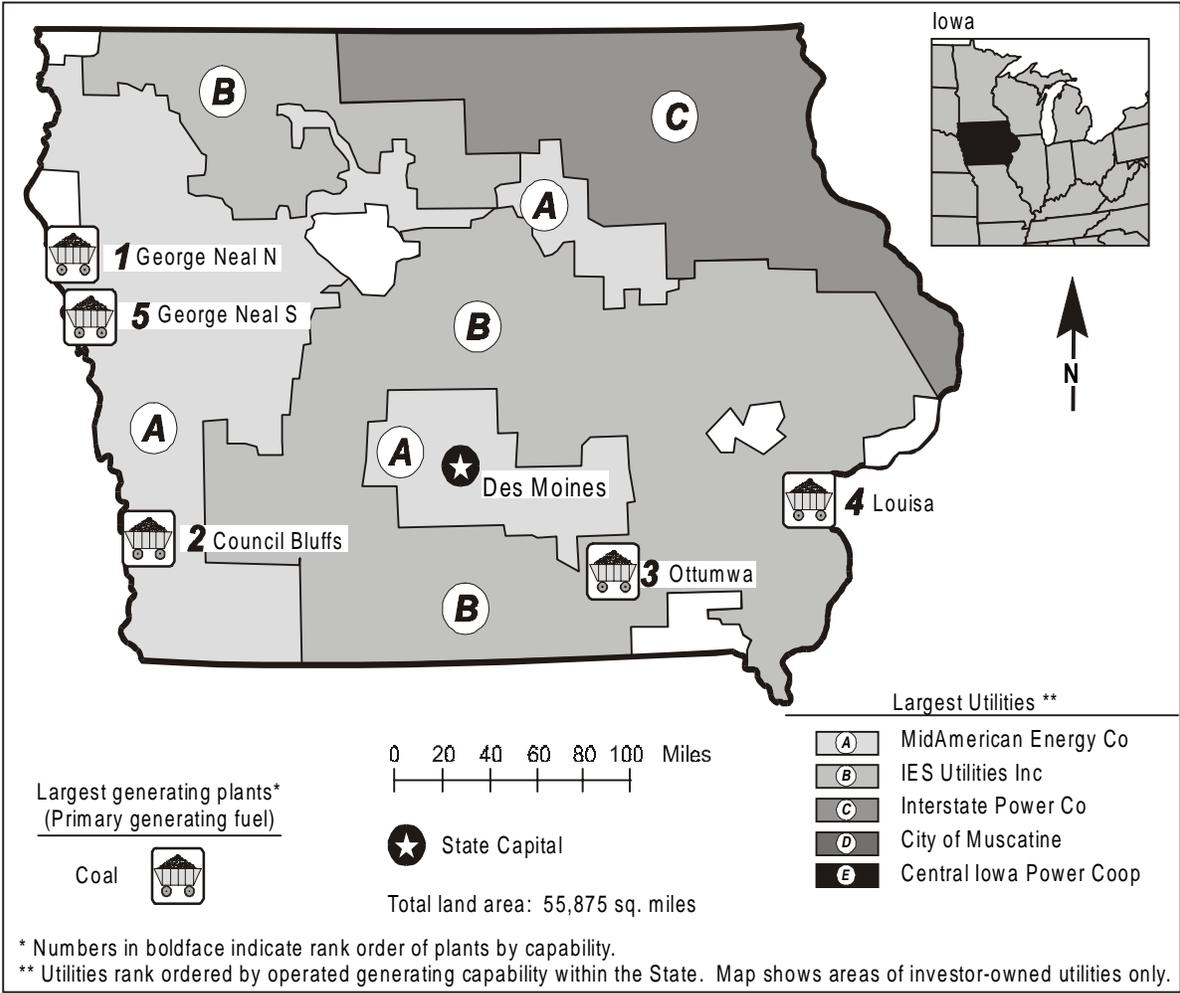


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		MAPP	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	8,161	31
State Primary Generating Fuel		Coal	Generation (MWh)	33,386,873	31
Population (as of 7/96)	2,848,033	30	Average Age of Coal Plants	23 years	
Average Revenue (cents/kWh)	5.94	^a 18	Average Age of Oil-fired Plants	20 years	
Industry			Average Age of Gas-fired Plants	25 years	
Total Capability (MWe)	8,497	^b 29	Average Age of Nuclear Plants	22 years	
Total Generation (MWh)	34,455,527	^b 30	Average Age of		
Capability/person			Hydroelectric Plants	79 years	
(KWe/person)	2.98	^b 24	Average Age of Other Plants	3 years	
Generation/person			Nonutility^c		
(MWh/person)	12.10	^b 27	Capability (MWe)	336	33
Sulfur Dioxide Emissions			Percentage Share of Capability	4.0	32
(Thousand Short Tons)	171	21	Generation (MWh)	1,068,654	36
Nitrogen Oxide Emissions			Percentage Share of		
(Thousand Short Tons)	156	21	Generation	3.1	35
Carbon Dioxide Emissions					
(Thousand Short Tons)	37,175	28			
Sulfur Dioxide/sq. mile (Tons)	3.06	27			
Nitrogen Oxides/sq. mile (Tons)	2.79	28			
Carbon Dioxide/sq. mile (Tons)	665.32	31			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. George Neal North	Coal	MidAmerican Energy Co	806
2. Council Bluffs	Coal	MidAmerican Energy Co	768
3. Ottumwa	Coal	IES Utilities Inc	714
4. Louisa	Coal	MidAmerican Energy Co	644
5. George Neal South	Coal	MidAmerican Energy Co	624

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. MidAmerican Energy Co	3,950	3,165	189	591	--	5
B. IES Utilities Inc	2,168	1,382	162	102	520	2
C. Interstate Power Co	710	615	77	18	--	--
D. City of Muscatine	263	263	--	--	--	--
E. Central Iowa Power Coop	151	64	65	22	--	--
Total	7,242	5,489	493	733	520	7
Percentage of Industry Capability	85.2	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

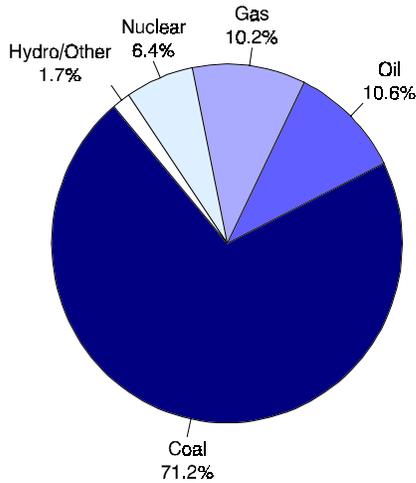


Figure 2. Utility Generation by Primary Energy Source, 1996

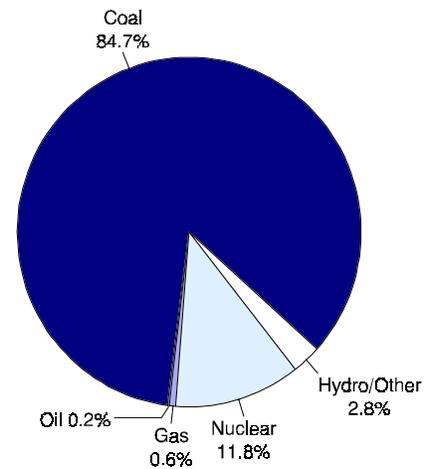


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

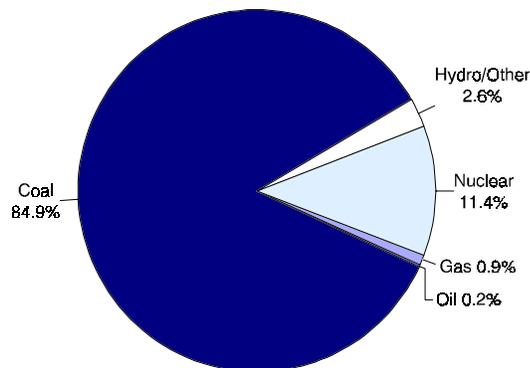


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	6,007	5,919	5,807	76.5	73.2	71.2
Oil	582	723	861	7.4	8.9	10.6
Gas	638	809	835	8.1	10.0	10.2
Nuclear	500	515	520	6.4	6.4	6.4
Hydro/Other	124	124	139	1.6	1.5	1.7
Total Utility	7,851	8,090	8,161	100.0	100.0	100.0
Total Nonutility	W	318	336	--	--	--

W = Withheld. -- = Not applicable.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	19,993,153	25,869,811	28,282,531	82.8	82.8	84.7
Oil	41,574	46,831	51,064	0.2	0.1	0.2
Gas	87,174	262,011	188,725	0.4	0.8	0.6
Nuclear	2,993,335	4,146,811	3,923,631	12.4	13.3	11.8
Hydro/Other	1,021,383	902,547	940,922	4.2	2.9	2.8
Total Utility	24,136,619	31,228,011	33,386,873	100.0	100.0	100.0
Total Nonutility	W	806,034	1,068,654	--	--	--

W = Withheld. -- = Not applicable.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.222	0.282	0.311	83.2	82.9	84.9
Oil	0.001	0.001	0.001	0.2	0.2	0.2
Gas	0.001	0.004	0.003	0.5	1.1	0.9
Nuclear	0.032	0.045	0.042	12.1	13.1	11.4
Hydro/Other	0.011	0.009	0.010	4.0	2.7	2.6
Total Utility	0.267	0.340	0.367	100.0	100.0	100.0
Total Nonutility	W	0.030	0.039	--	--	--

W = Withheld. -- = Not applicable.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

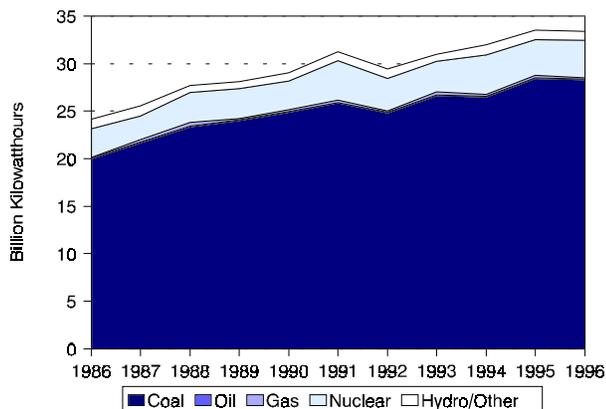


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

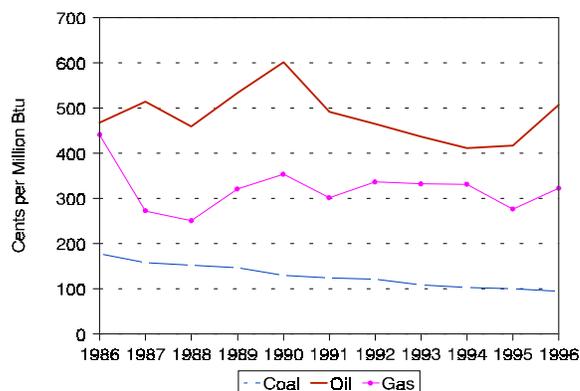


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	177.1	124.1	94.1	-6.1
Oil	468.0	492.0	507.5	0.8
Gas	441.3	301.8	322.4	-3.1

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	187	212	171	-0.9
Nitrogen Oxides ^d . .	114	158	156	3.2
Carbon Dioxide ^d . .	23,292	33,189	37,175	4.8

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

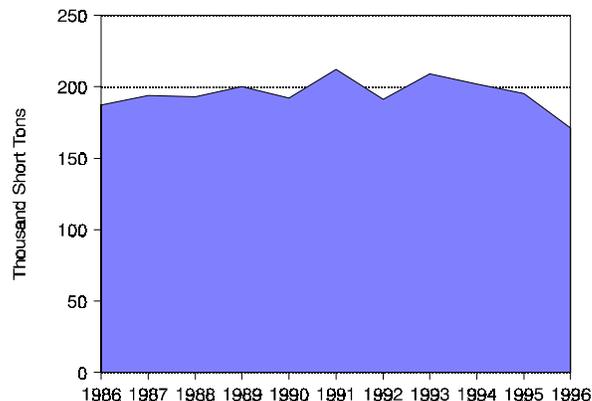


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

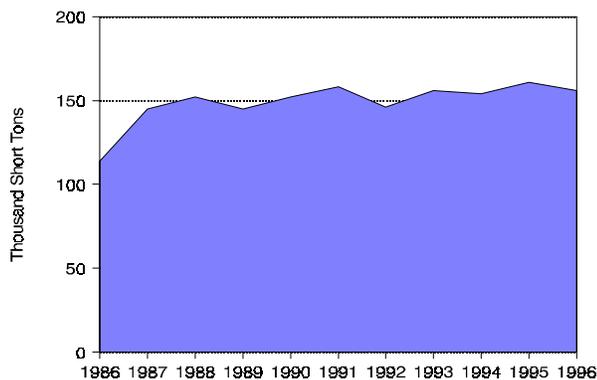


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

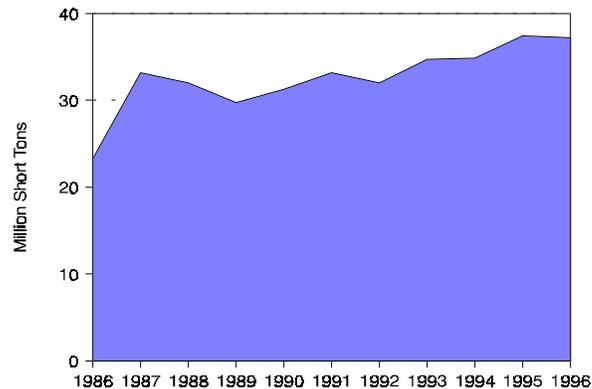


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	10,008,096	11,159,190	11,537,222	1.4	38.0	36.3	33.0
Commercial .	5,790,760	7,123,125	7,338,062	2.4	22.0	23.1	21.0
Industrial . . .	9,796,836	11,684,144	14,788,783	4.2	37.2	38.0	42.3
Other	759,872	815,003	1,335,349	5.8	2.9	2.6	3.8
Total	26,355,574	30,781,462	34,999,416	2.9	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

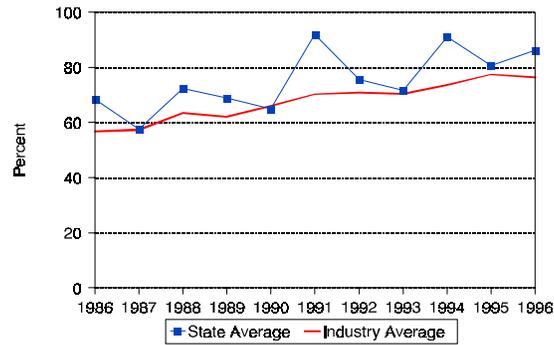


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	9	139	--	52	200
Number of Retail Customers	929,939	179,675	--	172,919	1,282,533
Retail Sales (MWh)	20,112,062	3,354,442	--	2,889,070	26,355,574
Percentage of Retail Sales	76.3	12.7	--	11.0	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,642,707	235,884	--	270,022	2,148,613
Percentage of Revenue	76.5	11.0	--	12.6	100.0
1991					
Number of Utilities	8	138	--	52	198
Number of Retail Customers	955,245	182,748	--	180,492	1,318,485
Retail Sales (MWh)	23,760,615	3,937,944	--	3,082,903	30,781,462
Percentage of Retail Sales	77.2	12.8	--	10.0	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,549,487	239,267	--	267,028	2,055,781
Percentage of Revenue	75.4	11.6	--	13.0	100.0
1996					
Number of Utilities	4	138	--	48	190
Number of Retail Customers	1,000,740	190,489	--	184,117	1,375,346
Retail Sales (MWh)	27,151,481	4,388,143	--	3,459,792	34,999,416
Percentage of Retail Sales	77.6	12.5	--	9.9	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,572,129	239,214	--	267,156	2,078,499
Percentage of Revenue	75.6	11.5	--	12.9	100.0

-- = Not applicable.

Kansas

Kansas' electricity generation comes predominantly from coal-fired power plants, producing 29.7 billion kilowatthours (74.6 percent of the utility share) in 1996. Over 85 percent of the electric utility coal purchases is mined in the Powder River Basin in Wyoming.¹ Very little coal comes from within the State. Although Kansas coal has a relatively high heat content, averaging more than 21 million Btu per short ton, its use is constrained by its high sulfur content, which averages about 4 percent by weight.² Given the State's large coal purchases, it follows that three of the four largest plants in Kansas, including Jeffrey EC, the largest, are coal-fired plants. The three plants are located in the eastern part of the State close to the capital, Topeka. The largest utility in the State, KPL, operates two of the four largest plants, including Jeffrey EC.

The five largest utilities with capability within the State—KPL, the Kansas City Power and Light Company, the Wolf Creek Nuclear Operating Corporation, KGE, and the city of Kansas City—operated over 80 percent of the net summer capability. These utilities, along with three investor-owned utilities, 119 public utilities, and 33 cooperatives, serve a population of about 2.5 million. The average retail price was 6.52 cents per kilowatthour, which was twenty-second lowest in the Nation. Over the 11-year period examined in this report, the fuel mix and capability and generation shares in Iowa remained quite stable.

In 1996, utilities generated 39.9 billion kilowatthours of electricity. The commercial sector accounted for over 35 percent of retail sales in 1996, while the residential sector accounted for 34 percent and the industrial sector accounted for 30 percent. From 1986 to 1996, utility retail

sales have increased at an average annual rate of 2.8 percent, reaching 31.3 billion kilowatthours in 1996. Kansas is an exporter of electricity with a net difference of 8.3 billion kilowatthours between generation and sales.

In spite of its largely coal-based generation, Kansas also produces a significant amount of nuclear power generation, 8.2 billion kilowatthours (20.6 percent of the utility share) in 1996. This power is produced by the State's only nuclear plant, Wolf Creek, which is operated by Wolf Creek Nuclear Operating Corporation. Wolf Creek's capacity factor was higher than the national average 10 of the 11 years examined, posting a capacity factor of 80.5 percent in 1996.

The Clean Air Act Amendments of 1990 cited 158 megawatts of nameplate capacity at the City of Kansas City's Quindaro plant to begin compliance with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x). Emissions of SO₂, NO_x, and carbon dioxide (CO₂) from Kansas generators ranked twenty-seventh, twenty-fifth, and thirtieth nationally in 1996. The concentration of these pollutants per square mile in Kansas ranked thirty-fifth, thirty-fifth and thirty-eighth, respectively. Emissions of SO₂ in Kansas rose slightly from 1986 to 1991, and then rose more sharply to the 1996 levels. NO_x and CO₂ emissions also increased substantially over both periods.

The Kansas State legislature did not act on a restructuring bill that was proposed in February, 1998 by the Retail Wheeling Task Force. Legislation will likely be introduced again in the 1999 session. The bill that was proposed by the Task Force called for retail access after July 2001.³

¹ Energy Information Administration, *Cost and Quality of Fuels for Electric Utility Plants 1997 Tables*, DOE/EIA-0191(97) (Washington, DC, May 1998), p. 31.

² Energy Information Administration, *State Coal Profiles*, DOE/EIA-0576 (Washington, DC, January 1994), p. 39.

³ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

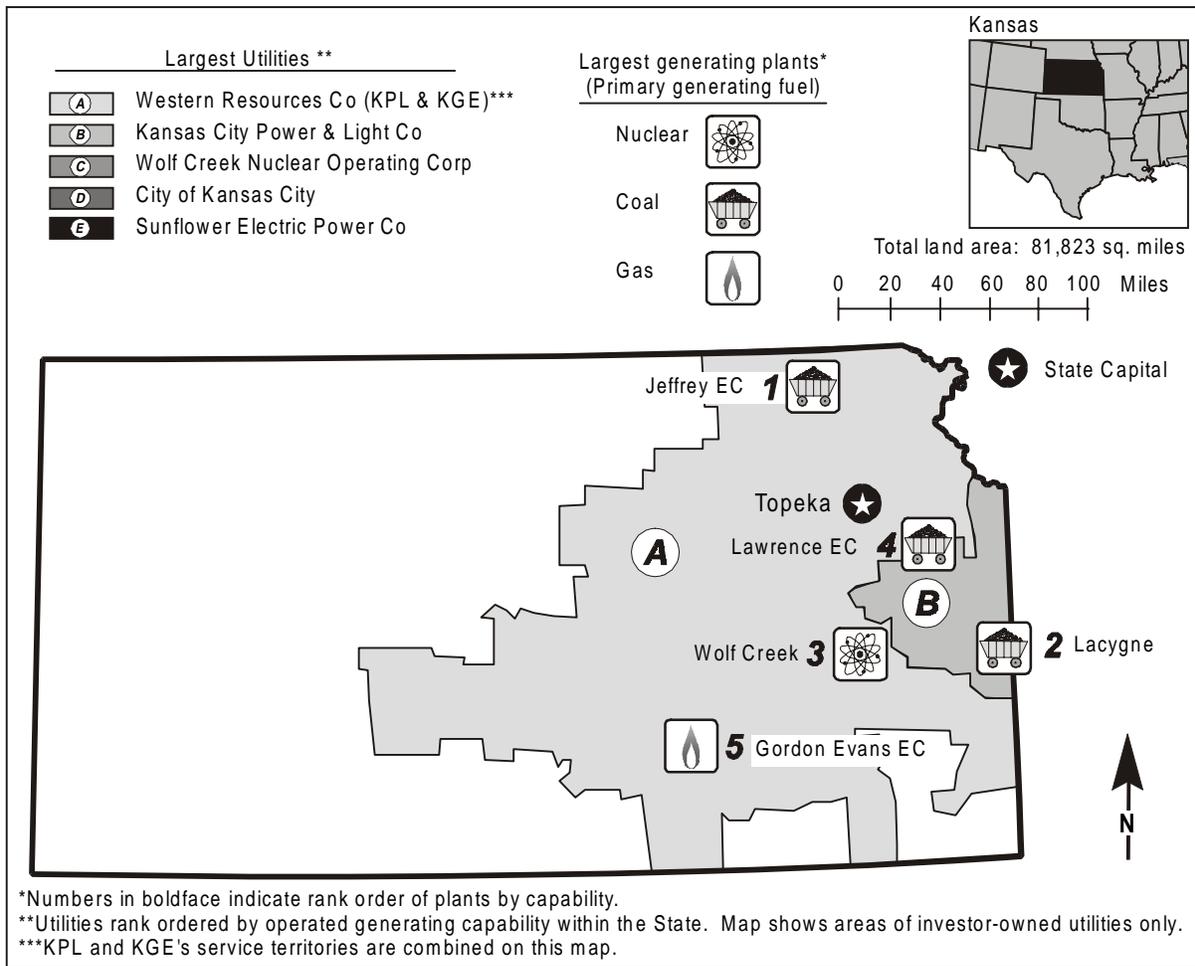


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		SPP/MAPP	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	9,694	27
State Primary Generating Fuel		Coal	Generation (MWh)	39,874,544	29
Population (as of 7/96)	2,579,149	32	Average Age of Coal Plants	21 years	
Average Revenue (cents/kWh)	6.52	^a 30	Average Age of Oil-fired Plants . .	23 years	
Industry			Average Age of Gas-fired Plants	29 years	
Capability (MWe)	9,743	^b 28	Average Age of Nuclear Plants . .	11 years	
Generation (MWh)	39,945,525	^b 26	Average Age of		
Capability/person			Hydroelectric Plants	--	
(KWe/person)	3.78	^b 12	Average Age of Other Plants	--	
Generation/person			Nonutility^c		
(MWh/person)	15.49	^b 17	Capability (MWe)	49	43
Sulfur Dioxide Emissions			Percentage Share of Capability . .	0.5	43
(Thousand Short Tons)	103	27	Generation (MWh)	70,981	43
Nitrogen Oxide Emissions			Percentage Share of		
(Thousand Short Tons)	134	25	Generation	0.2	43
Carbon Dioxide Emissions			-- = Not applicable.		
(Thousand Short Tons)	36,376	30			
Sulfur Dioxide/sq. mile (Tons)	1.26	35			
Nitrogen Oxides/sq. mile (Tons)	1.64	35			
Carbon Dioxide/sq. mile (Tons)	444.57	38			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capacity (MWe)
1. Jeffrey EC	Coal	KPL	2,136
2. Lacygne	Coal	Kansas City Power & Light Co	1,350
3. Wolf Creek	Nuclear	Wolf Creek Nuclear Oper Corp	1,163
4. Lawrence EC	Coal	KPL	565
5. Gordon Evans EC	Gas/Oil	KGE	517

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. KPL	3,534	2,867	81	1,462	--	--
B. Kansas City Power & Light Co	1,350	1,350	--	--	--	--
C. Wolf Creek Nuclear Oper Corp	1,163	--	--	--	1,163	--
D. KGE	920	--	3	917	--	--
E. City of Kansas City	676	572	90	14	--	--
Total	7,643	4,789	174	2,393	1,163	--
Percentage of Industry Capability	78.4	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

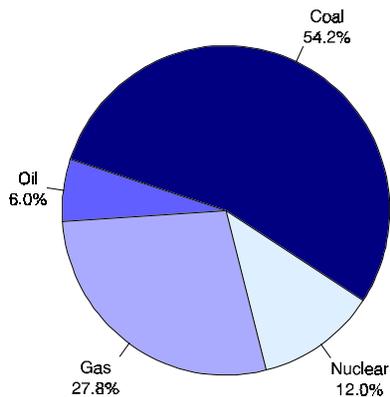


Figure 2. Utility Generation by Primary Energy Source, 1996

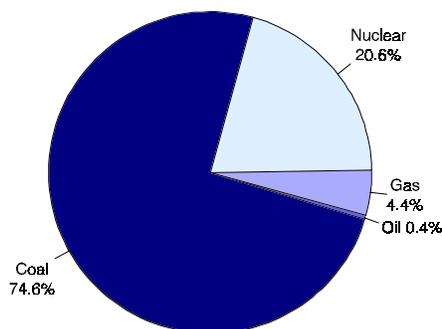


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

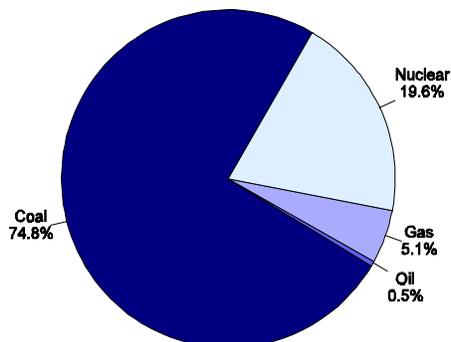


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	5,010	5,091	5,256	53.0	53.0	54.2
Oil	578	602	578	6.1	6.3	6.0
Gas	2,750	2,784	2,697	29.1	29.0	27.8
Nuclear	1,117	1,131	1,163	11.8	11.8	12.0
Hydro/Other	2	--	--	(s)	--	--
Total Utility	9,457	9,609	9,694	100.0	100.0	100.0
Total Nonutility	W	W	49	--	--	--

-- = Not applicable. W = Withheld. (s) = Nonzero percentage less than 0.05.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	21,362,084	23,435,008	29,742,722	72.3	72.5	74.6
Oil	84,497	52,702	158,472	0.3	0.2	0.4
Gas	1,117,308	2,959,358	1,768,482	3.8	9.2	4.4
Nuclear	6,958,726	5,858,613	8,204,868	23.6	18.1	20.6
Hydro/Other	8,376	9,144	--	(s)	(s)	--
Total Utility	29,530,991	32,314,825	39,874,544	100.0	100.0	100.0
Total Nonutility	W	W	70,981	--	--	--

-- = Not applicable. W = Withheld. (s) = Nonzero percentage less than 0.05.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.246	0.266	0.333	73.0	72.8	74.8
Oil	0.001	0.001	0.002	0.3	0.2	0.5
Gas	0.015	0.035	0.023	4.4	9.7	5.1
Nuclear	0.075	0.063	0.087	22.3	17.2	19.6
Hydro/Other	(s)	(s)	--	--	--	--
Total Utility	0.338	0.366	0.445	100.0	100.0	100.0
Total Nonutility	W	W	0.002	--	--	--

-- = Not applicable. W = Withheld. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

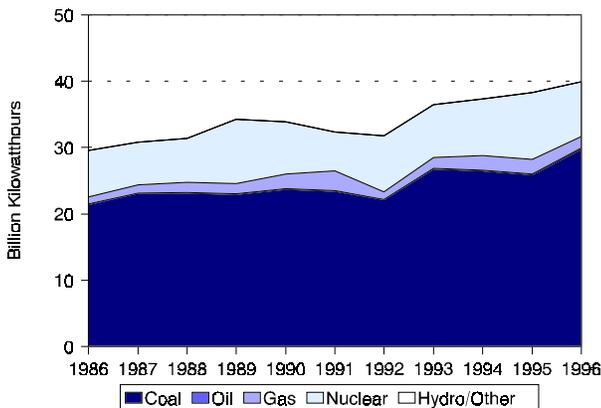


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

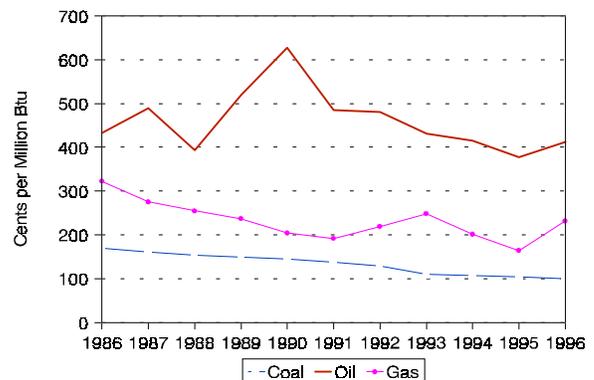


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	170.3	137.8	99.2	-5.3
Oil	433.4	485.2	412.2	-0.5
Gas	322.7	191.9	231.8	-3.3

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	71	77	103	3.8
Nitrogen Oxides ^d . .	78	116	134	5.6
Carbon Dioxide ^d . .	21,284	30,118	36,376	5.5

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

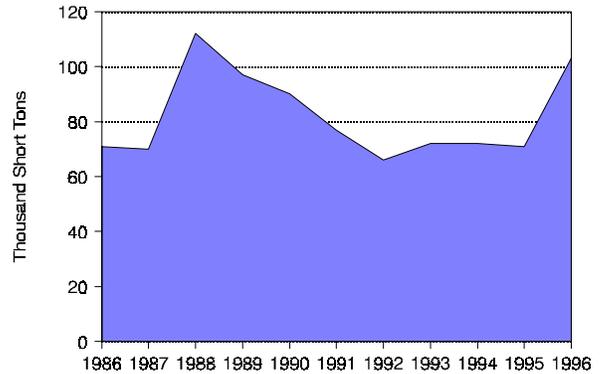


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

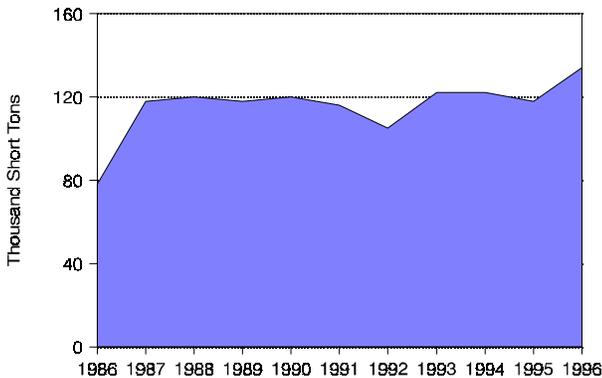


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

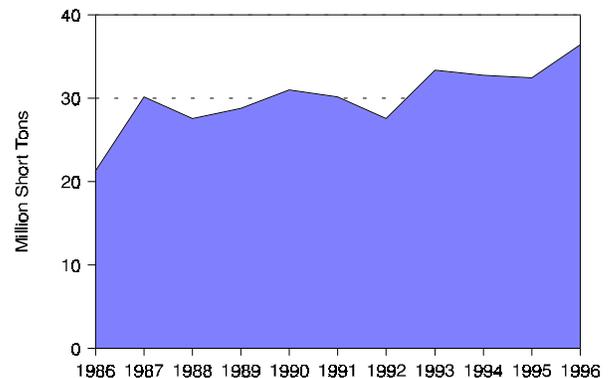


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . . .	8,345,769	9,933,309	10,672,347	2.5	35.0	35.3	34.1
Commercial . .	7,930,925	9,551,120	11,004,916	3.3	33.3	33.9	35.2
Industrial	7,127,850	8,283,739	9,230,522	2.6	29.9	29.4	29.5
Other	429,893	384,056	382,841	-1.2	1.8	1.4	1.2
Total	23,834,430	28,152,224	31,290,626	2.8	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

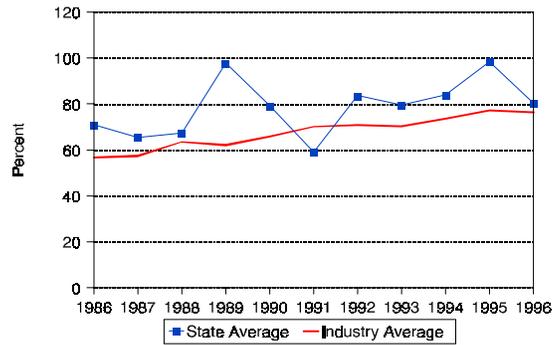


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	6	123	--	36	165
Number of Retail Customers	752,442	236,860	--	172,541	1,161,843
Retail Sales (MWh)	16,954,619	4,155,606	--	2,724,205	23,834,430
Percentage of Retail Sales	71.1	17.4	--	11.4	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,530,925	330,907	--	309,566	2,171,397
Percentage of Revenue	70.5	15.2	--	14.3	100.0
1991					
Number of Utilities	7	121	--	33	161
Number of Retail Customers	867,370	222,986	--	176,208	1,266,564
Retail Sales (MWh)	20,429,447	4,804,204	--	2,918,573	28,152,224
Percentage of Retail Sales	72.6	17.1	--	10.4	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,475,950	325,048	--	279,206	2,080,205
Percentage of Revenue	71.0	15.6	--	13.4	100.0
1996					
Number of Utilities	6	119	--	33	158
Number of Retail Customers	863,966	227,604	--	187,060	1,278,630
Retail Sales (MWh)	22,867,348	5,252,006	--	3,171,272	31,290,626
Percentage of Retail Sales	73.1	16.8	--	10.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,443,845	320,405	--	276,591	2,040,841
Percentage of Revenue	70.8	15.7	--	13.6	100.0

-- = Not applicable.

Kentucky

The Commonwealth of Kentucky was the Nation's leading coal producer until 1988, holding that position for over a decade before losing it to Wyoming.¹ It follows that most of the electricity in Kentucky (95.7 percent) is generated by coal-fired plants and that the five largest plants in the Commonwealth are coal-fired. The Commonwealth's two coalfields, one each in the eastern and the western part of the State, are separated by a large geologic uplift known as the Cincinnati arch. The eastern field is larger and is part of the Appalachian coal basin. The western field is a continuation of the Illinois coal basin, which also underlies parts of Illinois and Indiana. Coal from the eastern field has a lower sulfur content—between 1 and 2 percent by weight—than the western field. The largest utility presence in the Commonwealth is the Tennessee Valley Authority (TVA), the largest utility in the United States. TVA operates the largest plant in the Commonwealth, the Paradise plant.

Kentucky's five largest utilities—TVA, Kentucky Utilities Company, Louisville Gas and Electric Company, Big Rivers Electric Corporation, and East Kentucky Power Cooperative—operate more than 80 percent of the net summer capability. These and the other utilities in Kentucky—3 investor-owned, 30 public, and 26 co-operatives—serve a population of almost 4 million at an average price of 4.03 cents per kilowatthour of electricity. Only Idaho had cheaper electricity in 1996. Overall, the generation pattern observed in Kentucky over the 1986 through 1996 period examined in this report is one driven by coal, capped by a small layer of hydroelectric generation. The most salient aspect, with the exception of the almost tripling gas share of capability (in absolute terms, still not much), is that the fuel mix and capability and generation shares in Kentucky remained quite stable.

In 1996, Kentucky utilities generated 88.4 billion kilowatthours of electricity. The industrial sector

accounted for over 50 percent of retail sales in 1991 and 1996 while the residential sector accounted for twice that of the commercial sector over the same period. Over the 11-year period examined in this report, utility electricity retail sales increased at an average annual rate of 4.5 percent, reaching 77.0 billion kilowatthours in 1996. Kentucky is an exporter of electricity with a net difference of 11.4 billion kilowatthours between generation and sales.

In 1996, Kentucky's power plants emitted more sulfur dioxide (SO₂) than all but four States. The Clean Air Act Amendments of 1990 cited 4,644 megawatts of nameplate capacity at eight Kentucky plants that were to comply with lower SO₂ emissions standards beginning in 1995. All of these plants have been in compliance since these standards took effect. Kentucky's power plant emissions of nitrogen oxides (NO_x) and carbon dioxide were eighth and eleventh highest, respectively, in 1996. It is likely that Kentucky's Department for Environmental Protection will need to design a State implementation plan for reducing ground-level ozone in response to a proposal released by the Environmental Protection Agency (EPA) in October 1998. The EPA proposal does not mandate which sources must reduce pollution. EPA acknowledges, however, that utilities would be one of the most likely sources of NO_x emissions reductions.

Since the price of electricity in Kentucky is so low and there are so few stranded costs, Kentucky has been reluctant to move forward with deregulating its electric power industry. In March 1998, the Kentucky legislature passed a resolution to create an Electricity Restructuring Task Force. The resolution was signed by the governor in April and a report is due in November 1999. In May 1998, a merger between Kentucky Utilities and Louisville Gas and Electric became final. The merger had been approved by the Public Service Commission in September 1997.²

¹ Energy Information Administration, *State Coal Profiles*, DOE/EIA-0576 (Washington, DC, January 1994), p. 43.

² Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

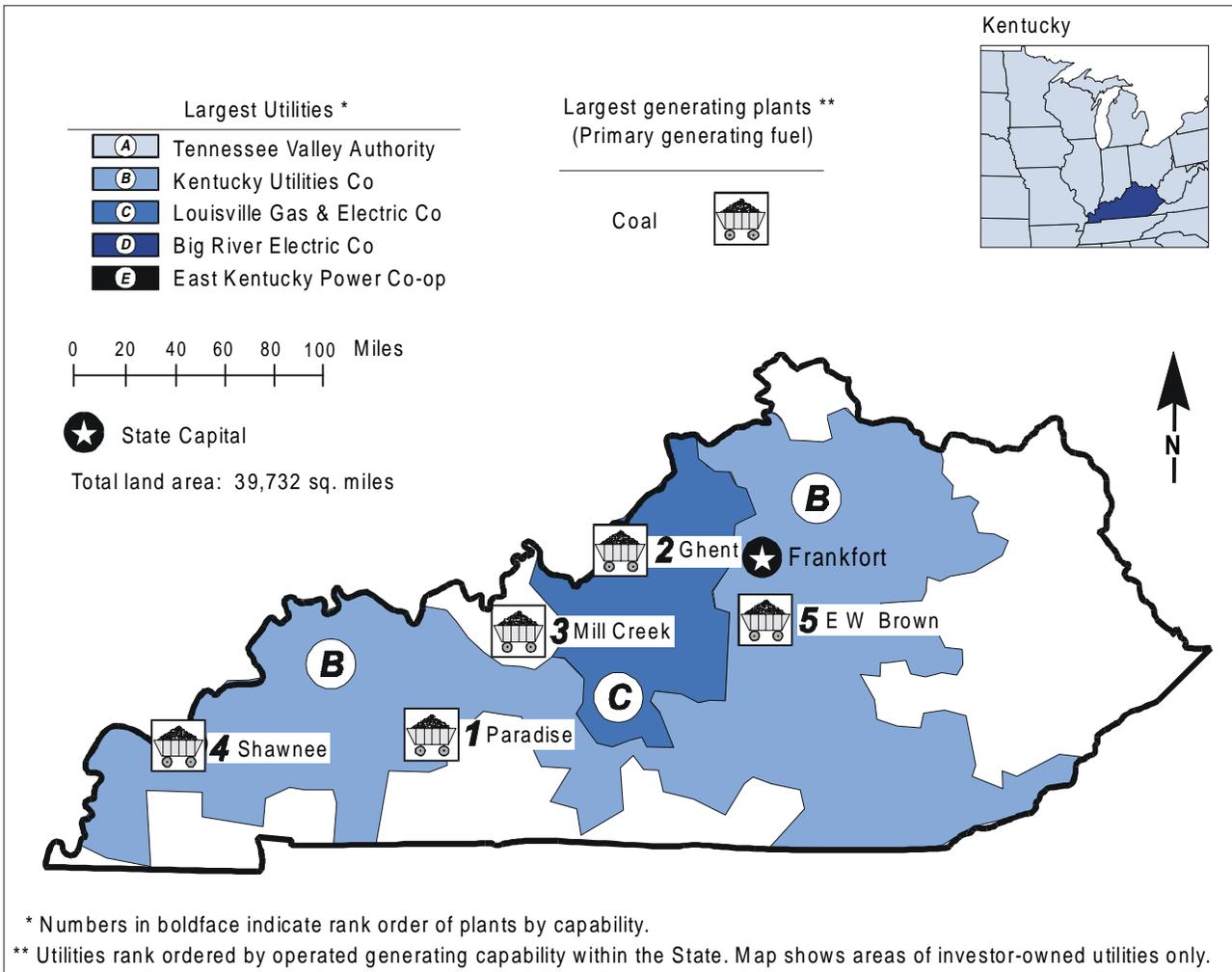


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		ECAR/SERC	Utility		
Net Exporter or Importer		Exporter	Capacity (MWe)	15,686	18
State Primary Generating Fuel		Coal	Generation (MWh)	88,438,224	15
Population (as of 7/96)	3,882,071	24	Average Age of Coal Plants	25 years	
Average Revenue (cents/kWh)	4.03	^a 2	Average Age of Oil-fired Plants	30 years	
Industry			Average Age of Gas-fired Plants	13 years	
Total Capability (MWe)	W	^b W	Average Age of Nuclear Plants	--	
Total Generation (MWh)	W	^b W	Average Age of		
Utility Capability/person			Hydroelectric Plants	45 years	
(KWe/person)	W	^b W	Average Age of Other Plants . . .	--	
Utility Generation/person			Nonutility^c		
(MWh/person)	W	^b W	Capacity (MWe)	W	W
Sulfur Dioxide Emissions			Percentage Share of Capability	W	W
(Thousand Short Tons)	789	5	Generation (MWh)	W	W
Nitrogen Oxide Emissions			Nonutility Percentage Share of		
(Thousand Short Tons)	339	8	Generation	W	W
Carbon Dioxide Emissions			-- = Not applicable. W = Withheld.		
(Thousand Short Tons)	88,375	11			
Sulfur Dioxide/sq. mile (Tons)	19.86	7			
Nitrogen Oxides/sq. mile (Tons)	8.53	9			
Carbon Dioxide/sq. mile (Tons)	2,224.28	13			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Paradise	Coal	Tennessee Valley Authority	2,169
2. Ghent	Coal	Kentucky Utilities Co	1,968
3. Mill Creek	Coal	Louisville Gas & Electric Co	1,470
4. Shawnee	Coal	Tennessee Valley Authority	1,330
5. E W Brown	Coal/Gas	Kentucky Utilities Co	1,097

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Tennessee Valley Authority ...	3,687	3,499	--	--	--	188
B. Kentucky Utilities Co	3,535	2,961	108	440	--	26
C. Louisville Gas & Electric Co ...	2,739	2,468	--	223	--	48
D. Big Rivers Electric Corp	1,774	1,709	65	--	--	0
E. East Kentucky Power Coop Inc	1,392	1,322	--	--	--	70
Total	13,127	11,959	173	663	--	332
Percentage of Utility Capability	83.7	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

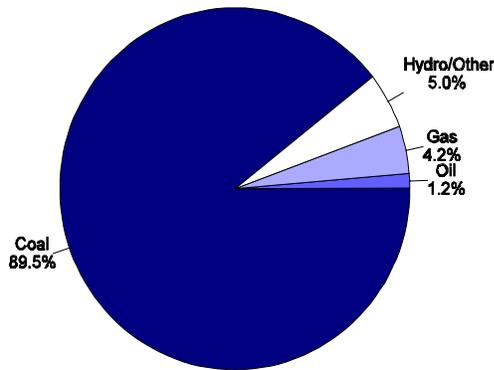


Figure 2. Utility Generation by Primary Energy Source, 1996

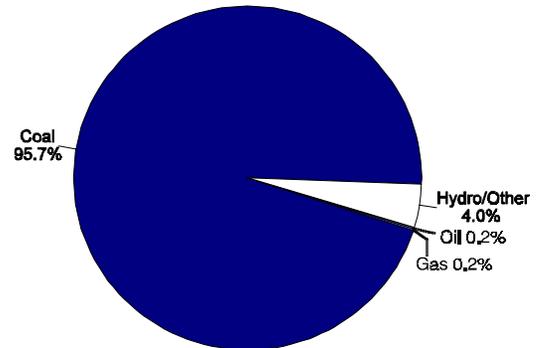


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

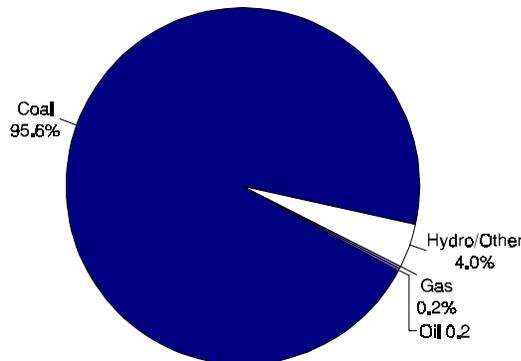


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	13,919	14,129	14,045	92.1	92.1	89.5
Oil	186	184	186	1.2	1.2	1.2
Gas	223	225	663	1.5	1.5	4.2
Nuclear	--	--	--	--	--	--
Hydro/Other	782	795	792	5.2	5.2	5.0
Total Utility	15,110	15,333	15,686	100.0	100.0	100.0
Total Nonutility	--	--	W	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	64,011,936	71,713,851	84,659,818	95.7	95.0	95.7
Oil	126,855	111,558	135,437	0.2	0.1	0.2
Gas	42,502	21,871	145,980	0.1	(s)	0.2
Nuclear	--	--	--	--	--	--
Hydro/Other	2,733,921	3,657,801	3,496,989	4.1	4.8	4.0
Total Utility	66,915,214	75,505,081	88,438,224	100.0	100.0	100.0
Total Nonutility	--	--	W	--	--	--

-- = Not applicable. W = Withheld. (s) = Nonzero percentage less than 0.05.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.656	0.725	0.855	95.6	94.8	95.6
Oil	0.001	0.001	0.002	0.2	0.2	0.2
Gas	(s)	(s)	0.002	0.1	--	0.2
Nuclear	--	--	--	--	--	--
Hydro/Other	0.029	0.038	0.036	4.2	5.0	4.0
Total Utility	0.686	0.764	0.895	100.0	100.0	100.0
Total Nonutility	--	--	W	--	--	--

-- = Not applicable. W = Withheld. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

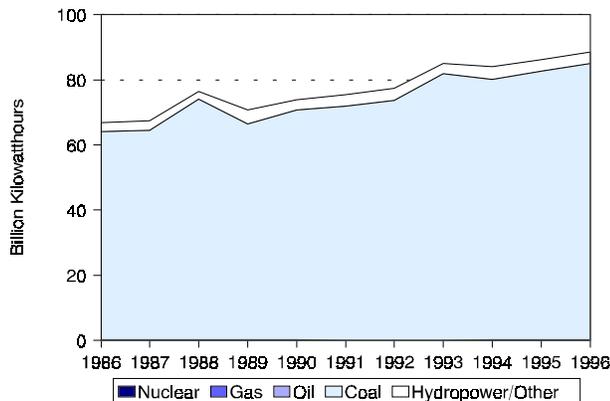


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

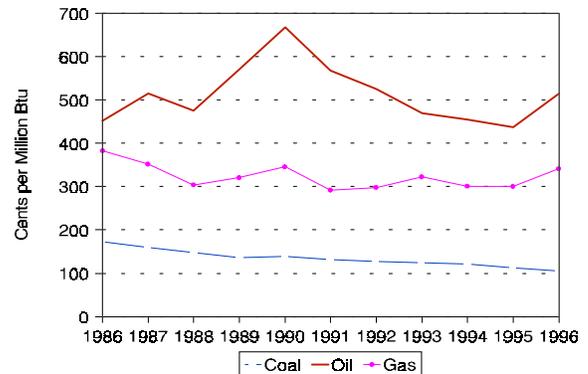


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	172.7	132.3	105.9	-4.8
Oil	452.2	567.7	515.4	1.3
Gas	382.9	291.9	341.3	-1.0

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	748	868	789	0.5
Nitrogen Oxides ^d . .	303	316	339	1.1
Carbon Dioxide ^d . . .	67,310	74,780	88,375	2.8

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

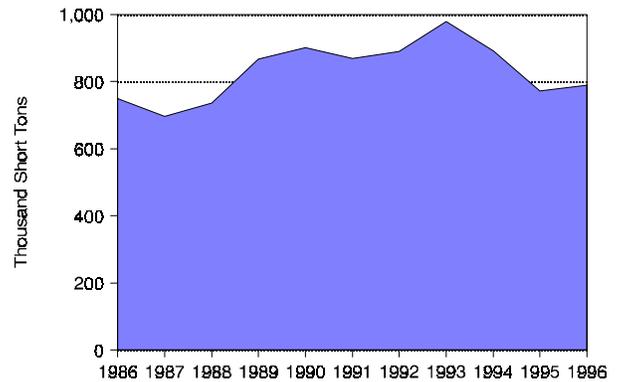


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

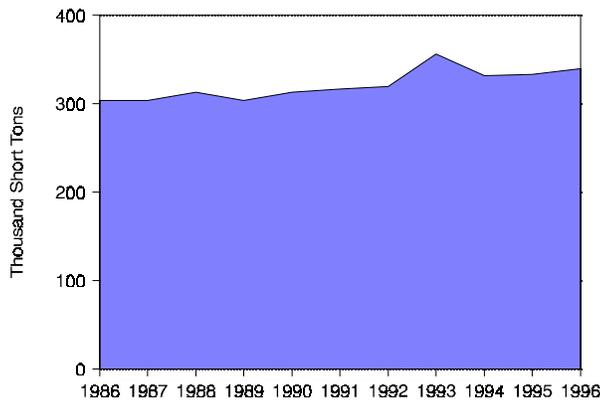


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

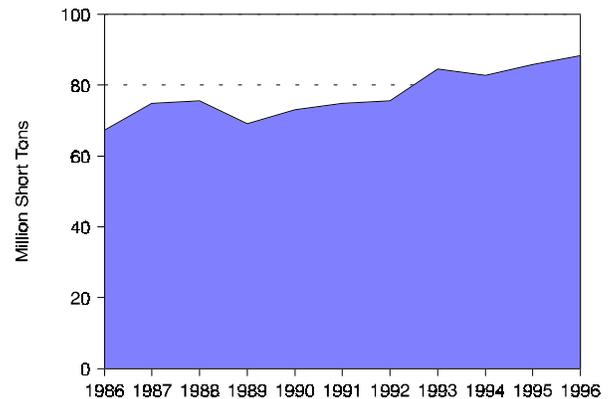


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential .	15,306,747	18,644,458	21,353,214	3.4	30.8	29.0	27.7
Commercial	7,664,405	9,899,870	10,658,512	3.4	15.4	15.4	13.8
Industrial . .	24,475,913	32,938,945	41,929,526	5.5	49.3	51.3	54.4
Other	2,248,529	2,710,529	3,077,482	3.2	4.5	4.2	4.0
Total	49,695,596	64,193,802	77,018,734	4.5	100.0	100.0	100.0

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	5	31	1	28	65
Number of Retail Customers	915,750	181,449	24	493,448	1,590,671
Retail Sales (MWh)	30,699,612	4,486,953	1,967,105	12,541,926	49,695,596
Percentage of Retail Sales	61.8	9.0	4.0	25.2	100.0
Revenue from Retail Sales (thousand 1996 dollars) ^e	1,820,746	281,571	310,844	771,713	3,275,330
Percentage of Revenue	55.6	8.6	12.3	23.6	100.0
1991					
Number of Utilities	6	30	1	27	64
Number of Retail Customers	1,012,018	183,941	15	548,572	1,744,546
Retail Sales (MWh)	40,620,383	5,105,910	2,103,152	16,364,357	64,193,802
Percentage of Retail Sales	63.3	8.0	3.3	25.5	100.0
Revenue from Retail Sales (thousand 1996 dollars) ^e	1,815,248	283,964	151,594	910,791	3,180,394
Percentage of Revenue	57.1	8.9	5.4	28.6	100.0
1996					
Number of Utilities	6	30	1	27	64
Number of Retail Customers	1,061,951	193,582	22	624,779	1,880,334
Retail Sales (MWh)	43,264,365	6,000,936	8,487,060	19,266,373	77,018,734
Percentage of Retail Sales	56.2	7.8	11.0	25.0	100.0
Revenue from Retail Sales (thousand 1996 dollars) ^e	1,713,400	294,062	189,636	906,405	3,103,503
Percentage of Revenue	55.2	9.5	6.1	29.2	100.0

Louisiana

Utility natural gas generators in Louisiana produced 24.0 billion kilowatthours in 1996, which was 30.6 percent of the State's total electricity generation. It is not surprising that Louisiana's generation is heavily based on gas since it ranks second in gas production. Only Texas produced more natural gas than Louisiana in 1997.¹ Three of the four largest plants in the State, including the two largest, Willow Glen and Ninemile, are gas-fired. These three plants are located in the southeastern part of the State near New Orleans. Ninemile, the second largest plant in the State, is operated by the the Louisiana Power and Light Company, the largest utility in Louisiana.

Louisiana's five largest utilities—Louisiana Power and Light, Gulf States Utilities, Central Louisiana Electric, Cajun Electric Power Cooperative, and New Orleans Public Service—operated 79.0 percent of the State's net summer capability in 1996. The six investor-owned utilities in the State accounted for about 87 percent of Louisiana's retail sales. In 1996, 78.3 billion kilowatthours of electricity were generated in Louisiana. The average retail price was 6.07 cents per kilowatthour, which was twenty-second lowest in the Nation. The nonutility share of generation in Louisiana was stable over the 11 years examined, rising from 24.7 percent of the State total in 1986 to 25.1 percent in 1996.

Between 1986 and 1996, electricity sales increased at an average annual rate of 2.4 percent. In 1996, utility retail sales were 75.3 billion kilowatthours, with industrial sales accounting for 43.2 percent of retail sales and residential sales accounting for 32.3 percent of the total.

Much like Texas and Mississippi, which border Louisiana, the State's electricity generation fuel mix is mainly coal, gas, and nuclear fuel. However, Texas and Mississippi use primarily coal, while gas-fired utility plants generated more electricity in Louisiana than any others. Roughly 70 percent of the coal used for electricity generation in Louisiana comes from the Powder River Basin in Wyoming; the remainder comes from Louisiana's own coal deposits.²

Louisiana is very reliant on its two nuclear power plants, Waterford, the fifth largest plant in the State, and River Bend. In 1996, these nuclear plants produced 15.8 billion kilowatthours of electricity. For most of the 11 years examined in this report, Louisiana's nuclear capacity factor was higher than the national average. While the share of total capability of nuclear units remained relatively stable over the 11 years examined, the share of net generation grew from 15.2 percent in 1986 to 20.1 percent in 1996.

Louisiana has not moved as quickly as some other States toward deregulating its electric power industry. In 1997, all deregulation bills that were introduced in the State legislature failed, although Resolution 150 created a study committee on electric power restructuring. In March 1998, the deregulation committee of the Public Service Commission (PSC) and the legislature met to discuss the tax implications of deregulation. In August 1998, the PSC conducted hearings on stranded costs. The PSC plans to develop draft legislation for 1999.³

¹ Energy Information Administration, *Natural Gas Annual 1997*, DOE/EIA-0131(97) (Washington, DC, October 1998), p. 11.

² Energy Information Administration, *State Coal Profiles*, DOE/EIA-0576 (Washington, DC, January 1994), p. 107.

³ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

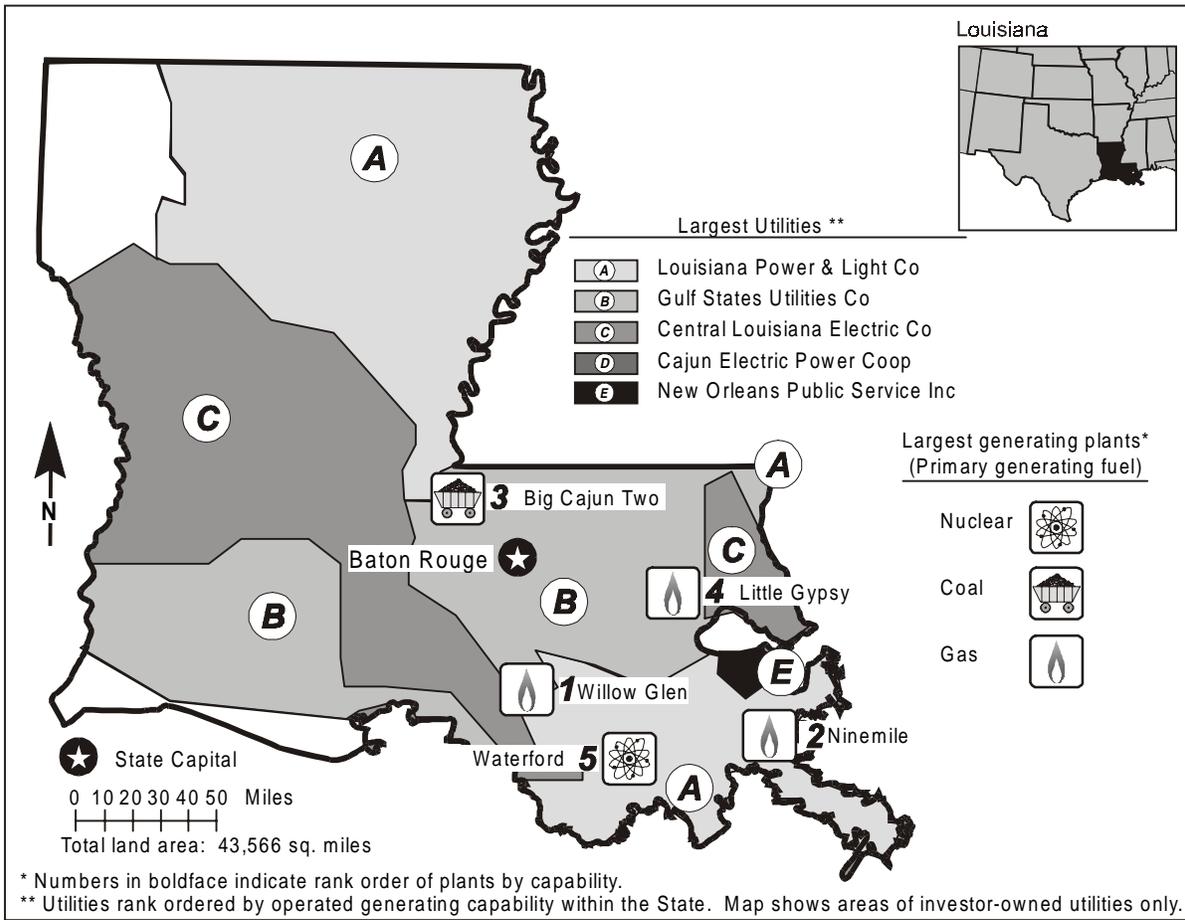


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		SPP/SERC	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	17,150	16
State Primary Generating Fuel		Gas	Generation (MWh)	58,643,113	20
Population (as of 7/96)	4,340,818	22	Average Age of Coal Plants	13 years	
Average Revenue (cents/kWh)	6.07	^a 22	Average Age of Oil-fired Plants	27 years	
Industry			Average Age of Gas-fired Plants	27 years	
Capability (MWe)	20,104	^b 14	Average Age of Nuclear Plants	11 years	
Generation (MWh)	78,266,814	^b 17	Average Age of Hydroelectric Plants	--	
Capability/person (KWe/person)	4.63	^b 5	Average Age of Other Plants	--	
Generation/person (MWh/person)	18.03	^b 8	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	428	14	Capability (MWe)	2,954	7
Nitrogen Oxide Emissions (Thousand Short Tons)	183	16	Percentage Share of Capability	14.7	9
Carbon Dioxide Emissions (Thousand Short Tons)	73,456	13	Generation (MWh)	19,623,701	5
Sulfur Dioxide/sq. mile (Tons)	9.82	15	Percentage Share of Generation	25.1	7
Nitrogen Oxides/sq. mile (Tons)	4.20	18			
Carbon Dioxide/sq. mile (Tons)	1,686.09	18	-- = Not applicable.		

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Willow Glen	Gas	Gulf States Utilities Co	2,045
2. Ninemile	Gas	Louisiana Power & Light Co	1,954
3. Big Cajun 2	Coal	Cajun Electric Power Coop Inc	1,730
4. Little Gypsy	Gas	Louisiana Power & Light Co	1,253
5. Waterford	Nuclear	Louisiana Power & Light Co	1,075

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Louisiana Power & Light Co	5,707	--	19	4,613	1,075	--
B. Gulf States Utilities Co	4,701	550	--	3,215	936	--
C. Central Louisiana Elec Co Inc ...	2,439	1,173	--	1,266	--	--
D. Cajun Electric Power Coop Inc ..	1,950	1,730	--	220	--	--
E. New Orleans Public Service Inc ..	1,077	--	16	1,061	--	--
Total	15,874	3,453	35	10,375	2,011	--
Percentage of Industry Capability	79.0	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

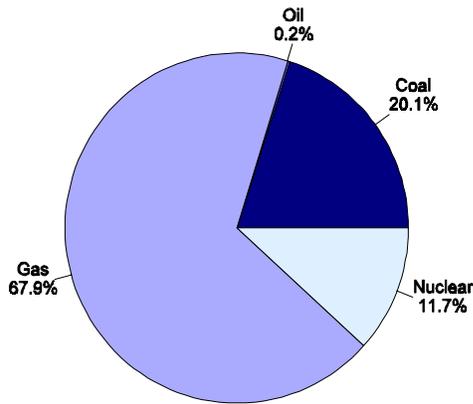


Figure 2. Utility Generation by Primary Energy Source, 1996

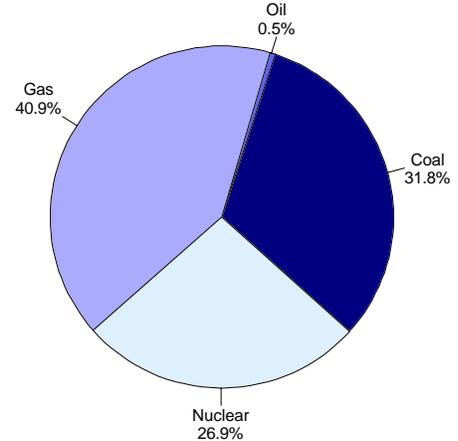


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

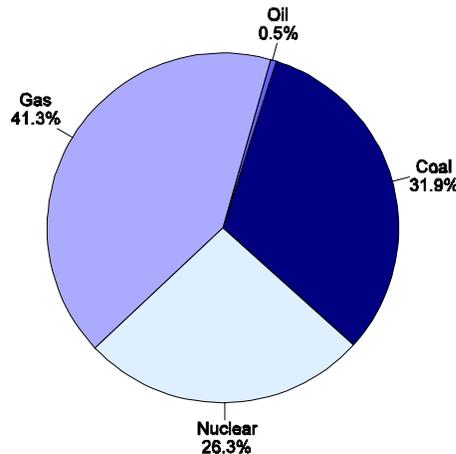


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	3,334	3,343	3,453	17.3	17.2	17.2
Oil	594	17	35	3.1	0.1	0.2
Gas	10,914	11,424	11,651	56.6	58.7	58.0
Nuclear	1,994	2,011	2,011	10.3	10.3	10.0
Hydro/Other	--	--	--	--	--	--
Total Utility	16,836	16,795	17,150	87.3	86.2	85.3
Total Nonutility	2,454	2,681	2,954	12.7	13.8	14.7
Industry	19,290	19,476	20,104	100.0	100.0	100.0

-- = Not applicable.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	15,585,722	18,911,856	18,632,666	22.2	25.2	23.8
Oil	418,739	45,305	273,308	0.6	0.1	0.3
Gas	26,201,723	24,244,619	23,972,316	37.3	32.3	30.6
Nuclear	10,637,262	13,956,196	15,764,823	15.2	18.6	20.1
Hydro/Other	--	--	--	--	--	--
Total Utility	52,843,447	57,157,976	58,643,113	75.3	76.2	74.9
Total Nonutility	17,317,061	17,825,638	19,623,701	24.7	23.8	25.1
Industry	70,160,508	74,983,614	78,266,814	100.0	100.0	100.0

-- = Not applicable.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.166	0.204	0.203	29.3	20.5	19.1
Oil	0.004	0.001	0.003	0.8	0.1	0.3
Gas	0.280	0.265	0.263	49.5	26.6	24.6
Nuclear	0.115	0.150	0.167	20.3	15.1	15.7
Hydro/Other	--	--	--	--	--	--
Total Utility	0.565	0.619	0.637	100.0	62.3	59.6
Total Nonutility	(s)	0.375	0.431	--	37.7	40.4
Industry	0.565	0.994	1.068	100.0	100.0	100.0

-- = Not applicable. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

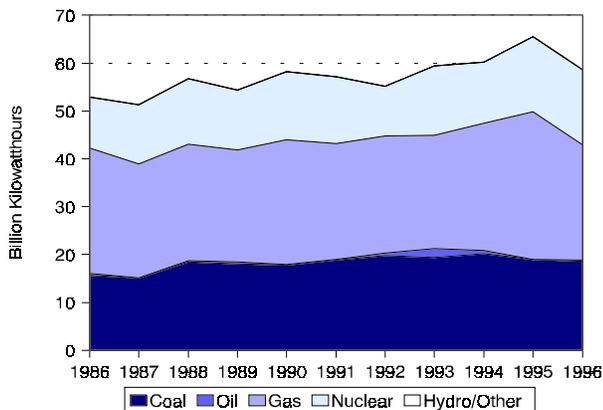


Figure 5. Utility Delivered fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

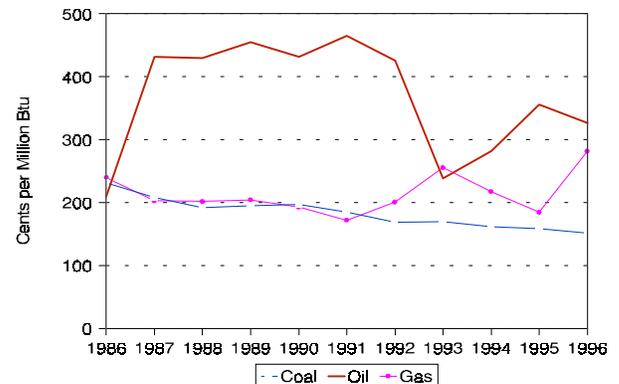


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	231.6	185.2	151.4	-4.2
Oil	209.0	464.6	326.8	4.6
Gas	239.5	172.1	281.6	1.6

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	83	130	428	17.8
Nitrogen Oxides ^d . .	109	171	183	5.3
Carbon Dioxide ^d . . .	32,846	60,916	73,456	8.4

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

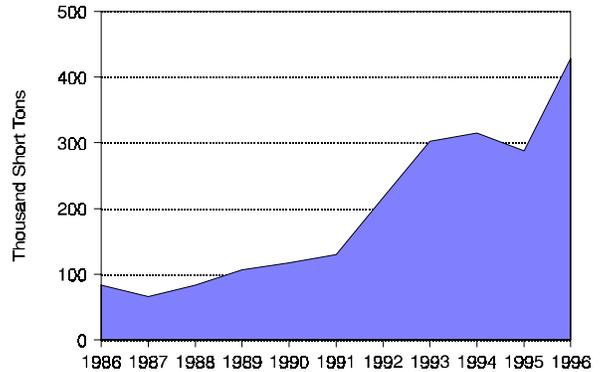


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

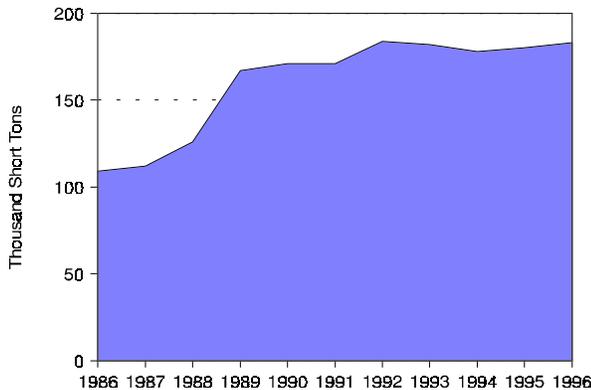


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

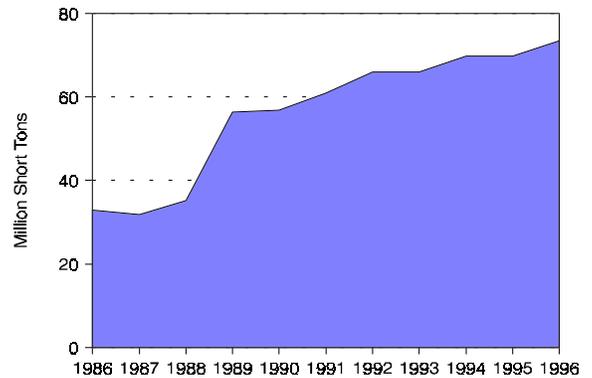


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . . .	20,263,134	21,576,815	24,310,803	1.8	34.2	33.3	32.3
Commercial . .	12,663,325	13,970,340	15,919,843	2.3	21.4	21.6	21.2
Industrial	22,473,936	26,583,900	32,544,269	3.8	37.9	41.1	43.2
Other	3,891,915	2,573,244	2,494,180	-4.4	6.6	4.0	3.3
Total	59,292,307	64,704,299	75,269,095	2.4	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

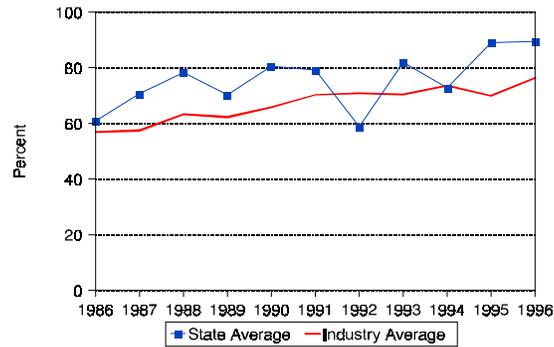


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	6	20	--	14	40
Number of Retail Customers	1,383,429	130,122	--	310,022	1,823,573
Retail Sales (MWh)	51,930,102	2,775,849	--	4,586,356	59,292,307
Percentage of Retail Sales	87.6	4.7	--	7.7	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	3,714,713	264,297	--	558,635	4,537,646
Percentage of Revenue	81.9	5.8	--	12.3	100.0
1991					
Number of Utilities	5	21	--	15	41
Number of Retail Customers	1,406,740	134,820	--	322,385	1,863,945
Retail Sales (MWh)	56,442,013	3,223,928	--	5,038,358	64,704,299
Percentage of Retail Sales	87.2	5.0	--	7.8	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	3,626,141	243,180	--	451,095	4,320,415
Percentage of Revenue	83.9	5.6	--	10.4	100.0
1996					
Number of Utilities	5	22	--	14	41
Number of Retail Customers	1,495,585	148,824	--	317,989	1,962,398
Retail Sales (MWh)	65,650,374	3,746,145	--	5,872,576	75,269,095
Percentage of Retail Sales	87.2	5.0	--	7.8	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	3,877,930	249,156	--	441,540	4,568,626
Percentage of Revenue	84.9	5.5	--	9.7	100.0

-- = Not applicable.

Maine

In 1996, most of the utility electricity in Maine was generated at the largest plant in the State, the Maine Yankee nuclear plant in Wicasset. Maine is also very reliant on hydroelectric power. The largest utility is the Central Maine Power Company, which operates four of the five largest plants in the State. The Nation's second highest percentage of nonutility generation was in Maine in 1996 where almost half of the electricity was generated at nonutility sources. Only Rhode Island had a larger share of nonutility capability. Maine has no utility coal capability. The average price of electricity in Maine, 9.46 cents per kilowatt-hour, ranked it as the eleventh most expensive in the Nation. Maine is a net importer of electricity.

Emissions from electricity generators in Maine were relatively low in 1996. Maine's emissions of sulfur dioxide (SO₂), nitrogen oxides (NO_x), and carbon dioxide (CO₂) ranked fortieth, forty-sixth and fortieth, respectively. The concentrations of these pollutants per square mile ranked thirty-third, forty-fifth and thirty-fifth, respectively. Emissions of SO₂ in Maine more than tripled between 1986 and 1991. They went down slightly in 1996. NO_x emissions also more than tripled between 1986 and 1991. They remained the same in 1996. In 1991, CO₂ emissions were more than six times those of 1986. They increased slightly again between 1991 and 1996. Maine is part of the Ozone Transport Commission (OTC).¹ Each of the thirteen States of the OTC is responsible for enacting regulations in order to achieve region-wide NO_x reductions in a consistent, enforceable manner and for allocating its NO_x Budget Program allowances among NO_x sources in the State. The targets in this program are large industrial boilers and all

electricity generating facilities with a rated output of 15 megawatts or more.

The five largest plants in Maine in 1996 were located in the southwest part of the State. Three of the five, Maine Yankee, Mason Steam, and Wyman, were located along the Atlantic coast. In 1986, nuclear units represented just over a quarter of Maine's generating capability and over two-fifths of its net generation. In 1996, the nuclear share of capability had fallen to under a quarter while the net generation share had fallen to just over a third. In 1997, the Maine Yankee Atomic Power Company announced the permanent shutdown of Maine Yankee, citing the rising cost of additional safety measures which made generating electricity too expensive in a market that is opening to deregulation and, therefore, providing no guaranteed customer base. Total nonutility capability and net generation, on the other hand, were just under a quarter and just over a quarter, respectively, in 1986. By 1996, the nonutility shares had risen to over a third and almost half, respectively.

Maine enacted a law in May 1997 that will allow retail competition by March 2000. For large investor-owned utilities, the law features a market share cap of 33 percent in their old service areas, terms for divestiture of generation assets, and the Nation's most aggressive renewables portfolio, requiring 30 percent of generation to be from renewable energy sources (including hydroelectric power). In May 1998, the Public Utility Commission adopted a requirement that, beginning in 1999, utilities must issue bills showing unbundled charges for generation and distribution, offer consumer education, and provide standard offer service for all consumers when competition begins.²

¹ The Ozone Transport Region comprises the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Delaware, the northern counties of Virginia, and the District of Columbia.

² Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

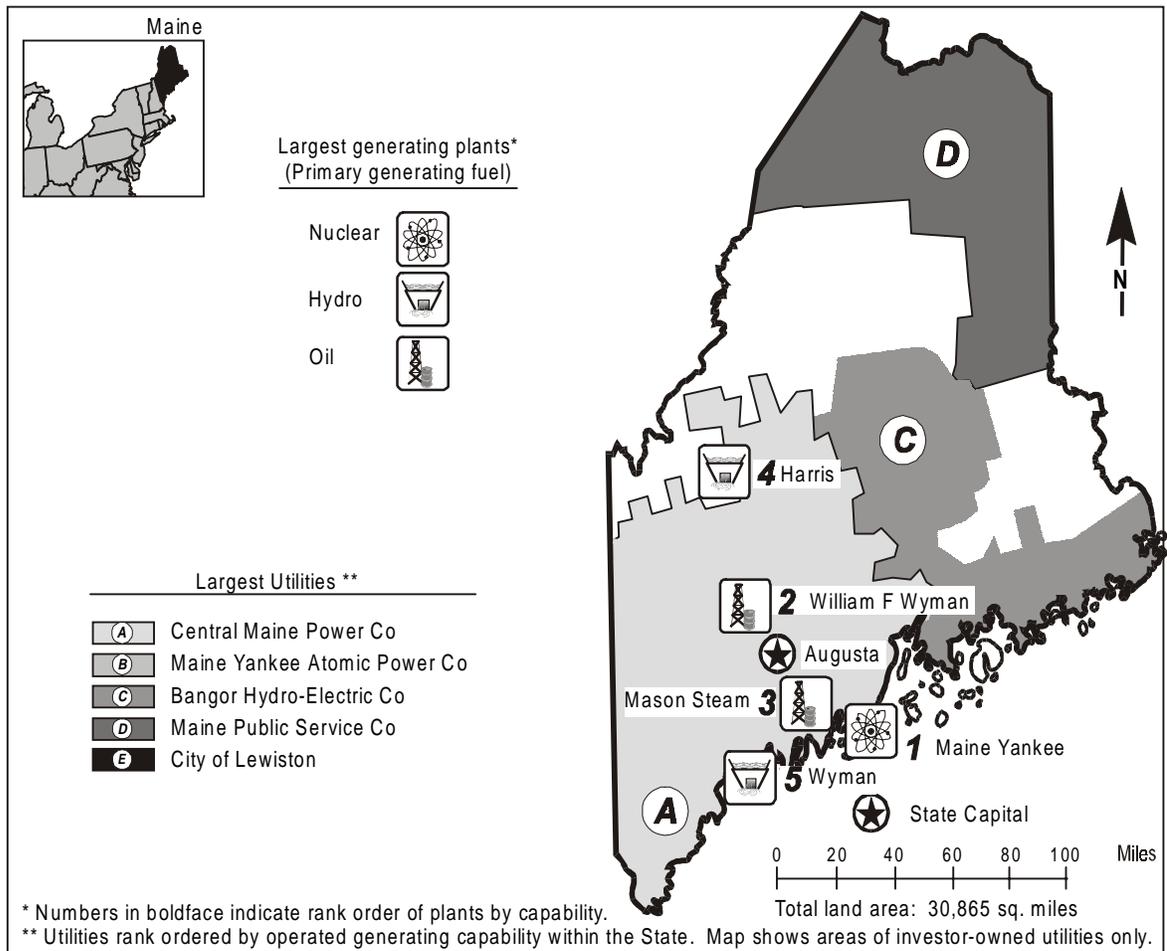


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		NPCC	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	2,387	45
State Primary Generating Fuel		Nuclear	Generation (MWh)	7,800,149	46
Population (as of 7/96)	1,238,566	39	Average Age of Coal Plants	--	
Average Revenue (cents/kWh)	9.46	^a 41	Average Age of Oil-fired Plants	26 years	
Industry			Average Age of Gas-fired Plants	--	
Capability (MWe)	3,747	^b 36	Average Age of Nuclear Plants	24 years	
Generation (MWh)	15,158,958	^b 37	Average Age of Hydroelectric Plants	47 years	
Capability/person (KWe/person)	3.03	^b 22	Average Age of Other Plants	2 years	
Generation/person (MWh/person)	12.24	^b 25	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	45	40	Capability (MWe)	1,360	13
Nitrogen Oxide Emissions (Thousand Short Tons)	18	46	Percentage Share of Capability	36.3	2
Carbon Dioxide Emissions (Thousand Short Tons)	14,962	40	Generation (MWh)	7,358,809	12
Sulfur Dioxide/sq. mile (Tons)	1.46	33	Percentage Share of Generation	48.5	2
Nitrogen Oxides/sq. mile (Tons)	0.58	45			
Carbon Dioxide/sq. mile (Tons)	484.76	35			

-- = Not applicable.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capacity (MWe)
1. Maine Yankee	Nuclear	Maine Yankee Atomic Power Co	870
2. William F Wyman	Oil	Central Maine Power Co	838
3. Mason Steam	Oil	Central Maine Power Co	97
4. Harris	Hydro	Central Maine Power Co	88
5. Wyman	Hydro	Central Maine Power Co	80

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Central Maine Power Co	1,366	--	969	--	--	397
B. Maine Yankee Atomic Power Co	870	--	--	--	870	--
C. Bangor Hydro-Electric Co	111	--	65	--	--	46
D. Maine Public Service Co	37	--	34	--	--	2
E. City of Lewiston	2	--	--	--	--	2
Total	2,386	--	1,068	--	870	447
Percentage of Industry Capability	63.7	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

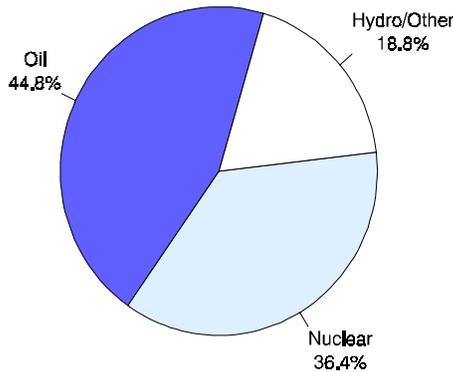


Figure 2. Utility Generation by Primary Energy Source, 1996

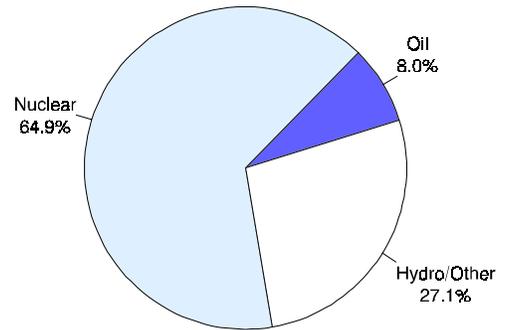


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

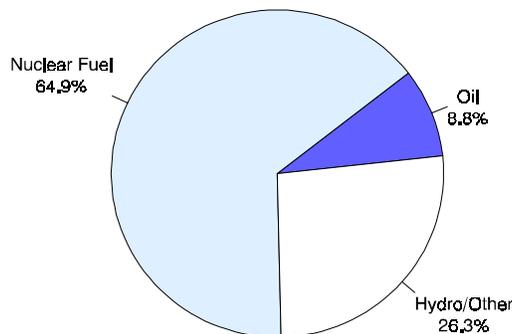


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	1,144	1,126	1,069	36.3	30.4	28.5
Gas	--	--	--	--	--	--
Nuclear	845	870	870	26.8	23.5	23.2
Hydro/Other	414	420	448	13.1	11.3	12.0
Total Utility	2,403	2,417	2,387	76.3	65.2	63.7
Total Nonutility	746	1,289	1,360	23.7	34.8	36.3
Industry	3,149	3,706	3,747	100.0	100.0	100.0

-- = Not applicable.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	2,615,462	1,268,988	621,755	17.8	7.5	4.1
Gas	--	--	--	--	--	--
Nuclear	6,241,756	6,264,366	5,062,017	42.4	37.3	33.4
Hydro/Other	2,033,212	1,985,152	2,116,377	13.8	11.8	14.0
Total Utility	10,890,430	9,518,506	7,800,149	74.0	56.6	51.5
Total Nonutility	3,822,051	7,292,478	7,358,809	26.0	43.4	48.5
Industry	14,712,481	16,810,984	15,158,958	100.0	100.0	100.0

-- = Not applicable.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	0.028	0.015	0.007	10.6	6.2	3.2
Gas	--	--	--	--	--	--
Nuclear	0.067	0.067	0.054	26.0	28.5	23.4
Hydro/Other	0.021	0.021	0.022	8.2	8.7	9.5
Total Utility	0.116	0.102	0.083	44.8	43.4	36.1
Total Nonutility	0.143	0.133	0.147	55.2	56.6	63.9
Industry	0.260	0.236	0.229	100.0	100.0	100.0

-- = Not applicable.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

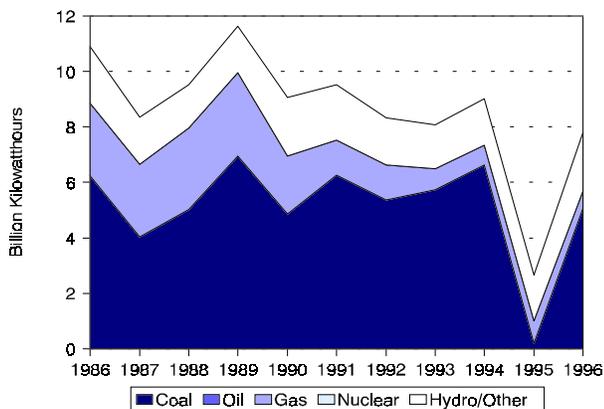


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

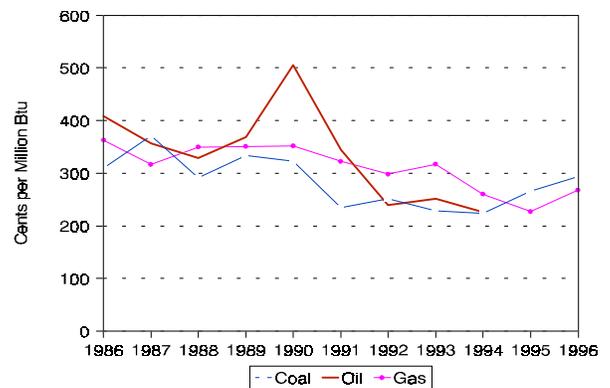


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	--	--	--	--
Oil	309.0	234.3	293.6	-0.5
Gas	--	--	--	--

-- = Not applicable.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	14	47	45	12.4
Nitrogen Oxides ^d	4	18	18	16.2
Carbon Dioxide ^d	2,279	14,280	14,962	20.7

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

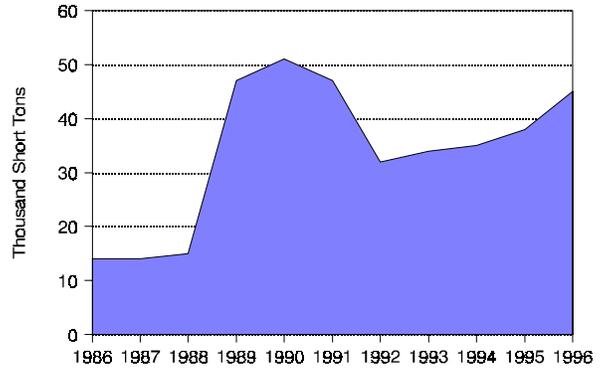


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

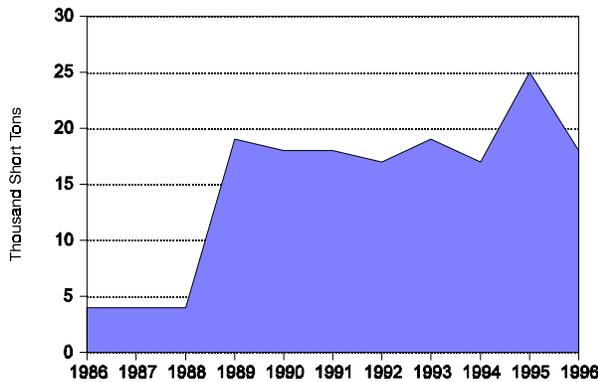


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

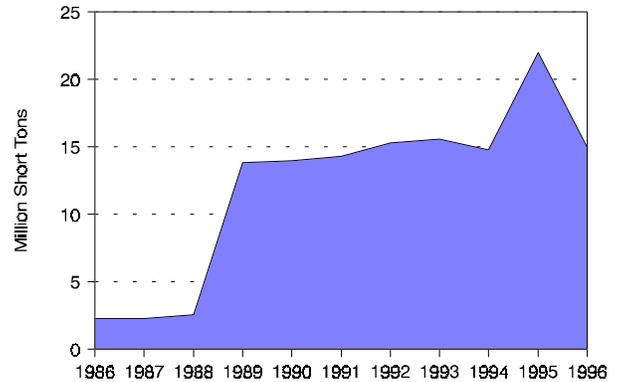


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential	3,577,640	3,817,137	3,679,190	0.3	35.1	33.5	31.4
Commercial	2,295,026	2,685,496	3,211,822	3.4	22.5	23.6	27.4
Industrial	4,135,335	4,708,841	4,771,700	1.4	40.5	41.4	40.7
Other	194,981	171,310	63,719	-10.6	1.9	1.5	0.5
Total	10,202,983	11,382,784	11,726,431	1.4	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

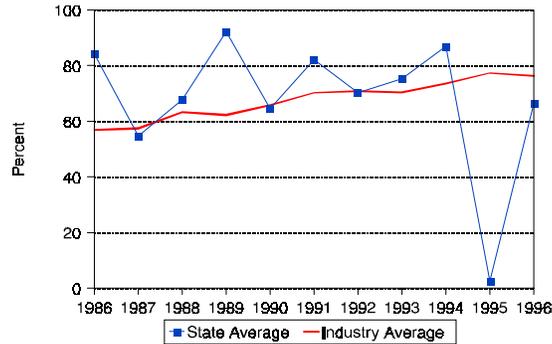


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	4	6	--	4	14
Number of Retail Customers	571,038	13,240	--	12,878	597,156
Retail Sales (MWh)	9,935,825	181,995	--	85,163	10,202,983
Percentage of Retail Sales	97.4	1.8	--	0.8	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	868,949	14,108	--	10,442	893,499
Percentage of Revenue	97.3	1.6	--	1.2	100.0
1991					
Number of Utilities	3	5	--	4	12
Number of Retail Customers	637,669	13,132	--	15,896	666,697
Retail Sales (MWh)	11,073,224	203,020	--	106,540	11,382,784
Percentage of Retail Sales	97.3	1.8	--	0.9	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,068,064	19,301	--	12,877	1,100,242
Percentage of Revenue	97.1	1.8	--	1.2	100.0
1996					
Number of Utilities	3	5	--	3	11
Number of Retail Customers	672,938	14,052	--	13,696	700,686
Retail Sales (MWh)	11,233,163	387,647	--	105,621	11,726,431
Percentage of Retail Sales	95.8	3.3	--	0.9	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,073,915	22,471	--	12,361	1,108,747
Percentage of Revenue	96.9	2.0	--	1.1	100.0

-- = Not applicable.

Maryland

The majority (63 percent) of utility electricity generation in the State of Maryland comes from coal-fired power plants. Roughly 90 percent of the coal used for electricity generation in Maryland comes from the Appalachian coal basin in West Virginia and Pennsylvania, with a small percentage coming from Maryland's own coal deposits.¹ Given the State's proximity to these large coal beds, it is not surprising that three of the five largest plants in the State are in fact coal-fired. Brandon Shores and Herbert Wagner—the fourth and fifth largest plants—are operated by the State's largest and one of the Nation's oldest utilities, Baltimore Gas and Electric (BG&E).

BG&E, along with Potomac Electric Power, Philadelphia Electric, Delmarva Power and Light, and Potomac Edison, operate more than 90 percent of Maryland's net summer capability. These investor-owned utilities (IOUs), along with one smaller IOU, 5 public utilities, and 3 cooperative utilities, generated over 44.4 billion kilowatt-hours of electricity in 1996.

Overall, electricity sales increased between 1986 and 1996. In 1996, utility retail sales were 57.0 billion kilowatt-hours.² In 1996, sales were distributed almost equally between the commercial and residential sectors. Maryland is an importer of electricity with a net difference of 10.7 billion kilowatt-hours between generation and sales.

In addition to its largely coal-based generation, Maryland also produces a significant amount of electricity from nuclear power. This power is produced by the State's only nuclear plant, Calvert Cliffs, which is operated by BG&E. Since Calvert Cliffs contributes such

a significant portion of the State's total generation and produces this electricity at a relatively low cost, BG&E became the first utility to formally request a license extension for the 22-year-old plant in 1998.³ Currently, Unit 1's license is set to expire in 2014 and Unit 2's will expire in 2016. If approved, the request will add an additional 20 years of operating life to the plant.

Unlike some States with nuclear power, Maryland's average revenue per kilowatt-hour of electricity is almost equal to the current national average of 6.86 cents per kilowatt-hour. This may explain why Maryland has not been as aggressive as other States in the move toward deregulation. In fact, legislation to allow retail competition by July 2000 did not progress after being introduced in April 1998. In the meantime, however, the four major IOUs in the State filed requests with the State's Public Service Commission for the recovery of stranded costs. The biggest part of these costs, however, are associated with the license extension request of BG&E for the Calvert Cliffs nuclear plant.⁴

The Clean Air Act Amendments of 1990 cited 2,379 megawatts of nameplate capacity at three Maryland plants to begin compliance with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x). SO₂ emissions from Maryland generators declined between 1991 and 1996. NO_x emissions, however, have increased slightly. Carbon dioxide emissions have increased at an average annual growth rate of 6.1 percent since 1986. Maryland's national rankings for the three pollutants ranked twentieth, twenty-four, and twenty-third, respectively, in 1996. However, the concentrations were much higher, ranking fourth, sixth, and fourth, respectively.

¹ Energy Information Administration, *State Coal Profiles*, DOE/EIA-0576 (Washington, DC, January 1994), p. 51.

² Over the past five years, Maryland's customer class has changed dramatically. While commercial sales of electricity have increased at an average annual rate of 9 percent, its industrial sales have decreased by more than 4 percent annually. Much of the shift, however, was the result of a reclassification of customer class between 1994 and 1995 based on information from the Energy Information Administration, *Electric Sales and Revenue 1994*, DOE/EIA-0540(94) (Washington, DC, November 1995), Tables 15 and 16; and, *Electric Sales and Revenue 1995*, DOE/EIA-0540(95) (Washington, DC, December 1996), Tables 15 and 16.

³ Energy Information Administration, *Challenges of Electric Power Industry Restructuring for Fuel Suppliers*, DOE/EIA-0623 (Washington, DC, September 1998), Chapter 2.

⁴ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

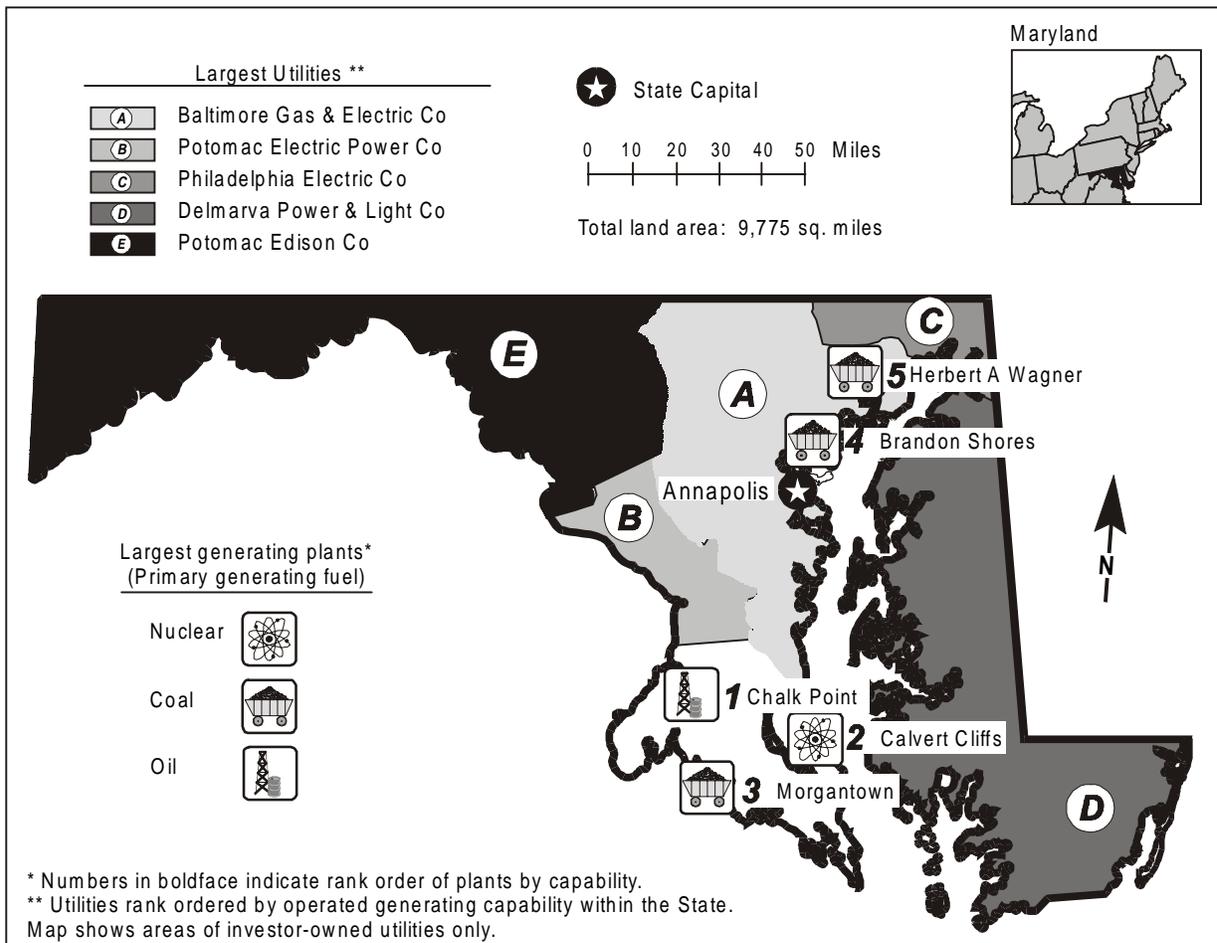


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		ECAR/MACC	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	10,957	25
State Primary Generating Fuel		Coal	Generation (MWh)	44,380,543	25
Population (as of 7/96)	5,060,296	19	Average Age of Coal Plants	25 years	
Average Revenue (cents/kWh)	6.96	^a 34	Average Age of Oil-fired Plants	22 years	
Industry			Average Age of Gas-fired Plants	14 years	
Capability (MWe)	11,570	^b 23	Average Age of Nuclear Plants	20 years	
Generation (MWh)	46,273,487	^b 23	Average Age of Hydroelectric Plants	52 years	
Capability/person (KWe/person)	2.29	^b 34	Average Age of Other Plants	--	
Generation/person (MWh/person)	9.14	^b 37	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	256	20	Capability (MWe)	613	26
Nitrogen Oxide Emissions (Thousand Short Tons)	134	24	Percentage Share of Capability	5.3	27
Carbon Dioxide Emissions (Thousand Short Tons)	42,203	23	Generation (MWh)	1,892,944	31
Sulfur Dioxide/sq. mile (Tons)	26.19	4	Percentage Share of Generation	4.1	31
Nitrogen Oxides/sq. mile (Tons)	13.71	6			
Carbon Dioxide/sq. mile (Tons)	4,317.44	4			

-- = Not applicable.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Chalk Point	Oil/Coal/Gas	Potomac Electric Power Co	2,423
2. Calvert Cliffs	Nuclear	Baltimore Gas & Electric Co	1,675
3. Morgantown	Coal	Potomac Electric Power Co	1,412
4. Brandon Shores	Coal	Baltimore Gas & Electric Co	1,291
5. Herbert A Wagner	Coal/Oil/Gas	Baltimore Gas & Electric Co	1,020

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Baltimore Gas & Electric Co	5,398	2,130	858	735	1,675	--
B. Potomac Electric Power Co	4,672	2,393	1,533	746	--	--
C. Philadelphia Electric Co	512	--	--	--	--	512
D. Delmarva Power & Light Co	178	--	178	--	--	--
E. Potomac Edison Co	113	113	--	--	--	--
Total	10,873	4,636	2,569	1,481	1,675	512
Percentage of Industry Capability	94.0	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

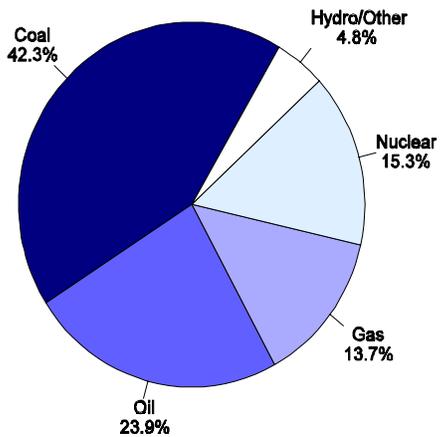


Figure 2. Utility Generation by Primary Energy Source, 1996

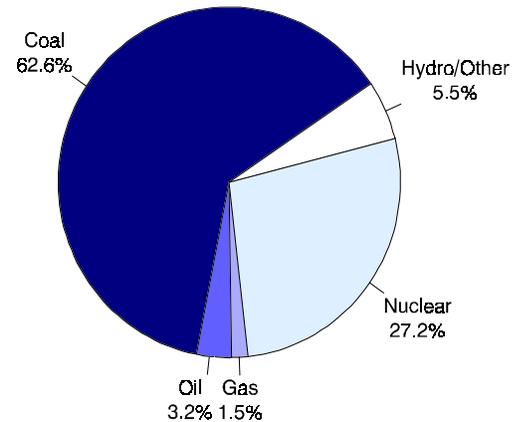


Figure 3. Energy Consumed at Electric Utilities by Energy Source, 1996

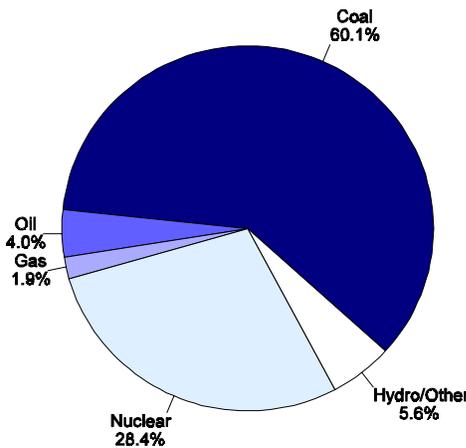


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	3,798	4,617	4,636	39.7	43.1	42.3
Oil	3,300	2,427	2,618	34.5	22.6	23.9
Gas	392	1,601	1,498	4.1	14.9	13.7
Nuclear	1,650	1,650	1,675	17.2	15.4	15.3
Hydro/Other	428	428	530	4.5	4.0	4.8
Total Utility	9,568	10,723	10,957	100.0	100.0	100.0
Total Nonutility	W	W	613	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	20,195,452	22,622,989	27,780,141	53.5	59.2	62.6
Oil	2,653,405	3,935,221	1,401,195	7.0	10.3	3.2
Gas	142,199	1,213,523	648,976	0.4	3.2	1.5
Nuclear	12,827,653	9,036,100	12,092,768	34.0	23.6	27.2
Hydro/Other	1,913,704	1,407,287	2,457,463	5.1	3.7	5.5
Total Utility	37,732,414	38,215,120	44,380,543	100.0	100.0	100.0
Total Nonutility	W	W	1,892,944	--	--	--

-- = Not applicable. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.202	0.221	0.272	51.3	55.6	60.1
Oil	0.031	0.048	0.018	7.9	12.1	4.0
Gas	0.002	0.017	0.009	0.6	4.2	1.9
Nuclear	0.139	0.097	0.128	35.2	24.4	28.4
Hydro/Other	0.020	0.015	0.025	5.1	3.7	5.6
Total Utility	0.394	0.397	0.452	100.0	100.0	100.0
Total Nonutility	W	W	0.052	--	--	--

-- = Not applicable. W = Withheld.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

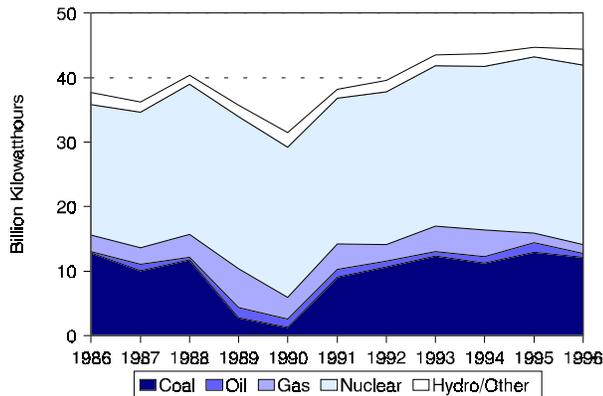


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

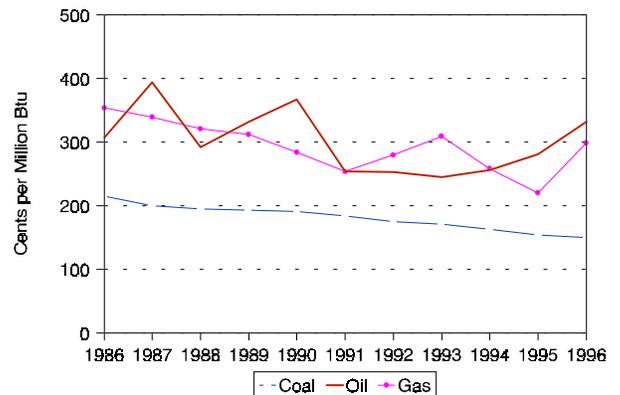


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	215.1	183.7	149.4	-3.6
Oil	307.0	254.1	331.6	0.8
Gas	353.7	253.8	298.6	-1.7

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	234	276	256	0.9
Nitrogen Oxides ^d . .	77	123	134	5.7
Carbon Dioxide ^d . . .	23,386	37,365	42,203	6.1

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

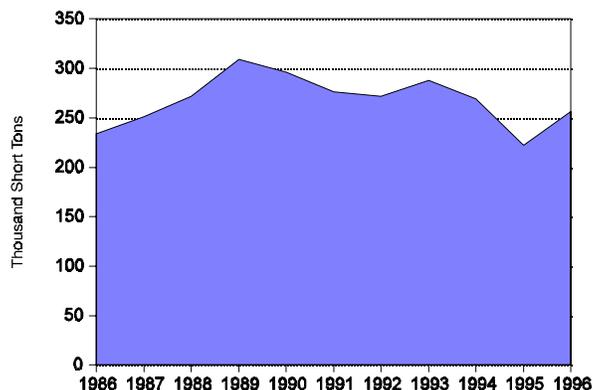


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

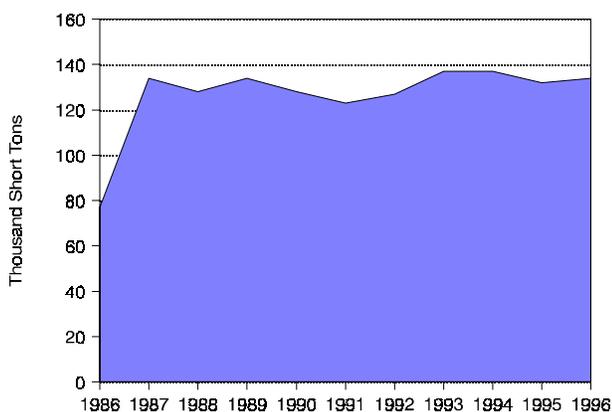


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

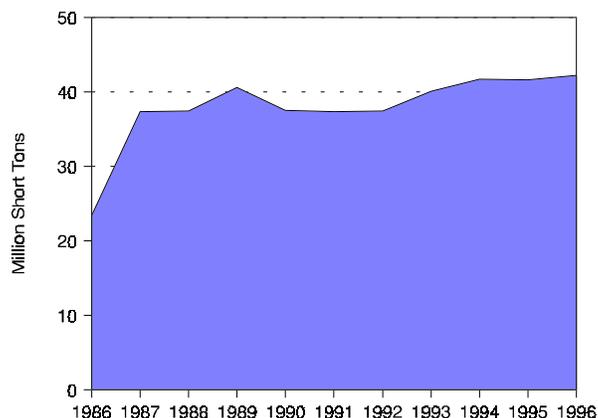


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential	15,819,028	20,295,448	22,985,771	3.8	37.7	39.7	40.3
Commercial . . .	9,743,025	10,667,414	23,126,093	9.0	23.2	20.9	40.6
Industrial	15,807,583	19,448,116	10,098,448	-4.4	37.7	38.1	17.7
Other	590,980	696,831	787,208	2.9	1.4	1.4	1.4
Total	41,960,617	51,107,809	56,997,520	3.1	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

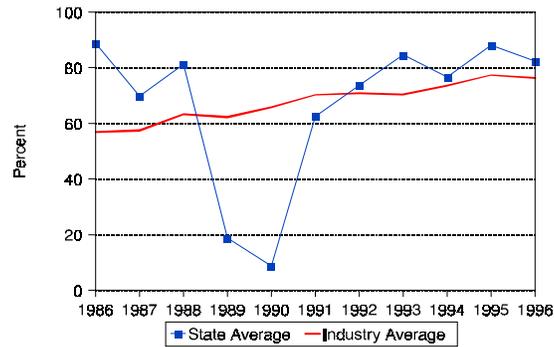


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	5	5	--	3	13
Number of Retail Customers	1,594,942	26,886	--	105,971	1,727,799
Retail Sales (MWh)	39,679,396	480,991	--	1,800,230	41,960,617
Percentage of Retail Sales	94.6	1.2	--	4.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	3,238,510	33,060	--	169,974	3,441,544
Percentage of Revenue	94.1	1.0	--	4.9	100.0
1991					
Number of Utilities	5	5	--	3	13
Number of Retail Customers	1,800,338	29,046	--	127,348	1,956,732
Retail Sales (MWh)	48,029,650	585,960	--	2,492,199	51,107,809
Percentage of Retail Sales	94.0	1.2	--	4.9	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	3,670,673	36,439	--	206,979	3,914,091
Percentage of Revenue	93.8	0.9	--	5.3	100.0
1996					
Number of Utilities	4	5	--	3	12
Number of Retail Customers	1,925,950	30,571	--	144,888	2,101,409
Retail Sales (MWh)	53,213,765	716,447	--	3,067,308	56,997,520
Percentage of Retail Sales	93.4	1.3	--	5.4	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	3,680,477	43,226	--	242,432	3,966,135
Percentage of Revenue	92.8	1.1	--	6.1	100.0

-- = Not applicable.

Massachusetts

Boston's first central station for the production of electricity began its operation in February 1886 under the name of the Edison Electric Illuminating Company of Boston. In 1996, the Commonwealth of Massachusetts had the thirteenth largest population and the twenty-ninth largest utility generating capability. Four of the five largest power plants in the Commonwealth are on the coast. The largest share of electricity generated in Massachusetts comes from coal-fired plants like Brayton Point, the largest plant in the Commonwealth. Massachusetts is also very reliant on oil, gas, and nuclear plants, with each category generating more than ten percent of the State's total. The largest utility in terms of generating capability in 1996 was the New England Power Company. There has recently been a massive sale of generating assets, including Brayton Point and Salem Harbor, the fifth largest plant in the Commonwealth, by the New England Electric System, New England Power's parent company, to the U.S. Generating Company of Bethesda, Maryland. (However, in 1996, it is accurate to report New England Power as the largest operating utility in the Commonwealth.) The average price of electricity in Massachusetts, 10.13 cents per kilowatt-hour, was sixth most expensive in the Nation. Massachusetts has more of a nonutility share of generating capability than all but six States.

The concentrations of electricity generator emissions of sulfur dioxide, nitrogen oxides (NO_x) and carbon dioxide all ranked in the top ten nationally in 1996. It is likely that Massachusetts will need to design a State implementation plan for reducing ground-level ozone in response to a proposal released by the Environmental Protection Agency (EPA) in October 1998. The EPA proposal does not mandate which sources must reduce pollution. However, EPA states that utilities would be one of the most likely sources of NO_x emissions

reductions. Massachusetts is also part of the Ozone Transport Commission (OTC).¹ Each of the thirteen States of the OTC is responsible for enacting regulations in order to achieve region-wide NO_x reductions in a consistent, enforceable manner and for allocating its NO_x Budget Program allowances among NO_x sources in the State. The targets in this program are all large industrial boilers and electric generating facilities with a rated output of 15 megawatts or more. Massachusetts is one of the seven States that has issued its final rule for complying with the NO_x Budget Program.

In 1996, the oil share of utility capability was just over a third while the net generation share was just under one-sixth. In 1996, the utility coal capability share was slightly under one-sixth while the generation share of the total was just under one-third. Over the 11-year period examined in this report, the nonutility generation share of the total increased from 4.1 percent to over one-quarter of the total.

Massachusetts has been among the leaders in the move toward a deregulated environment for electricity. In November 1997, legislation was enacted to restructure the industry. The law required retail access by March 1998. However, in February 1998 a referendum to repeal the November legislation was successfully added to the November 1998 ballot. The referendum was soundly defeated.²

The Boston Edison Company, the second largest utility in the Commonwealth and owner of Massachusetts' only operating nuclear plant, Pilgrim, put the plant up for sale in April 1998. If sold, Pilgrim would be the first ownership transfer of a nuclear plant in a competitive electric market.³

¹ The Ozone Transport Region comprises the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Delaware, the northern counties of Virginia, and the District of Columbia.

² Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

³ John O'Keefe, *The Patriot Ledger*, (August 6, 1998), p. 1.

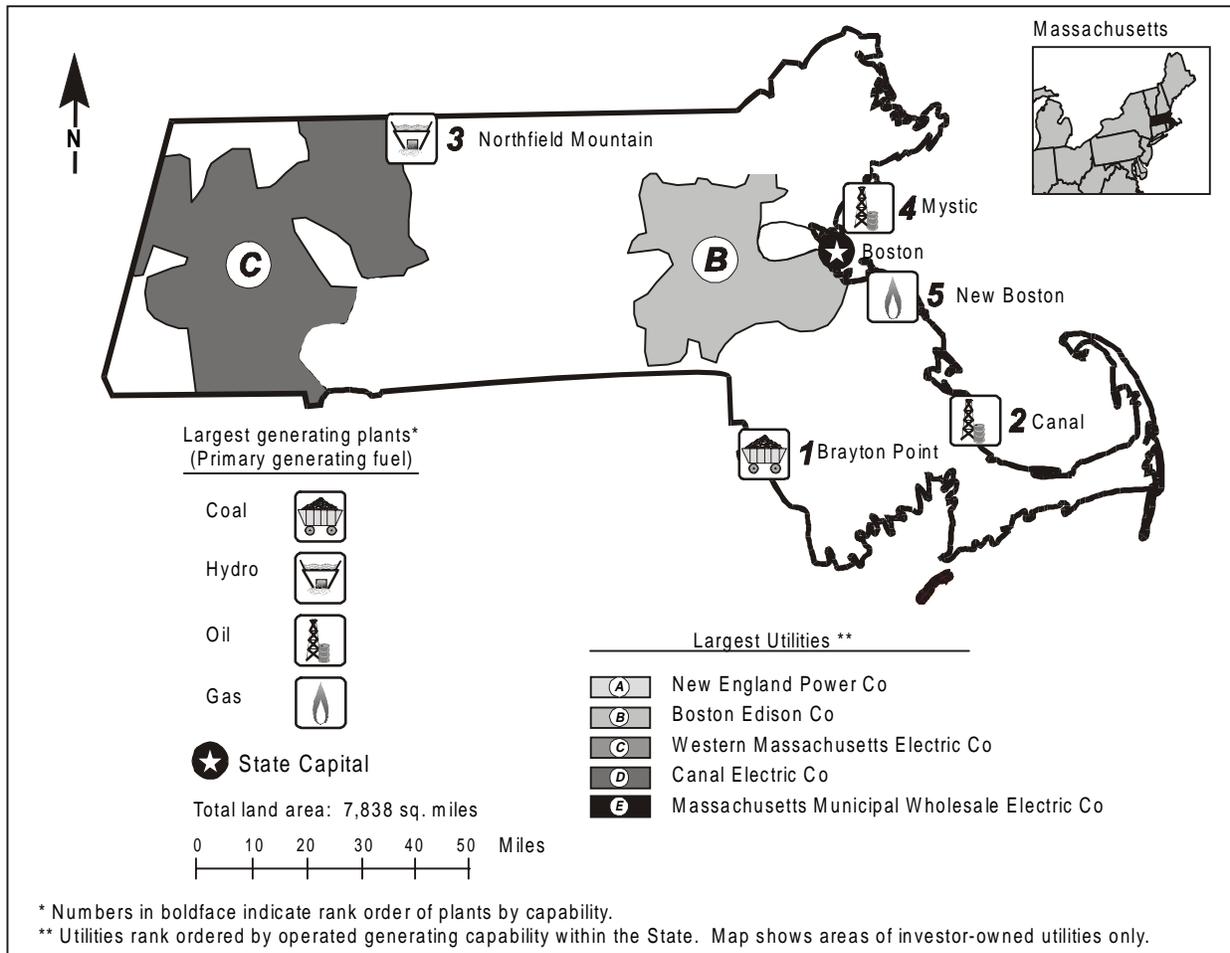


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		NPCC	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	9,365	29
State Primary Generating Fuel		Coal	Generation (MWh)	27,758,877	36
Population (as of 7/96)	6,085,395	13	Average Age of Coal Plants	33 years	
Average Revenue (cents/kWh)	10.13	^a 44	Average Age of Oil-fired Plants	25 years	
Industry			Average Age of Gas-fired Plants	26 years	
Capability (MWe)	11,204	^b 25	Average Age of Nuclear Plants	24 years	
Generation (MWh)	38,049,471	^b 27	Average Age of Hydroelectric Plants	27 years	
Capability/person (KWe/person)	1.84	^b 42	Average Age of Other Plants	12 years	
Generation/person (MWh/person)	6.25	^b 41	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	108	25	Capability (MWe)	1,839	11
Nitrogen Oxide Emissions (Thousand Short Tons)	64	37	Percentage Share of Capability	16.4	7
Carbon Dioxide Emissions (Thousand Short Tons)	28,735	33	Generation (MWh)	10,290,594	10
Sulfur Dioxide/sq. mile (Tons)	13.78	9	Percentage Share of Generation	27	6
Nitrogen Oxides/sq. mile (Tons)	8.17	10			
Carbon Dioxide/sq. mile (Tons)	3,666.11	6			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Brayton Point	Coal/Oil	New England Power Co	1,543
2. Canal	Oil	Canal Electric Co	1,143
3. Northfield Mountain	Hydro	Western Massachusetts Elec Co	1,080
4. Mystic	Oil	Boston Edison Co	990
5. New Boston	Gas	Boston Edison Co	749

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. New England Power Co	2,928	1,404	900	--	--	624
B. Boston Edison Co	2,600	--	1,182	749	669	--
C. Western Massachusetts Elec Co	1,342	--	157	--	--	1,184
D. Canal Electric Co	1,143	--	1,143	--	--	--
E. Massachusetts Mun Whls Elec Co	425	--	325	100	--	--
Total	8,438	1,404	3,707	849	669	1,808
Percentage of Industry Capability	75.3	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

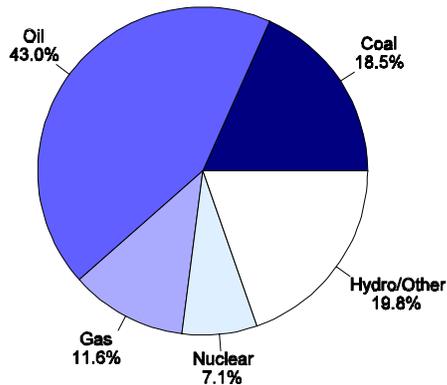


Figure 2. Utility Generation by Primary Energy Source, 1996

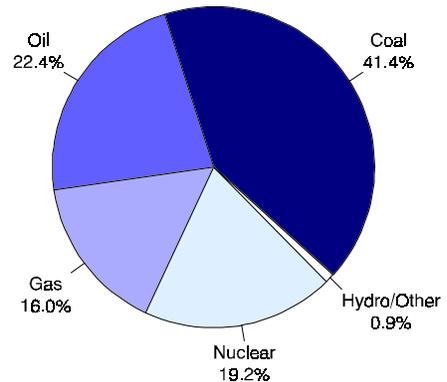


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

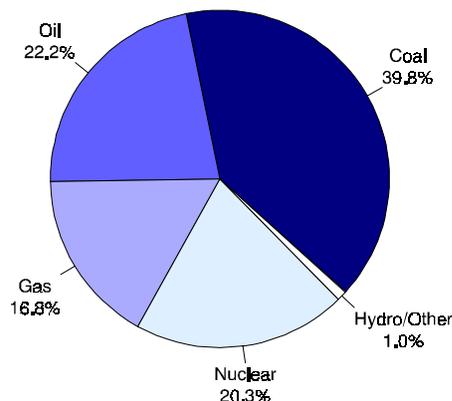


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	1,756	1,692	1,730	17.2	15.7	15.4
Oil	5,343	5,070	4,030	52.3	46.9	36.0
Gas	127	330	1,082	1.2	3.1	9.7
Nuclear	834	830	669	8.2	7.7	6.0
Hydro/Other	1,775	1,849	1,854	17.4	17.1	16.5
Total Utility	9,835	9,771	9,365	96.3	90.4	83.6
Total Nonutility	378	1,034	1,839	3.7	9.6	16.4
Industry	10,213	10,805	11,204	100.0	100.0	100.0

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	9,754,912	11,861,344	11,500,536	27.1	29.0	30.2
Oil	20,664,914	15,612,257	6,221,378	57.5	38.2	16.4
Gas	1,311,432	3,679,433	4,449,799	3.6	9.0	11.7
Nuclear	2,420,252	4,416,611	5,324,341	6.7	10.8	14.0
Hydro/Other	329,462	232,713	262,823	0.9	0.6	0.7
Total Utility	34,480,972	35,802,358	27,758,877	95.9	87.7	73.0
Total Nonutility	1,488,518	5,039,761	10,290,594	4.1	12.3	27.0
Industry	35,969,490	40,842,119	38,049,471	100.0	100.0	100.0

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.095	0.113	0.111	23.4	26.6	28.2
Oil	0.209	0.156	0.062	51.6	36.5	15.7
Gas	0.015	0.041	0.047	3.8	9.5	11.9
Nuclear	0.026	0.047	0.057	6.5	11.1	14.4
Hydro/Other	0.003	0.002	0.003	0.9	0.6	0.7
Total Utility	0.348	0.360	0.279	86.1	84.2	70.9
Total Nonutility	0.056	0.067	0.114	13.9	15.8	29.1
Industry	0.405	0.427	0.393	100.0	100.0	100.0

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

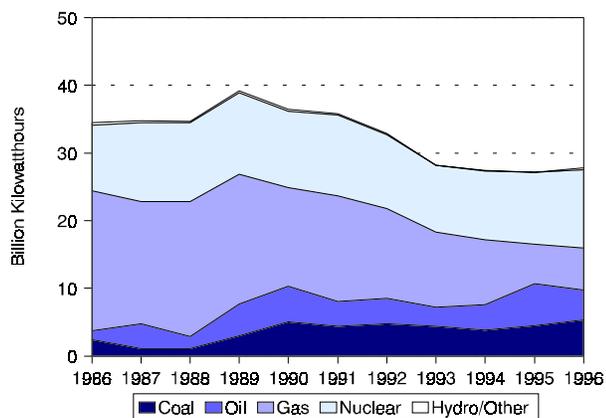


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

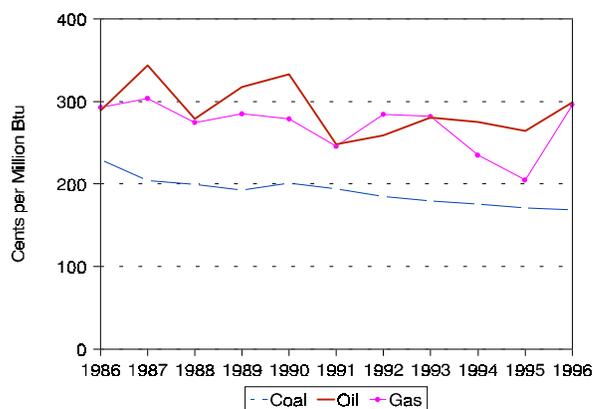


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	229.5	193.9	168.8	-3.0
Oil	288.9	248.4	299.2	0.4
Gas	292.9	245.5	296.2	0.1

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	267	243	108	-8.7
Nitrogen Oxides ^d . .	69	82	64	-0.7
Carbon Dioxide ^d . . .	28,575	33,463	28,735	0.1

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

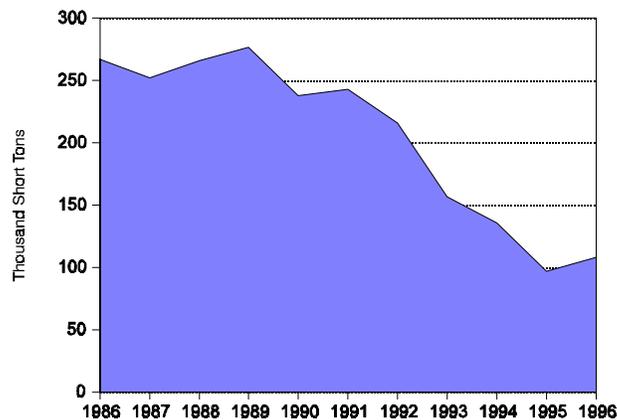


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

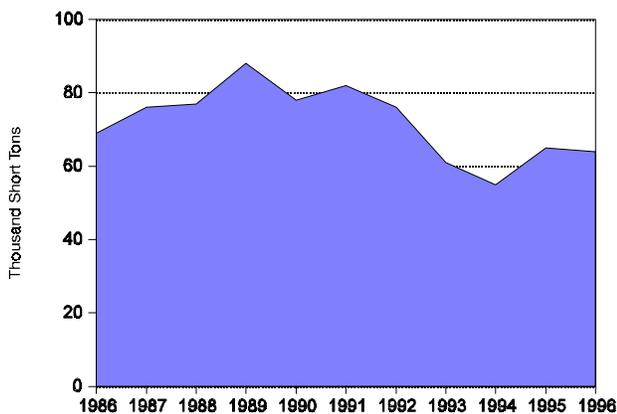


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

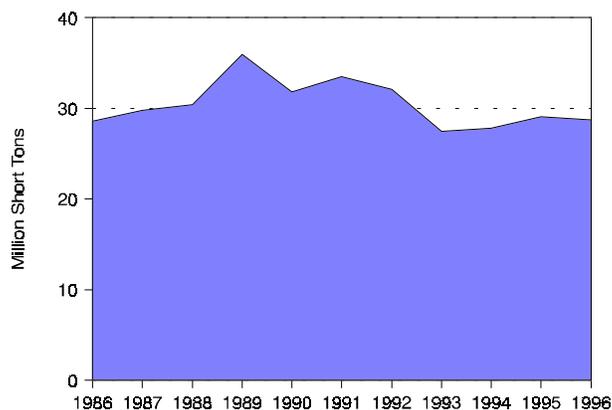


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	13,607,844	15,379,421	16,255,780	1.8	34.0	34.3	34.4
Commercial .	15,832,316	18,516,906	20,345,620	2.5	39.5	41.3	43.0
Industrial . . .	9,682,305	9,793,513	10,085,167	0.4	24.2	21.9	21.3
Other	919,763	1,106,947	607,206	-4.1	2.3	2.5	1.3
Total	40,042,234	44,796,787	47,293,773	1.7	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

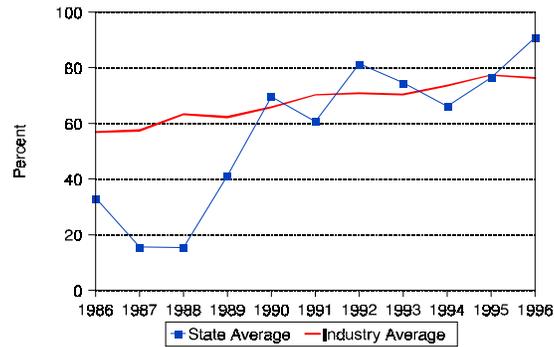


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	10	40	--	--	50
Number of Retail Customers	2,123,348	314,239	--	--	2,437,587
Retail Sales (MWh)	34,968,007	5,074,227	--	--	40,042,234
Percentage of Retail Sales	87.3	12.7	--	--	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	3,480,589	521,712	--	--	4,002,301
Percentage of Revenue	87.0	13.0	--	--	100.0
1991					
Number of Utilities	10	40	--	1	51
Number of Retail Customers	2,304,702	339,937	--	2,867	2,647,506
Retail Sales (MWh)	38,867,017	5,895,662	--	34,108	44,796,787
Percentage of Retail Sales	86.8	13.2	--	0.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	4,159,668	636,922	--	3,407	4,799,997
Percentage of Revenue	86.7	13.3	--	0.1	100.0
1996					
Number of Utilities	10	40	--	--	50
Number of Retail Customers	2,388,091	357,736	--	--	2,745,827
Retail Sales (MWh)	40,862,198	6,431,575	--	--	47,293,773
Percentage of Retail Sales	86.4	13.6	--	--	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	4,203,913	585,261	--	--	4,789,174
Percentage of Revenue	87.8	12.2	--	--	100.0

-- = Not applicable.

Michigan

In 1880, the Grand Rapids Electric Light and Power Company began operating the first commercial hydro-power installation.¹ Today, most of the electricity in Michigan is generated at coal-fired plants like the Monroe plant, the largest in the State, and St Clair, the fifth largest. Michigan is also very reliant on nuclear power. In fact, virtually all the electricity in Michigan is generated at coal or nuclear plants. Detroit Edison, the largest utility in the State, operates Monroe and St. Clair. The five largest plants in the State are all on the Lower Peninsula. The average price of electricity in Michigan, 7.10 cents per kilowatt-hour, was seventeenth most expensive in the Nation. Michigan is a net exporter of electricity.

The Clean Air Act Amendments of 1990 specified a number of utility plants to begin compliance with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x) beginning in 1995. Six hundred fifty megawatts of nameplate capacity at J H Campbell, a coal plant, were mentioned in the law. Michigan's emissions of SO₂, NO_x and carbon dioxide (CO₂) from electricity generators were all among the top fifteen nationally in 1996. The paths of the three pollutants have diverged over time in Michigan. SO₂ totals in 1991 were less than in 1986 but they increased well above 1986 totals in 1996. NO_x went up from 1986 to 1991 but then leveled off in 1996. CO₂ emissions increased in

both time periods. It is likely that Michigan will need to design a State implementation plan (SIP) for reducing ground-level ozone in response to a proposal released by the Environmental Protection Agency (EPA) in October 1998. The EPA SIP call proposal does not mandate which sources must reduce pollution. However, EPA states that utilities would be one of the most likely sources of NO_x emissions reductions.

In 1986, utility coal units represented over half of Michigan's generating capability and over three quarters of its net generation. In 1996, the coal share of capability fell to under one-half while the net generation share fell to under three-fifths. Nuclear capability and net generation, on the other hand, were 17.3 percent and 15.3 percent, respectively, in 1986. By 1996, the nuclear shares had fallen to 16.0 percent and risen to 23.8 percent, respectively. Nonutility generators provided 5.0 percent of the net generation in Michigan in 1986. By 1996, the nonutility share had more than tripled to 15.5 percent.

Michigan has not been as aggressive as some other States in moving toward deregulation. Legislation to introduce retail competition apparently stalled in April 1998.²

¹ George S. Bush, *Future Builders, The Story of Michigan's Consumers Power Company*, McGraw Hill (New York, 1973), p. 58.

² Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

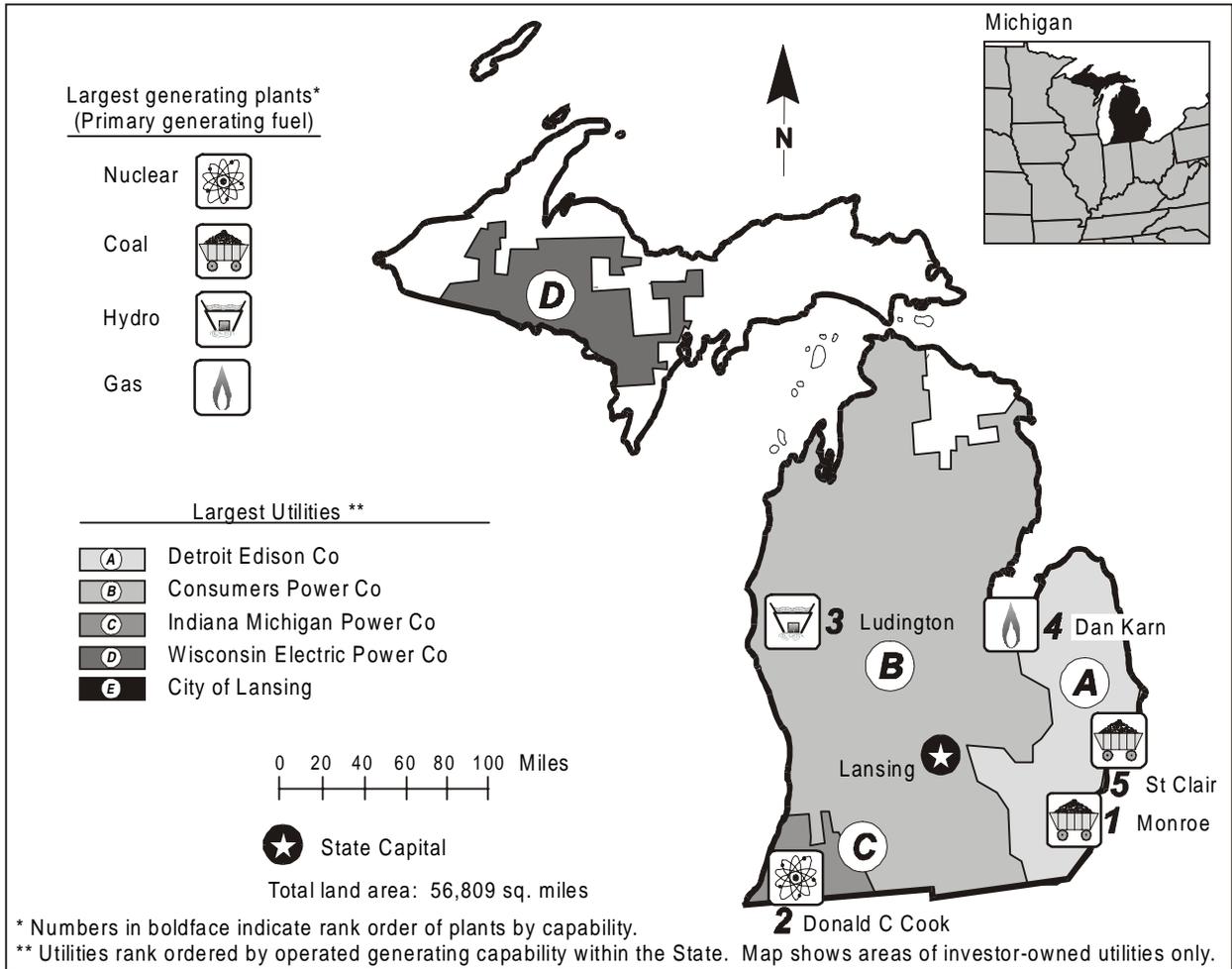


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)	ECAR/MAPP/MAIN		Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	21,985	10
State Primary Generating Fuel		Coal	Generation (MWh)	95,155,261	13
Population (as of 7/96)	9,730,925	8	Average Age of Coal Plants	28 years	
Average Revenue (cents/kWh)	7.10	^a 35	Average Age of Oil-fired Plants	26 years	
Industry			Average Age of Gas-fired Plants	24 years	
Capability (MWe)	24,924	^b 9	Average Age of Nuclear Plants	17 years	
Generation (MWh)	112,636,317	^b 10	Average Age of Hydroelectric Plants	29 years	
Capability/person		^b 28	Average Age of Other Plants	--	
Generation/person			Nonutility^c		
(MWh/person)	11.58	^b 30	Capability (MWe)	2,939	8
Sulfur Dioxide Emissions			Percentage Share of Capability	11.8	12
(Thousand Short Tons)	450	13	Generation (MWh)	17,481,056	7
Nitrogen Oxide Emissions			Percentage Share of Generation	15.5	14
(Thousand Short Tons)	326	9			
Carbon Dioxide Emissions			-- = Not applicable.		
(Thousand Short Tons)	91,160	9			
Sulfur Dioxide/sq. mile (Tons)	7.92	18			
Nitrogen Oxides/sq. mile (Tons)	5.74	14			
Carbon Dioxide/sq. mile (Tons)	1,604.68	20			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Monroe	Coal	Detroit Edison Co	3,014
2. Donald C Cook	Nuclear	Indiana Michigan Power Co	2,060
3. Ludington	Hydro	Consumers Power Co	1,872
4. Dan E Karn	Gas/Oil/Coal	Consumers Power Co	1,791
5. St Clair	Coal/Oil	Detroit Edison Co	1,654

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Detroit Edison Co	10,277	7,403	1,558	218	1,098	--
B. Consumers Power	7,226	2,830	664	957	829	1,946
C. Indiana Michigan Power	2,064	--	--	--	2,060	4
D. Wisconsin Electric Power Co	684	613	--	--	--	71
E. City of Lansing	515	515	--	--	--	--
Total	20,766	11,361	2,222	1,175	3,987	2,021
Percentage of Industry Capability	83.3	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

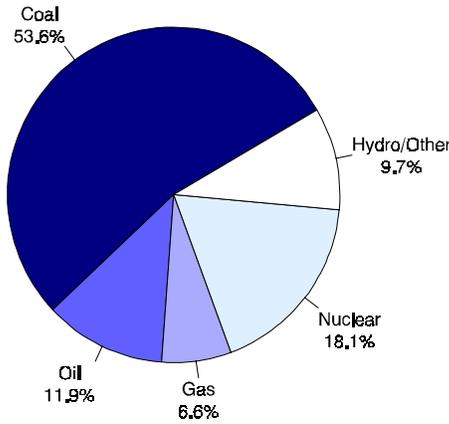


Figure 2. Utility Generation by Primary Energy Source, 1996

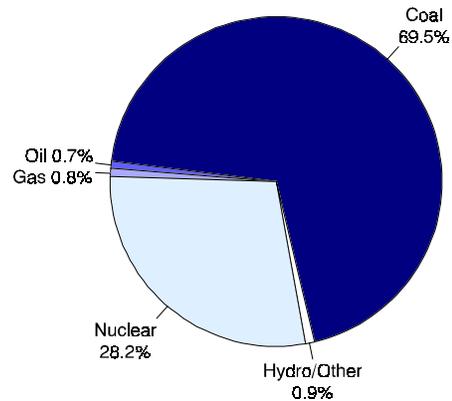


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

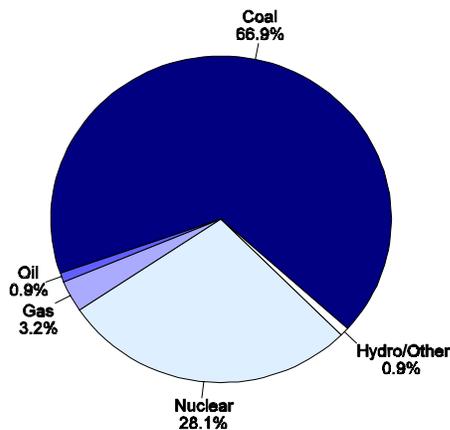


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	11,992	11,960	11,793	51.4	48.0	47.3
Oil	3,638	3,171	2,620	15.6	12.7	10.5
Gas	657	1,003	1,447	2.8	4.0	5.8
Nuclear	4,026	3,942	3,987	17.3	15.8	16.0
Hydro/Other	2,192	2,200	2,137	9.4	8.8	8.6
Total Utility	22,506	22,275	21,985	96.5	89.4	88.2
Total Nonutility	818	2,652	2,939	3.5	10.6	11.8
Industry	23,324	24,927	24,924	100.0	100.0	100.0

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	61,613,094	65,138,291	66,097,259	77.0	61.6	58.7
Oil	798,547	553,863	651,860	1.0	0.5	0.6
Gas	787,514	998,058	737,006	1.0	0.9	0.7
Nuclear	12,257,421	27,021,214	26,829,363	15.3	25.5	23.8
Hydro/Other	604,082	855,957	839,773	0.8	0.8	0.7
Total Utility	76,060,658	94,567,383	95,155,261	95.0	89.4	84.5
Total Nonutility	3,996,688	11,204,853	17,481,056	5.0	10.6	15.5
Industry	80,057,346	105,772,236	112,636,317	100.0	100.0	100.0

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.637	0.663	0.678	63.4	57.6	54.1
Oil	0.010	0.008	0.010	1.0	0.7	0.8
Gas	0.011	0.024	0.032	1.1	2.1	2.6
Nuclear	0.132	0.290	0.285	13.2	25.2	22.8
Hydro/Other	0.006	0.009	0.009	0.6	0.8	0.7
Total Utility	0.796	0.993	1.013	79.3	86.3	80.9
Total Nonutility	0.208	0.158	0.239	20.7	13.7	19.1
Industry	1.004	1.151	1.252	100.0	100.0	100.0

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

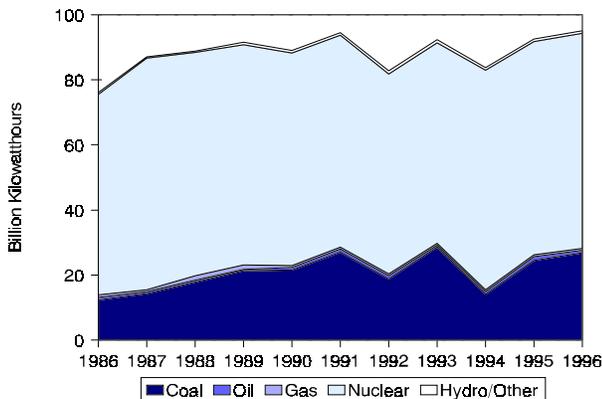


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996

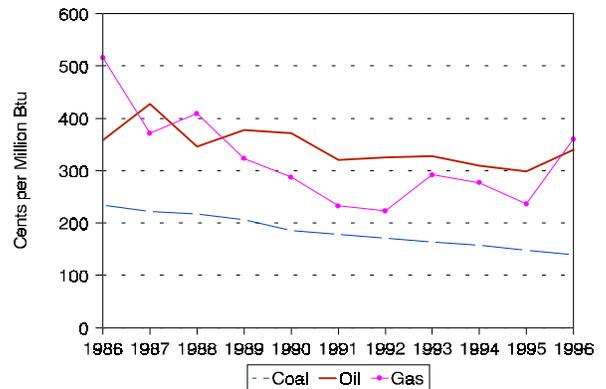


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	233.9	179.0	139.7	-5.0
Oil	358.1	320.9	340.2	-0.5
Gas	469.5	220.2	269.3	-5.4

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

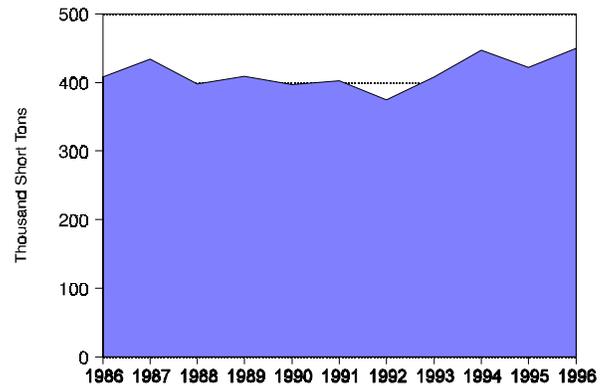


Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	408	402	450	1.0
Nitrogen Oxides ^d	268	325	326	2.0
Carbon Dioxide ^d	67,155	83,173	91,160	3.1

Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

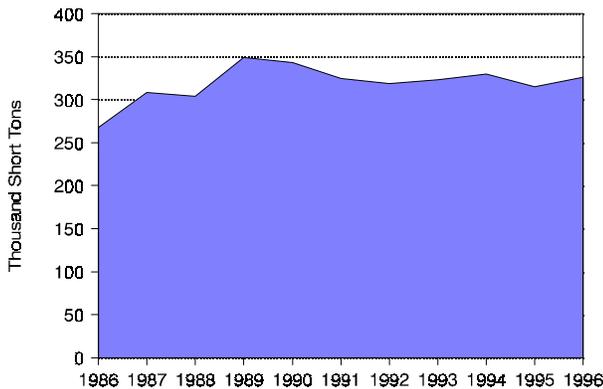


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

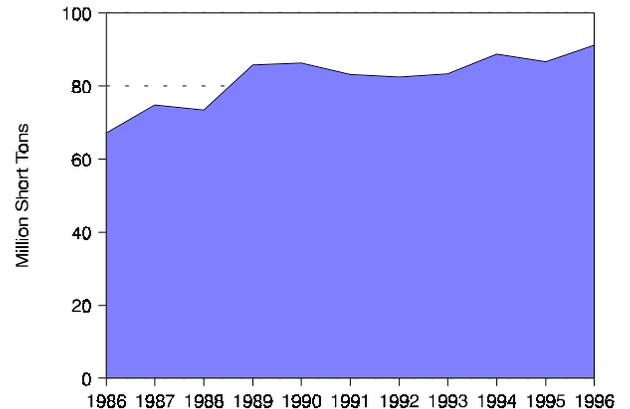


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential	23,025,082	26,759,510	28,901,473	2.3	30.2	31.7	30.0
Commercial	17,813,170	21,454,734	32,037,663	6.0	23.4	25.4	33.3
Industrial	34,090,722	35,006,636	34,499,412	0.1	44.7	41.4	35.8
Other	1,323,778	1,297,663	863,018	-4.2	1.7	1.5	0.9
Total	76,252,753	84,518,543	96,301,566	2.4	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

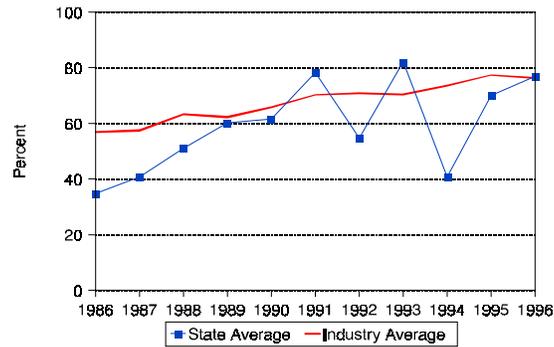


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	12	41	--	15	68
Number of Retail Customers	3,439,126	246,881	--	194,423	3,880,430
Retail Sales (MWh)	69,327,770	5,370,865	--	1,554,118	76,252,753
Percentage of Retail Sales	90.9	7.0	--	2.0	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	6,165,177	416,305	--	151,904	6,733,386
Percentage of Revenue	91.6	6.2	--	2.3	100.0
1991					
Number of Utilities	10	41	--	14	65
Number of Retail Customers	3,665,380	263,374	--	210,963	4,139,717
Retail Sales (MWh)	76,584,765	6,124,438	--	1,809,340	84,518,543
Percentage of Retail Sales	90.6	7.3	--	2.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	6,245,355	427,526	--	177,733	6,850,614
Percentage of Revenue	91.2	6.2	--	2.6	100.0
1996					
Number of Utilities	9	41	--	14	64
Number of Retail Customers	3,850,845	278,266	--	239,077	4,368,188
Retail Sales (MWh)	87,141,791	6,983,900	--	2,175,875	96,301,566
Percentage of Retail Sales	90.5	7.3	--	2.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	6,200,421	446,152	--	189,374	6,835,947
Percentage of Revenue	90.7	6.5	--	2.8	100.0

-- = Not applicable.

Minnesota

In 1881, the Minnesota Electric Light and Electric Motive Power Company was organized. The company built a 24-square-foot hydroelectric plant on the Mississippi River just below the St. Anthony Falls. Within a year, the company landed the Minneapolis street lighting contract for \$200 a year.¹ One hundred fourteen years later, Minnesota had the twentieth largest population and the thirtieth largest utility generating capability. Most of the electricity in the State is generated at coal-fired plants. Minnesota is also very reliant on nuclear power. The average price of electricity in Minnesota, 5.54 cents per kilowatt-hour, was fourteenth lowest in the Nation. Northern States Power, the largest utility in Minnesota, operates four of the five largest plants in the State, including the Sherburne County (Sherco)² plant, the largest in the State. The second largest plant, Prairie Island, also operated by Northern States Power, is a nuclear plant. Four of the five largest plants are located within fifty miles of the Twin Cities. Minnesota is a net importer of electricity.

The Clean Air Act Amendments of 1990 specified a number of utility plants to begin compliance with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x) beginning in 1995. One hundred sixty-three megawatts of nameplate capacity at Northern States Power's High Bridge plant was cited by the law.

Emissions of SO₂, NO_x, and carbon dioxide rose from 1986 to 1991 and then did so again from 1991 to 1996. The absolute emissions totals of the three pollutants from Minnesota electricity generators and the concentrations of these pollutants in the State all ranked around the national medians.

In 1986, utility coal units represented 52.1 percent of Minnesota's generating capability and 55.7 percent of its net generation. In 1996, the coal share of capability had risen to 58.8 percent, while the net generation share rose to 61.6 percent. Nuclear capability and net generation, on the other hand, were 18.5 percent and 37.9 percent, respectively, in 1986. By 1996, the nuclear shares had fallen to 16.0 percent and 27.3 percent, respectively. Over the 11-year period examined in this report, Minnesota's nuclear capacity factor was always higher than the national average. The nonutility share of generation more than doubled from 1986 to 1996.

Minnesota's State legislature has not been as aggressive as some others in the move toward a more deregulated environment. In January 1998, the Legislative Electric Energy Task Force recommended that the 1998 legislature should not act on restructuring the industry. A further study of the issues and another report is due in January 1999.³

¹ Carl Pine, *Northern States People: The Past 70 Years*, Northern States Power Company, (Minneapolis, 1979), p. 3.

² <http://www.nspco.com/nsp/Generating%20Plants/sherco.htm>.

³ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

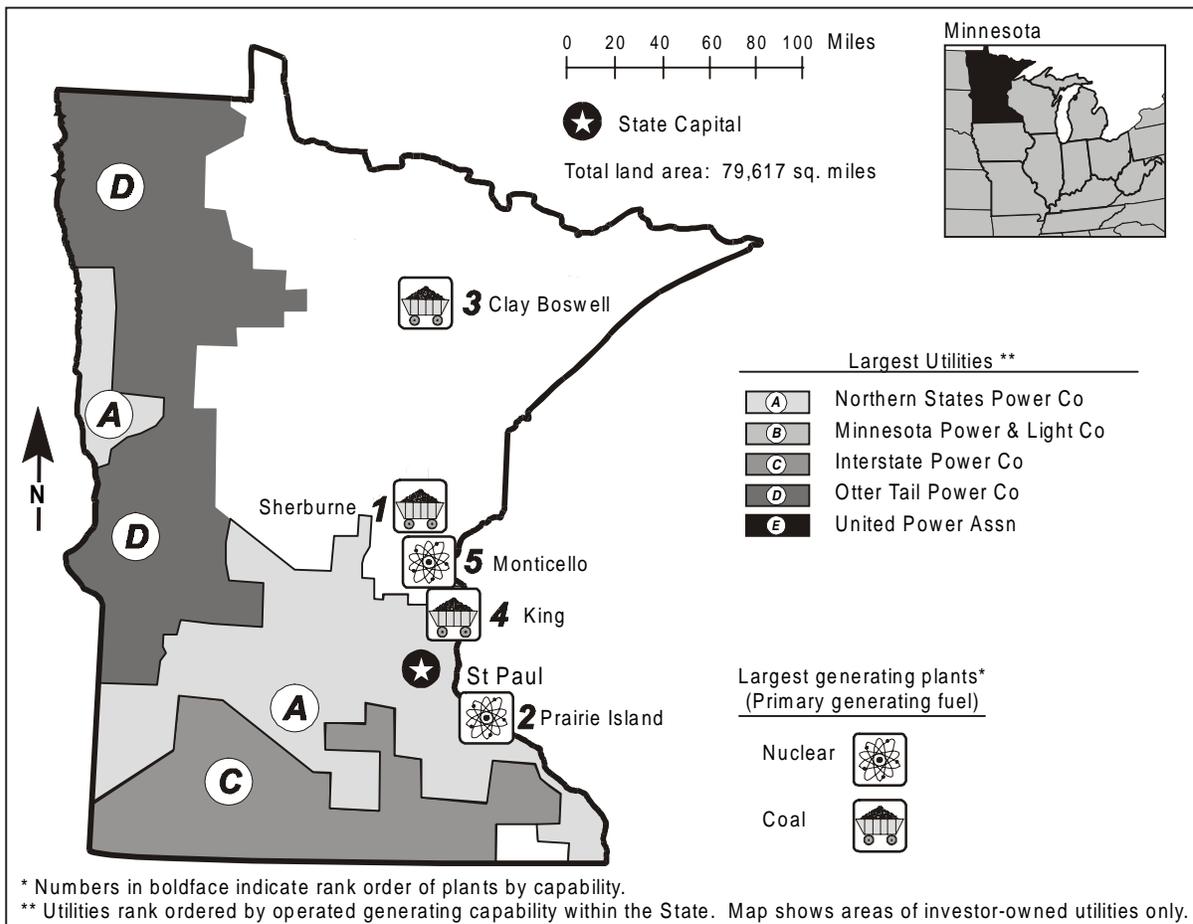


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		MAPP	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	9,180	30
State Primary Generating Fuel		Coal	Generation (MWh)	41,791,506	27
Population (as of 7/96)	4,648,596	20	Average Age of Coal Plants	25 years	
Average Revenue (cents/kWh)	5.54	^a 14	Average Age of Oil-fired Plants	25 years	
Industry			Average Age of Gas-fired Plants	27 years	
Capability (MWe)	9,822	^b 27	Average Age of Nuclear Plants	23 years	
Generation (MWh)	44,363,780	^b 25	Average Age of Hydroelectric Plants	69 years	
Capability/person			Average Age of Other Plants	45 years	
(KWe/person)	2.11	^b 36	Nonutility^c		
Generation/person			Capability (MWe)	642	24
(MWh/person)	9.54	^b 35	Percentage Share of Capability	6.5	23
Sulfur Dioxide Emissions	105	26	Generation (MWh)	2,572,274	28
(Thousand Short Tons)			Percentage Share of		
Nitrogen Oxide Emissions	153	22	Generation	5.8	25
(Thousand Short Tons)					
Carbon Dioxide Emissions	43,324	22			
(Thousand Short Tons)					
Sulfur Dioxide/sq. mile (Tons)	1.32	34			
Nitrogen Oxides/sq. mile (Tons)	1.92	31			
Carbon Dioxide/sq. mile (Tons)	544.16	33			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Sherburne	Coal	Northern States Power Co	2,295
2. Prairie Island	Nuclear	Northern States Power Co	1,027
3. Clay Boswell	Coal	Minnesota Power & Light Co	1,024
4. King	Coal	Northern States Power Co	567
5. Monticello	Nuclear	Northern States Power Co	545

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Northern States Power Co	6,503	4,125	592	158	1,572	56
B. Minnesota Power & Light Co	1,376	1,172	51	--	--	153
C. Interstate Power Co	158	149	2	--	--	6
D. Otter Tail Power Co	157	--	107	--	--	39
E. United Power Assn	145	84	50	24	--	--
Total	8,339	5,530	802	182	1,572	254
Percentage of Industry Capability	84.9	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

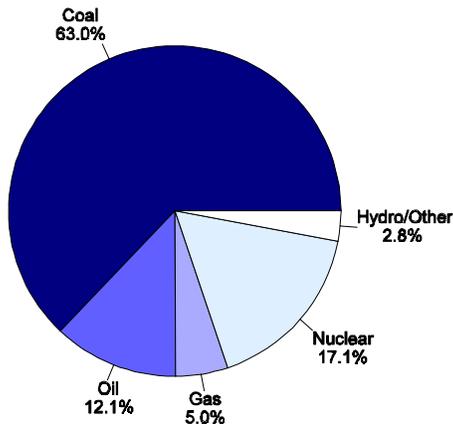


Figure 2. Utility Generation by Primary Energy Source, 1996

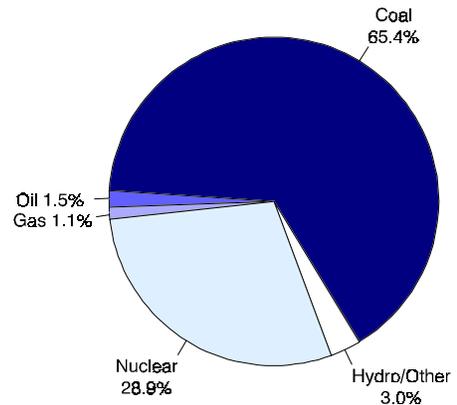


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

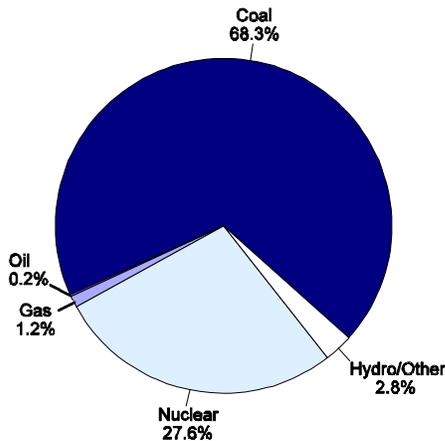


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	4,360	5,786	5,779	52.1	61.3	58.8
Oil	1,116	1,020	1,112	13.3	10.8	11.3
Gas	695	305	458	8.3	3.2	4.7
Nuclear	1,550	1,542	1,572	18.5	16.3	16.0
Hydro/Other	138	230	259	1.6	2.4	2.6
Total Utility	7,859	8,884	9,180	94.0	94.1	93.5
Total Nonutility	506	558	642	6.0	5.9	6.5
Industry	8,365	9,442	9,822	100.0	100.0	100.0

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	16,267,289	26,186,299	27,329,077	55.7	62.2	61.6
Oil	21,628	575,916	640,427	0.1	1.4	1.4
Gas	124,372	426,122	467,568	0.4	1.0	1.1
Nuclear	11,052,033	12,059,055	12,095,122	37.9	28.6	27.3
Hydro/Other	935,931	1,180,183	1,259,312	3.2	2.8	2.8
Total Utility	28,401,254	40,427,575	41,791,506	97.3	96.0	94.2
Total Nonutility	797,727	1,682,847	2,572,274	2.7	4.0	5.8
Industry	29,198,981	42,110,422	44,363,780	100.0	100.0	100.0

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.182	0.290	0.318	52.2	59.8	60.0
Oil	(s)	0.001	0.001	0.1	0.1	0.2
Gas	0.002	0.006	0.005	0.5	1.2	1.0
Nuclear	0.119	0.130	0.128	34.2	26.7	24.2
Hydro/Other	0.010	0.012	0.013	2.8	2.5	2.4
Total Utility	0.313	0.439	0.466	89.8	90.3	87.8
Total Nonutility	0.035	0.047	0.065	10.2	9.7	12.2
Industry	0.349	0.486	0.530	100.0	100.0	100.0

(s) = Nonzero value less than 0.0005

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

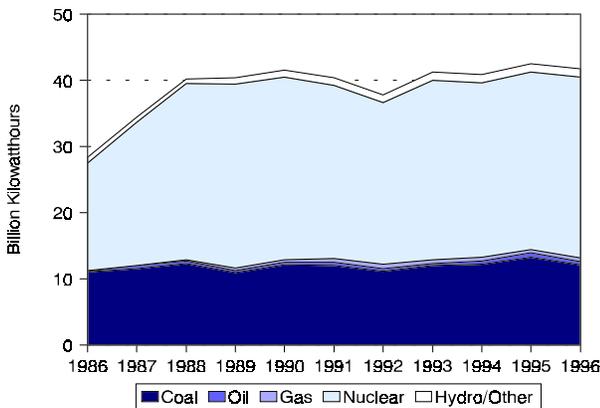


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

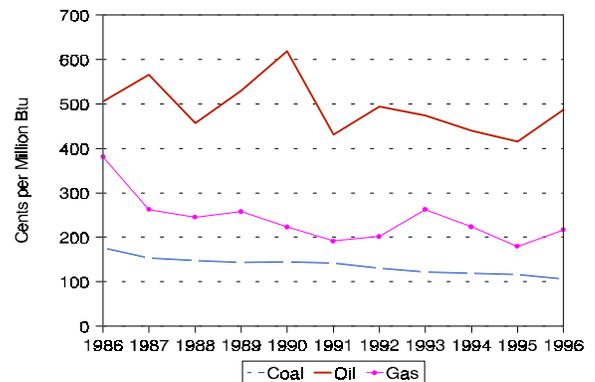


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	175.6	141.6	106.6	-4.9
Oil	505.0	430.4	487.4	-0.4
Gas	381.3	191.3	216.9	-5.5

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	80	93	105	2.8
Nitrogen Oxides ^d . .	73	145	153	7.7
Carbon Dioxide ^d . . .	19,343	38,327	43,324	8.4

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

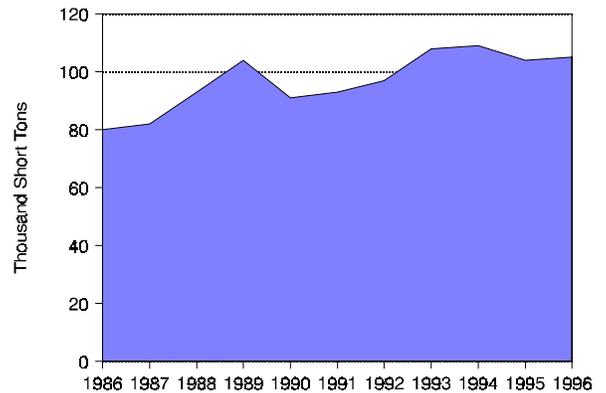


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

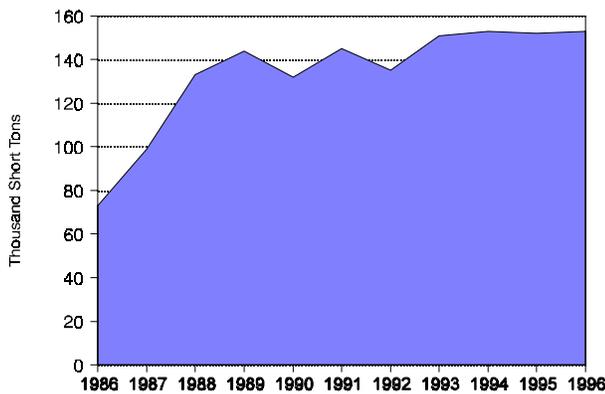


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

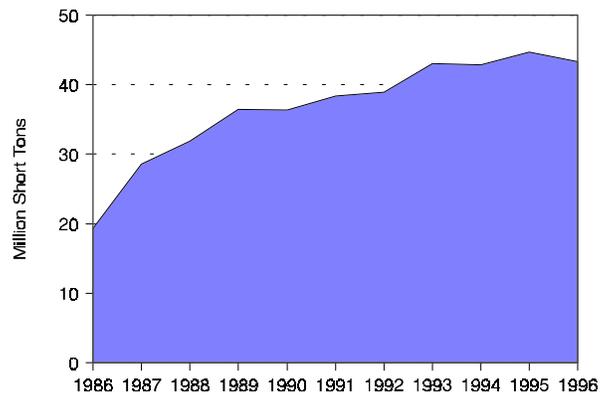


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	13,259,349	15,655,101	17,157,124	2.6	34.2	32.1	31.2
Commercial	6,823,865	8,416,648	10,114,971	4.0	17.6	17.3	18.4
Industrial . . .	17,849,302	23,937,844	26,934,450	4.2	46.1	49.1	49.0
Other	801,224	745,004	735,154	-0.9	2.1	1.5	1.3
Total	38,733,742	48,754,597	54,941,699	3.6	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

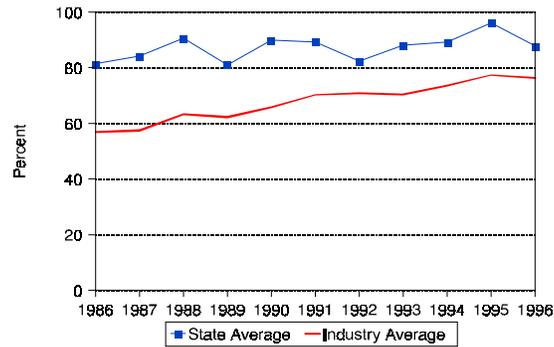


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	6	125	1	51	183
Number of Retail Customers	1,106,710	280,291	3	408,727	1,795,731
Retail Sales (MWh)	27,858,719	5,323,919	41,389	5,509,715	38,733,742
Percentage of Retail Sales	71.9	13.7	0.1	14.2	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,875,642	356,963	322	509,114	2,742,134
Percentage of Revenue	68.4	13.0	(s)	18.6	100.0
1991					
Number of Utilities	5	125	1	50	181
Number of Retail Customers	1,222,272	283,616	3	510,292	2,016,183
Retail Sales (MWh)	34,891,118	6,328,482	41,001	7,493,996	48,754,597
Percentage of Retail Sales	71.6	13.0	0.1	15.4	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,988,505	399,226	377	605,765	2,993,920
Percentage of Revenue	66.4	13.3	(s)	20.2	100.0
1996					
Number of Utilities	5	125	1	49	180
Number of Retail Customers	1,271,094	304,244	3	565,609	2,140,950
Retail Sales (MWh)	38,370,395	7,320,991	43,329	9,206,984	54,941,699
Percentage of Retail Sales	69.8	13.3	0.1	16.8	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,027,912	413,259	589	604,246	3,046,006
Percentage of Revenue	66.6	13.6	(s)	19.8	100.0

(s) = Nonzero percentage less than 0.05.

Mississippi

Mississippi utilities serve a population of almost 3 million and generated 28.8 billion kilowatthours of electricity in 1996. The largest portion of the electricity generated by utilities comes from coal-fired power plants, which produced 12.0 billion kilowatthours in 1996. Roughly 50 percent of the coal used for electricity generation in Mississippi is mined in the southeastern part of Montana. Two of the four largest plants, the third and fourth largest—Jack Watson and Victor J. Daniel—are coal-fired.¹ Three of the five largest plants are located in the western part of the State along the Mississippi River. The other two are located in the extreme southeast along the coast of the Gulf of Mexico. The largest utility in the State is Mississippi Power and Light Company (MP&L).

Mississippi's five largest utilities, MP&L, Mississippi Power, System Energy Resources, South Mississippi Electric Power Association, and Greenwood Utilities, operate virtually all (98.7 percent) of the State's utility net summer capability. The average price of electricity in Mississippi, 6.01 cents per kilowatthour, was twentieth lowest in the Nation.

Overall electricity sales increased between 1986 and 1996. In 1996, utility retail sales were 39.6 billion kilowatthours, with industrial sales accounting for 40.5 percent of sales followed by residential sales at 37.8

percent. Over 40 percent of retail sales was provided through the 23 public utilities and 25 cooperatives.

In addition to its coal-fired generation, Mississippi also has significant gas-fired and nuclear power generation. The relatively large gas-fired share can be attributed to its proximity to Louisiana, the second largest gas producer in the Nation. Some of the State's gas-fired electricity comes from the first and fifth largest plants in the State, Baxter Wilson and Andrus, which are operated by Mississippi Power, a subsidiary of the Atlanta-based Southern Company.

Mississippi is also very reliant on Grand Gulf, its only nuclear power plant and the State's second largest plant. In 1996, Grand Gulf generated 32.0 percent of the utility electricity generated in Mississippi. Since 1987, Grand Gulf's capacity factor has been higher than the national average. Given Grand Gulf's young age, however, MP&L may have significant stranded costs associated with the plant if utility restructuring takes place.

In June 1998, the Mississippi Public Service Commission issued a Revised Proposed Plan for retail competition that addresses the comments received from industry, consumers, suppliers, and utilities. Hearings will be held throughout 1999 to address these issues, and retail competition will be phased in beginning in January 2001. Full competition is slated for January 2004.²

¹ The Clean Air Act Amendments of 1990 included 750 megawatts of nameplate capacity at Mississippi Power's Jack Watson plant to begin compliance with stricter emissions standards for sulfur dioxide and nitrogen oxides.

² Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

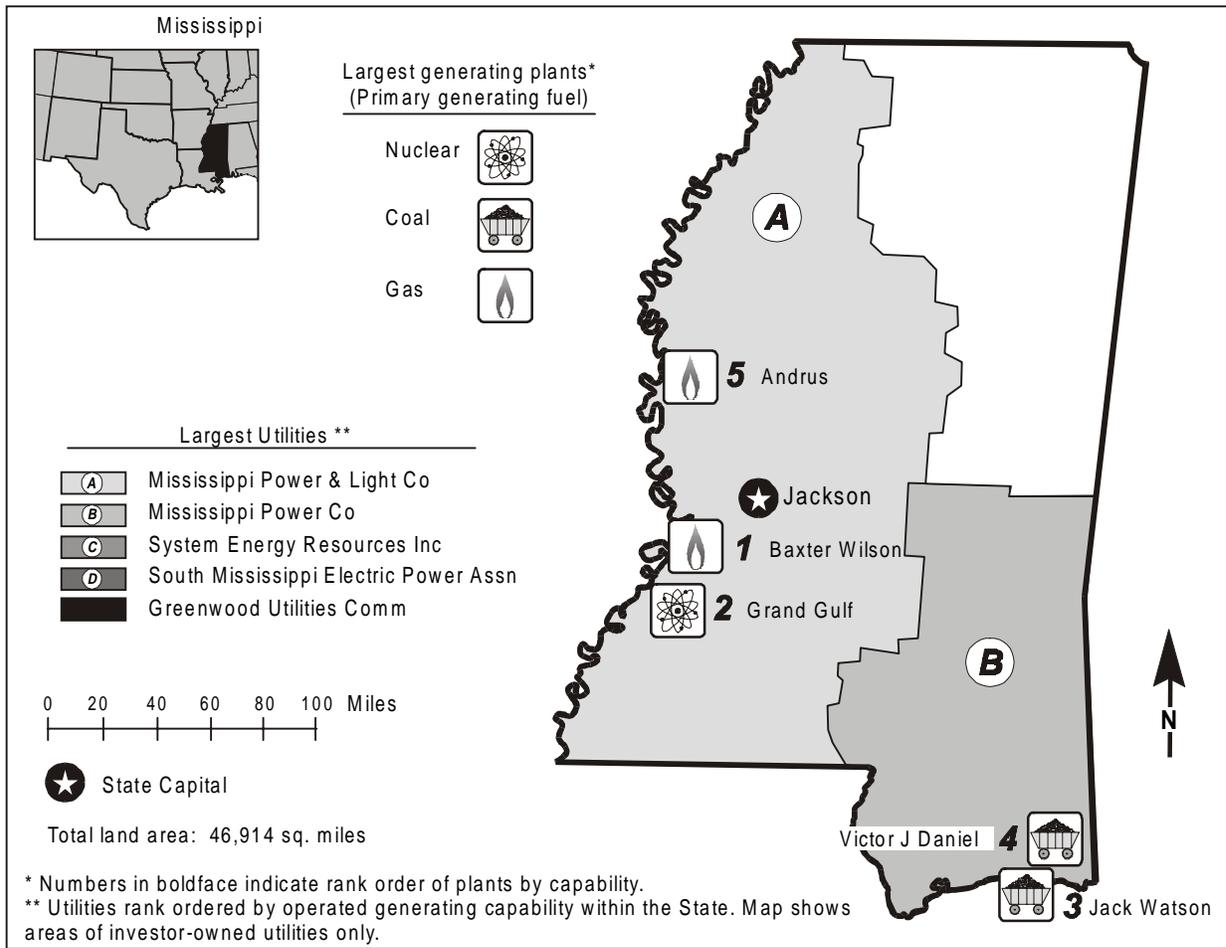


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		SERC/SPP	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	7,177	32
State Primary Generating Fuel		Coal	Generation (MWh)	28,838,302	35
Population (as of 7/96)	2,710,750	31	Average Age of Coal Plants	20 years	
Average Revenue (cents/kWh)	6.01	^a 20	Average Age of Oil-fired Plants	25 years	
Industry			Average Age of Gas-fired Plants	29 years	
Capability (MWe)	W	^b W	Average Age of Nuclear Plants	11 years	
Generation (MWh)	W	^b W	Average Age of Hydroelectric Plants	--	
Capability/person (KWe/person)	W	^b W	Average Age of Other Plants	--	
Generation/person (MWh/person)	W	^b W	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	98	29	Capability (MWe)	W	W
Nitrogen Oxide Emissions (Thousand Short Tons)	78	35	Percentage Share of Capability	W	W
Carbon Dioxide Emissions (Thousand Short Tons)	27,675	34	Generation (MWh)	W	W
Sulfur Dioxide/sq. mile (Tons)	2.09	28	Percentage Share of Generation	W	W
Nitrogen Oxides/sq. mile (Tons)	1.66	33			
Carbon Dioxide/sq. mile (Tons)	589.91	32			

-- = Not applicable. W = Withheld.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Baxter Wilson	Gas	Mississippi Power & Light Co	1,321
2. Grand Gulf	Nuclear	System Energy Resources Inc	1,179
3. Jack Watson	Coal/Gas	Mississippi Power Co	1,090
4. Victor J Daniel Jr	Coal	Mississippi Power Co	1,081
5. Andrus	Gas	Mississippi Power & Light Co	761

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Mississippi Power & Light Co	2,716	--	11	2,705	--	--
B. Mississippi Power Co	2,512	1,855	--	657	--	--
C. System Energy Resources Inc	1,179	--	--	--	1,179	--
D. South Mississippi El Pwr Assn	613	400	20	193	--	--
E. Greenwood Utilities Comm.	65	--	--	65	--	--
Total	7,085	2,255	31	3,620	1,179	--
Percentage of Utility Capability	98.7	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

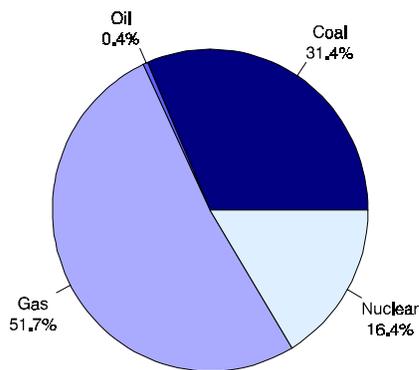


Figure 2. Utility Generation by Primary Energy Source, 1996

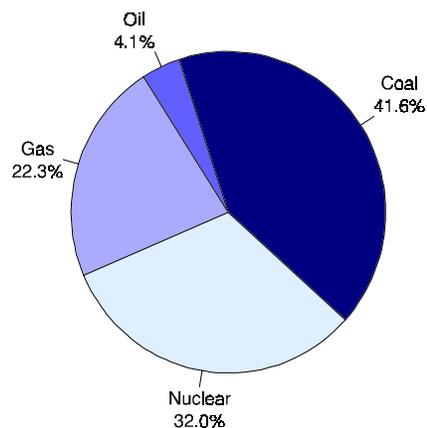


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

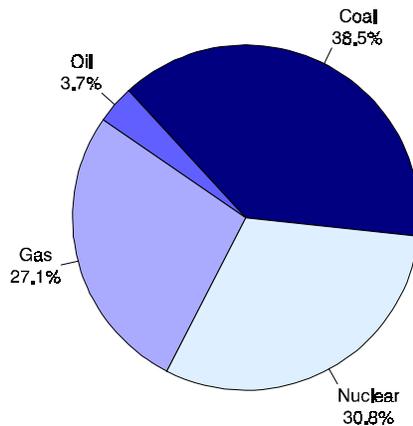


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996 (Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	2,219	2,246	2,255	32.2	32.0	31.4
Oil	106	894	31	1.5	12.7	0.4
Gas	3,456	2,733	3,712	50.2	39.0	51.7
Nuclear	1,108	1,143	1,179	16.1	16.3	16.4
Hydro/Other	--	--	--	--	--	--
Total Utility	6,888	7,016	7,177	100.0	100.0	100.0
Total Nonutility	292	355	W	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996 (Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	9,806,108	8,750,253	12,010,196	51.7	37.5	41.6
Oil	835,561	370,130	1,173,503	4.4	1.6	4.1
Gas	4,251,175	5,051,811	6,430,010	22.4	21.7	22.3
Nuclear	4,086,714	9,132,933	9,224,593	21.5	39.2	32.0
Hydro/Other	--	--	--	--	--	--
Total Utility	18,979,558	23,305,127	28,838,302	100.0	100.0	100.0
Total Nonutility	2,098,163	2,554,139	W	--	--	--

-- = Not applicable. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996 (Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.103	0.090	0.122	50.1	35.1	38.5
Oil	0.009	0.004	0.012	4.3	1.7	3.7
Gas	0.049	0.064	0.086	24.1	25.0	27.1
Nuclear	0.044	0.098	0.098	21.5	38.3	30.8
Hydro/Other	--	--	--	--	--	--
Total Utility	0.206	0.256	0.318	100.0	100.0	100.0
Total Nonutility	0.101	0.096	W	--	--	--

-- = Not applicable. W = Withheld.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

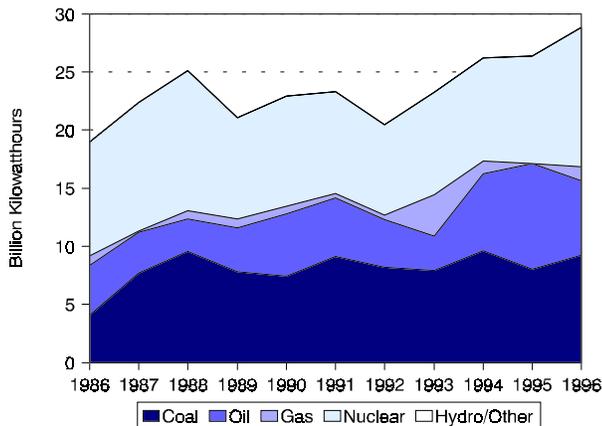


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996 (1996 Dollars)

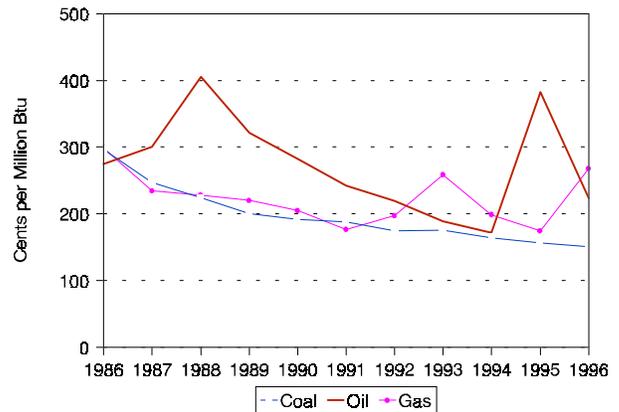


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	296.2	187.6	151.1	-6.5
Oil	275.0	242.4	223.6	-2.0
Gas	298.9	176.7	267.9	-1.1

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

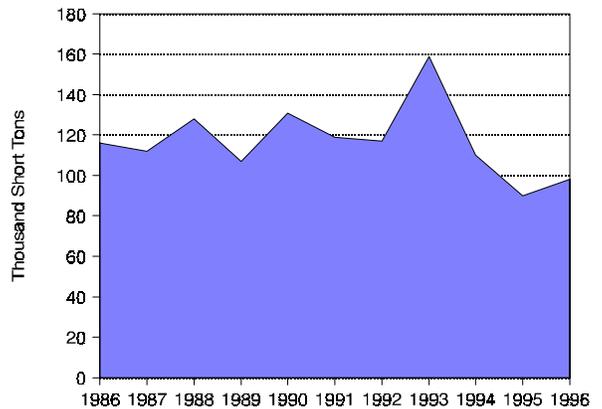


Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	116	119	98	-1.7
Nitrogen Oxides ^d ...	48	58	78	5.0
Carbon Dioxide ^d	14,568	23,452	27,675	6.6

Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

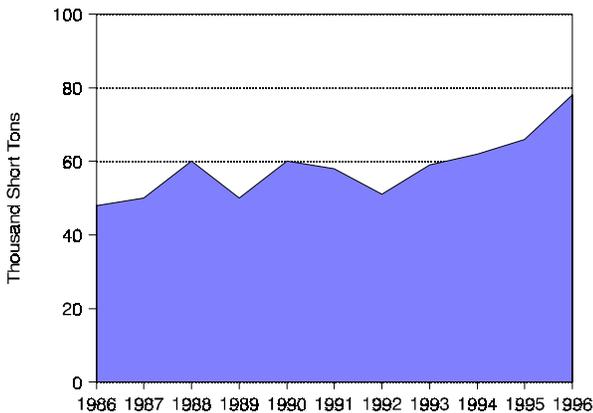


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

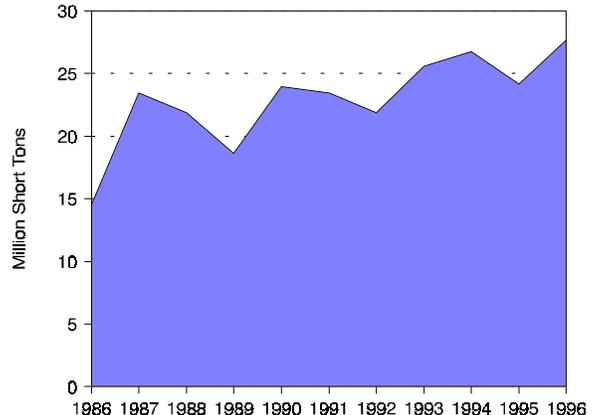


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential ..	10,868,066	12,517,521	14,964,600	3.3	41.0	37.9	37.8
Commercial	5,698,676	6,831,768	7,912,999	3.3	21.5	20.7	20.0
Industrial ...	9,328,966	13,024,289	16,042,796	5.6	35.2	39.4	40.5
Other	636,266	645,805	701,979	1.0	2.4	2.0	1.8
Total	26,531,968	33,019,383	39,622,374	4.1	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

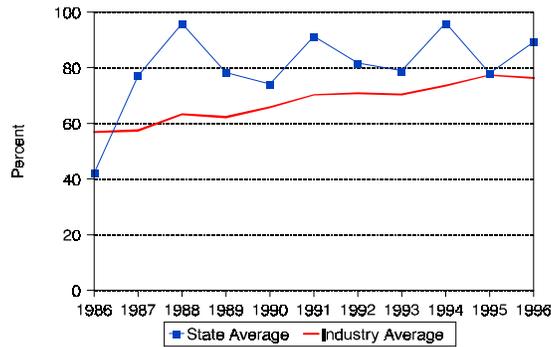


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	2	23	1	24	50
Number of Retail Customers	503,187	116,785	6	466,431	1,086,409
Retail Sales (MWh)	14,274,583	2,899,564	1,317,424	8,040,397	26,531,968
Percentage of Retail Sales	53.8	10.9	5.0	30.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,181,727	207,461	48,210	648,240	2,099,667
Percentage of Revenue	56.3	9.9	3.0	30.9	100.0
1991					
Number of Utilities	2	23	1	26	52
Number of Retail Customers	527,423	126,657	6	528,996	1,183,082
Retail Sales (MWh)	16,436,590	3,435,504	2,977,135	10,170,154	33,019,383
Percentage of Retail Sales	49.8	10.4	9.0	30.8	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,185,718	219,935	86,991	730,850	2,234,280
Percentage of Revenue	53.1	9.8	4.4	32.7	100.0
1996					
Number of Utilities	2	23	1	25	51
Number of Retail Customers	560,843	126,769	6	585,306	1,272,924
Retail Sales (MWh)	19,667,181	3,941,375	3,153,951	12,859,867	39,622,374
Percentage of Retail Sales	49.6	10.0	8.0	32.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,268,460	222,247	80,724	811,639	2,383,070
Percentage of Revenue	53.2	9.3	3.4	34.1	100.0

Missouri

Missouri utilities serve a population of more than 5.3 million and generated 67.8 billion kilowatthours of electricity in 1996. Most of the electricity generated by Missouri utilities is from coal-fired power plants. Unlike the neighboring State of Illinois, Missouri coal deposits are small and have an even higher sulfur content, averaging about 4 percent by weight. As a result, about half of the Missouri utility coal comes from Illinois, one-third from Wyoming, and the remainder from within the State. Four of the five largest plants in the State, including the largest, Labadie, are coal-fired. The largest utility in the State is the Union Electric Company (UEC), which operates three of the five largest plants in Missouri.

UEC, along with Associated Electric Cooperative, Kansas City Power and Light Company, UtiliCorp United Inc., and the City of Springfield, operate more than 80 percent of the net summer capability in the State. Overall electricity sales increased between 1986 and 1996. In 1996, utility retail sales were 64.8 billion kilowatthours, with residential sales accounting for 40.8 percent, followed by commercial sales, which accounted for 34.7 percent of the total. Missouri's 89 public utilities and 45 cooperatives provided 28.2 percent of retail sales in 1996. Missouri is a net exporter of electricity with a net difference of 3.0 billion kilowatthours between generation and sales.

In addition to its coal-fired generation capability, Missouri also has significant nuclear power capability.

In 1996, the State's only nuclear plant, UEC's Callaway, generated 8.9 billion kilowatthours of Missouri's utility generation. Unlike some States with nuclear power, Missouri's average revenue per kilowatthour of electricity is reasonably low at 6.11 cents per kilowatthour, over a half cent less than the national average of 6.86 cents per kilowatthour. Given Callaway's young age, however, UEC may have a significant level of stranded costs associated with the plant if utility restructuring takes place.

The Clean Air Act Amendments of 1990 specified 6,456 megawatts of nameplate capacity at eight Missouri plants to begin compliance with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides. By 1996, SO₂ emissions had shrunk to less than two-fifths of the total in 1986, placing the State's national SO₂ emissions rank at 15.

Missouri has been actively studying retail competition since early 1997 when the Public Service Commission (PSC) established the Retail Electric Competition Task Force to prepare reports to the PSC and study retail wheeling and related issues. In May 1998, the task force issued its Final Rule with recommendations on issues including public interest programs, stranded costs, taxes, reliability, and market power. At the same time, a bill was introduced to restructure Missouri's electric power industry and to implement retail competition by January 2000, but no action was taken during the 1998 legislative session. Pilot programs have been instituted.¹

¹ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

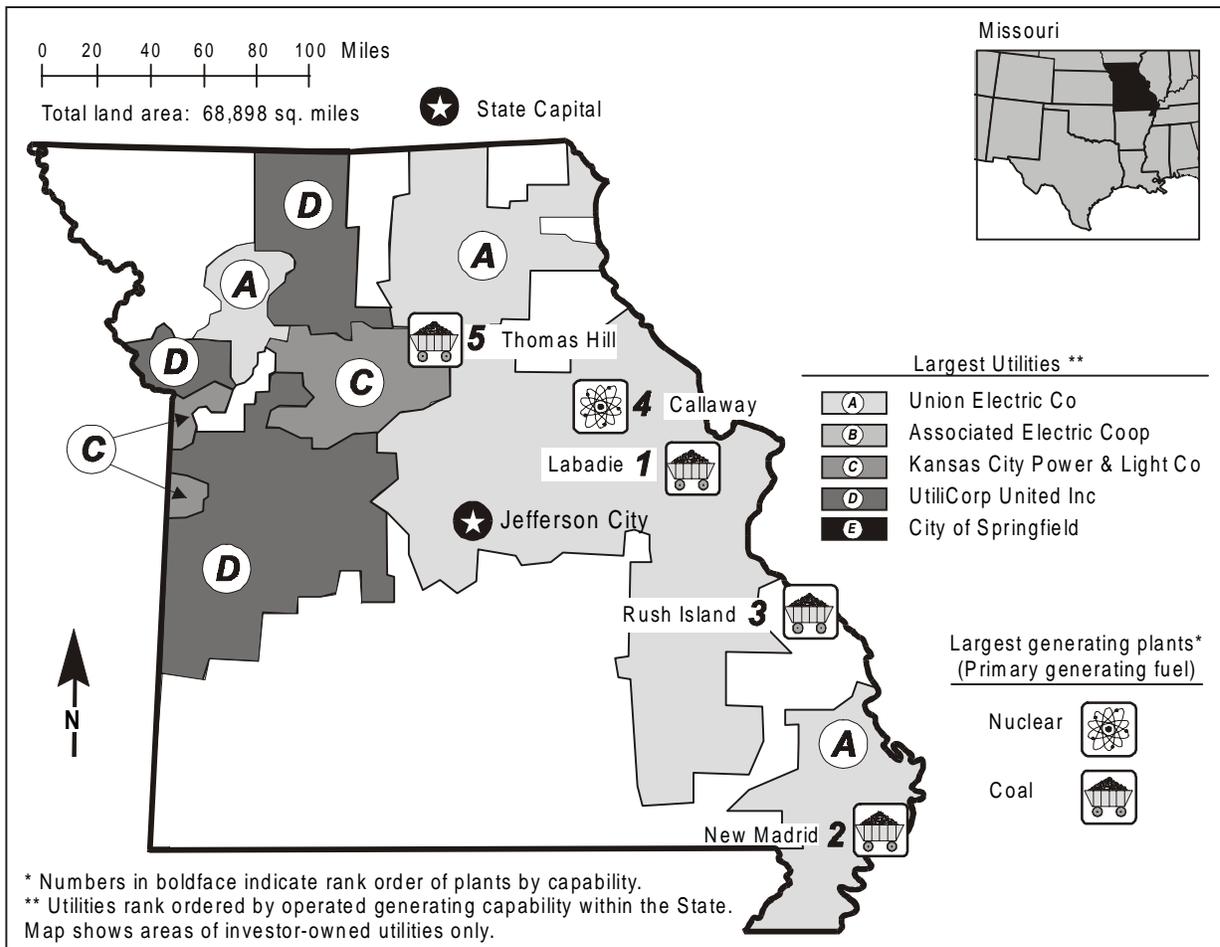


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		SPP/MAIN	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	15,978	17
State Primary Generating Fuel		Coal	Generation (MWh)	67,827,241	19
Population (as of 7/96)	5,363,669	16	Average Age of Coal Plants	25 years	
Average Revenue (cents/kWh)	6.11	^a 24	Average Age of Oil-fired Plants	23 years	
Industry			Average Age of Gas-fired Plants	21 years	
Capability (MWe)	16,087	^b 19	Average Age of Nuclear Plants	12 years	
Generation (MWh)	68,124,736	^b 18	Average Age of Hydroelectric Plants	35 years	
Capability/person (KWe/person)	3.00	^b 23	Average Age of Other Plants	--	
Generation/person (MWh/person)	12.70	^b 23	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	347	15	Capability (MWe)	109	41
Nitrogen Oxide Emissions (Thousand Short Tons)	245	11	Percentage Share of Capability	0.7	42
Carbon Dioxide Emissions (Thousand Short Tons)	64,773	16	Generation (MWh)	297,495	42
Sulfur Dioxide/sq. mile (Tons)	5.04	26	Percentage Share of Generation	0.4	42
Nitrogen Oxides/sq. mile (Tons)	3.56	23			
Carbon Dioxide/sq. mile (Tons)	940.13	27			

-- = Not applicable.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Labadie	Coal	Union Electric Co	2,300
2. New Madrid	Coal	Associated Electric Coop Inc	1,160
3. Rush Island	Coal	Union Electric Co	1,158
4. Callaway	Nuclear	Union Electric Co	1,137
5. Thomas Hill	Coal	Associated Electric Coop Inc	1,120

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Union Electric Co	7,343	5,287	318	39	1,137	562
B. Associated Electric Coop Inc . . .	2,325	2,280	45	--	--	--
C. Kansas City Power & Light Co . .	2,208	1,304	757	147	--	--
D. UtiliCorp United Inc	950	496	267	187	--	--
E. City of Springfield	662	413	12	237	--	--
Total	13,488	9,780	1,399	610	1,137	562
Percentage of Industry Capability	83.8	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

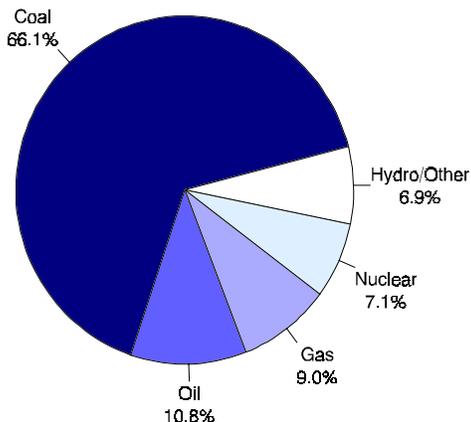


Figure 2. Utility Generation by Primary Energy Source, 1996

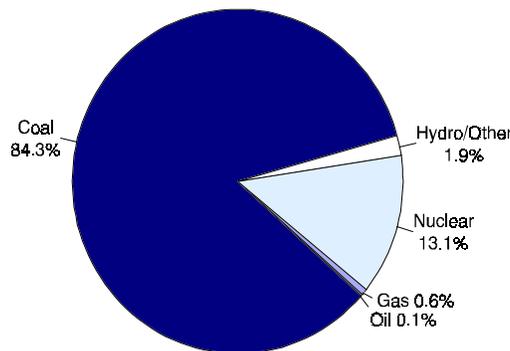


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

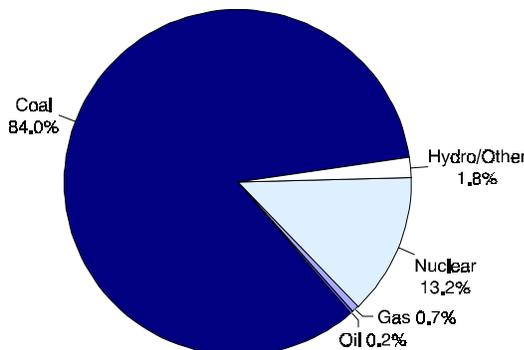


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	10,631	10,778	10,557	71.3	70.4	66.1
Oil	1,392	1,533	1,730	9.3	10.0	10.8
Gas	722	761	1,444	4.8	5.0	9.0
Nuclear	1,109	1,125	1,137	7.4	7.3	7.1
Hydro/Other	1,062	1,112	1,110	7.1	7.3	6.9
Total Utility	14,916	15,308	15,978	100.0	100.0	100.0
Total Nonutility	W	107	109	--	--	--

W = Withheld. -- = Not applicable.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	44,855,792	47,907,503	57,176,084	82.8	79.7	84.3
Oil	100,000	118,645	95,980	0.2	0.2	0.1
Gas	79,407	1,043,653	394,796	0.1	1.7	0.6
Nuclear	7,170,229	9,979,371	8,890,377	13.2	16.6	13.1
Hydro/Other	1,995,690	1,071,517	1,270,004	3.7	1.8	1.9
Total Utility	54,201,118	60,120,689	67,827,241	100.0	100.0	100.0
Total Nonutility	W	323,266	297,495	--	--	--

W = Withheld. -- = Not applicable.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.469	0.500	0.601	82.3	79.0	84.0
Oil	0.001	0.002	0.002	0.2	0.3	0.2
Gas	0.001	0.013	0.005	0.2	2.0	0.7
Nuclear	0.077	0.107	0.094	13.6	16.9	13.2
Hydro/Other	0.021	0.011	0.013	3.7	1.8	1.8
Total Utility	0.570	0.633	0.715	100.0	100.0	100.0
Total Nonutility	W	0.010	0.012	--	--	--

W = Withheld. -- = Not applicable.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

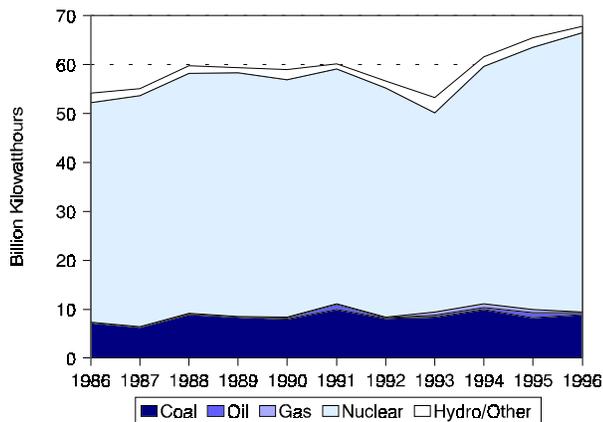


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

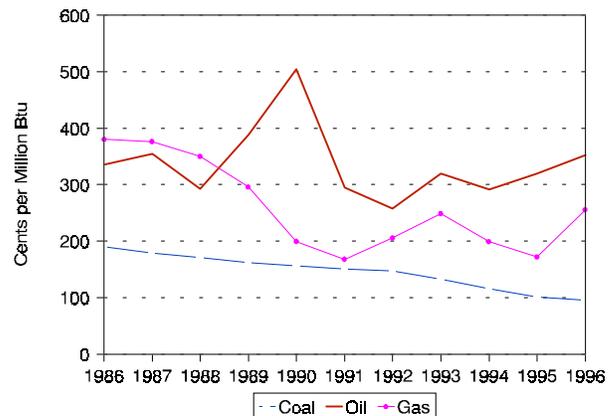


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	189.3	150.9	95.5	-6.6
Oil	335.6	294.4	352.2	0.5
Gas	377.3	167.5	255.2	-3.8

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	910	753	347	-9.2
Nitrogen Oxides ^d	266	254	245	-0.8
Carbon Dioxide ^d	87,639	52,702	64,773	-3.0

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

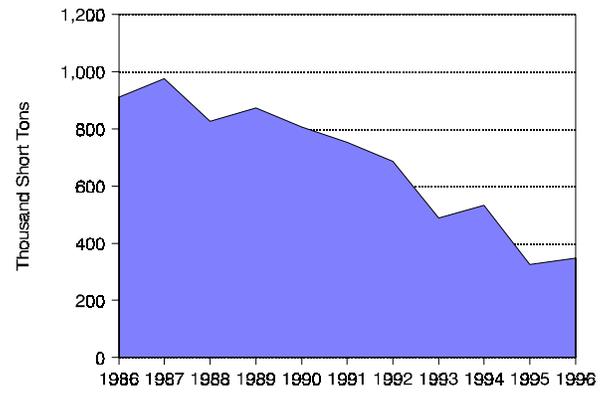


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

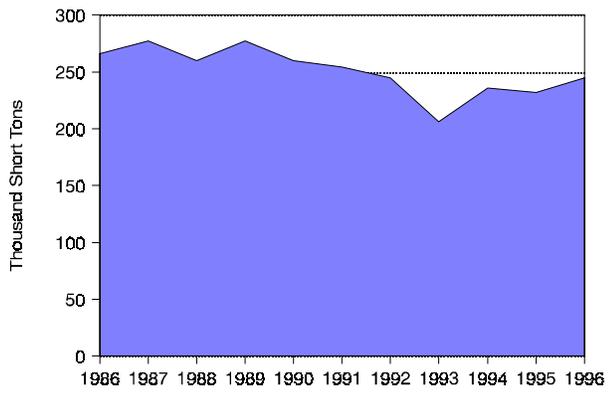


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

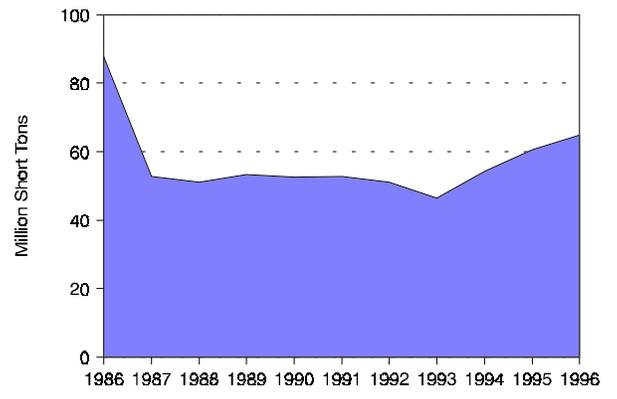


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential	19,477,161	23,386,303	26,447,604	3.1	40.3	41.4	40.8
Commercial	15,303,390	19,111,774	22,522,442	3.9	31.7	33.8	34.7
Industrial	12,724,998	13,113,852	14,914,972	1.6	26.4	23.2	23.0
Other	786,649	902,227	958,225	2.0	1.6	1.6	1.5
Total	48,292,194	56,514,156	64,843,243	3.0	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

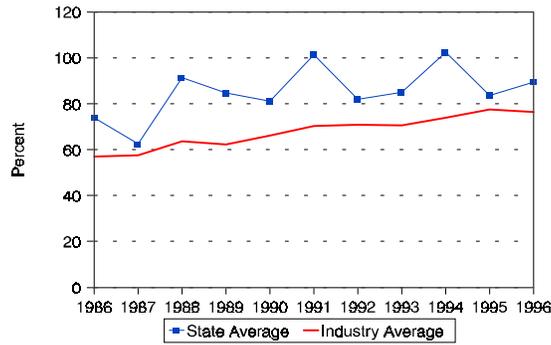


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	6	90	--	44	140
Number of Retail Customers	1,501,884	339,615	--	442,929	2,284,428
Retail Sales (MWh)	35,026,186	6,007,362	--	7,258,646	48,292,194
Percentage of Retail Sales	72.5	12.4	--	15.0	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,899,253	427,114	--	576,455	3,902,822
Percentage of Revenue	74.3	10.9	--	14.8	100.0
1991					
Number of Utilities	6	90	--	45	141
Number of Retail Customers	1,610,384	340,500	--	497,846	2,448,730
Retail Sales (MWh)	40,372,993	7,345,781	--	8,795,382	56,514,156
Percentage of Retail Sales	71.4	13.0	--	15.6	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	3,009,046	469,553	--	627,812	4,106,411
Percentage of Revenue	73.3	11.4	--	15.3	100.0
1996					
Number of Utilities	5	89	--	45	139
Number of Retail Customers	1,693,290	361,088	--	566,009	2,620,387
Retail Sales (MWh)	45,440,496	8,664,838	--	10,737,909	64,843,243
Percentage of Retail Sales	70.1	13.4	--	16.6	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,843,867	474,865	--	643,163	3,961,895
Percentage of Revenue	71.8	12.0	--	16.2	100.0

-- = Not applicable.

Montana

Montana had the seventh smallest population and the twelfth smallest utility generating capability in the Nation in 1996. Nearly 53 percent of Montana's utility electricity is generated by hydroelectric/other plants but coal generation is also very prevalent at 47 percent. Only a very small amount of electricity, 0.1 percent, is generated by oil and gas and there are no nuclear facilities in the State. The largest plant is the Colstrip coal-fired plant which is operated by the Montana Power Company, the largest investor-owned utility in Montana. (The Colstrip power plant alone was responsible for significantly increasing the State's production of coal when the facility came on-line in the 1970s.)¹ The second through the fifth largest plants in the State are hydroelectric facilities, owned and operated by the Bureau of Reclamation, the U.S. Army Corps of Engineers, or the Washington Water Power Company.

There were 39 utilities in Montana in 1996. The majority of them were cooperatives which is typical of a rural State with a low population density; its seventh smallest population occupies the fourth largest area. There were 3 Federal utilities, 1 public, and 5 investor-owned, the latter of which accounted for almost 62 percent of retail sales.

While the coal and hydroelectric generating capability in Montana remained about the same from 1991 to 1996, coal generation and electric power industry consumption of coal declined by approximately 17.5 percent while hydroelectric generation and electric power industry consumption increased by 24 percent. The large percentage of hydroelectric capability (52 percent) is due to the State's many rivers which are the sites of approximately 82 hydroelectric units that were operating in 1996. In addition, part of the Powder River Basin is located in the southeastern portion of the State. Therefore, Montana coal-fired plants have easy access to the basin's low-sulfur coal, which accounts for approximately half of the State's coal production.² These are two of the main reasons that the average price of electricity in Montana, 4.72 cents per kilowatthour, was

fifth lowest in the Nation. These factors also explain why Montana's emissions of sulfur dioxide (SO₂), nitrogen oxides (NO_x), and carbon dioxide (CO₂) are comparatively very low. In fact, the Clean Air Act Amendments of 1990 did not specify any Montana plants to begin compliance with stricter emissions standards for SO₂ and NO_x. The State's emissions ranked forty-fourth for SO₂ and thirty-ninth for NO_x and CO₂. Concentrations of these pollutants per square mile ranked forty-seventh for SO₂ and forty-sixth for NO_x and CO₂. SO₂ emissions in Montana declined slightly from 1986 to 1991 and then again from 1991 to 1996. NO_x emissions were less in 1996 than they were in 1986 although they had a substantial increase in 1991. CO₂ emissions were also up in 1991, but had declined back toward 1986 totals in 1996.

In 1996, Montana utilities generated 26 billion kilowatthours of electricity. The industrial sector accounted for over 45 percent of retail sales in 1996, which was a drop of 7.7 percent from 1991 levels. The residential share was 28.3 percent and the commercial share was 23.9 percent, both of which increased since 1991 by 9.7 percent and 13.8 percent, respectively. Overall, since 1986, the annual growth rate in utility electricity retail sales in Montana was slightly on the negative side of 0.0 percent. The State is an exporter of electricity with a net difference of 12 billion kilowatthours between generation and sales.

For a State with relatively low electricity prices, Montana has been rather aggressive in its approach to restructuring its electricity industry. The Montana Public Service Commission (PSC) has been progressing rapidly in its efforts since it began to study competition in early 1997. In June 1998, the PSC approved a plan to phase-in competition. Beginning on July 1, 1998, Montana's largest customers (with loads over 1 megawatt) were able to choose their energy supplier. Beginning in November 1998, 5 percent of residential and small consumers were able to select their power supplier under a pilot program. Full retail access should be complete by April 2000.³

¹ Energy Information Administration, *State Coal Profiles*, DOE/EIA-0576 (Washington, DC, January 1994), p. 59.

² Energy Information Administration, *Coal Distribution Report January-December 1996*, DOE/EIA-0125(96/4Q) (Washington, DC), Table 34.

³ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

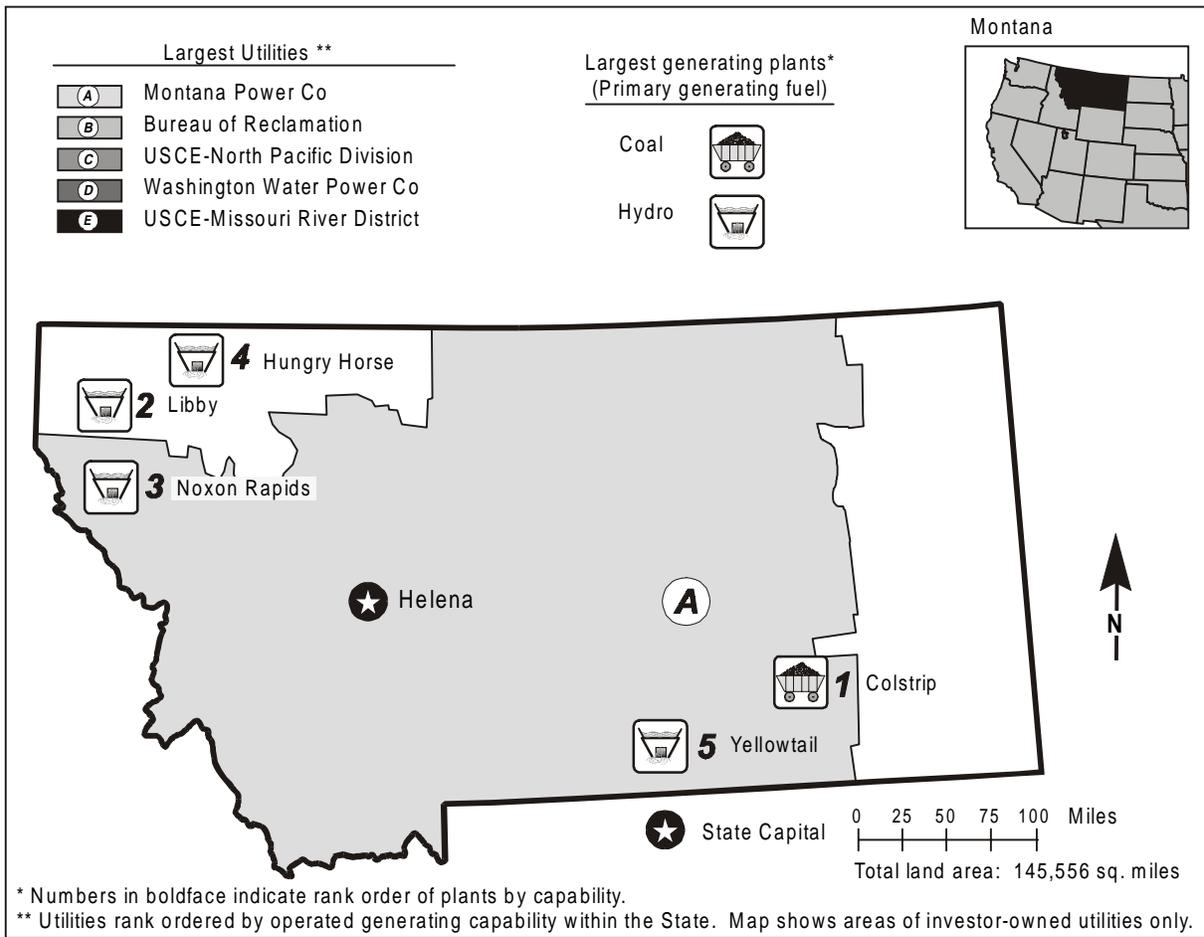


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		WSCC/MAPP	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	4,943	39
State Primary Generating Fuel		Hydro	Generation (MWh)	26,039,141	38
Population (as of 7/96)	876,684	44	Average Age of Coal Plants	16 years	
Average Revenue (cents/kWh)	4.72	^a 5	Average Age of Oil-fired Plants	24 years	
Industry			Average Age of Gas-fired Plants	33 years	
Capability (MWe)	5,064	^b 34	Average Age of Nuclear Plants	--	
Generation (MWh)	26,837,425	^b 33	Average Age of Hydroelectric Plants	38 years	
Capability/person (KWe/person)	5.78	^b 2	Average Age of Other Plants	28 years	
Generation/person (MWh/person)	30.61	^b 2	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	21	44	Capability (MWe)	121	40
Nitrogen Oxide Emissions (Thousand Short Tons)	48	39	Percentage Share of Capability	2.4	38
Carbon Dioxide Emissions (Thousand Short Tons)	16,241	39	Generation (MWh)	798,284	38
Sulfur Dioxide/sq. mile (Tons)	0.15	47	Percentage Share of Generation	3.0	36
Nitrogen Oxides/sq. mile (Tons)	0.33	46			
Carbon Dioxide/sq. mile (Tons)	111.58	46			

-- = Not applicable.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Colstrip	Coal	Montana Power Co	2,060
2. Libby	Hydro	USCE-North Pacific Division	604
3. Noxon Rapids	Hydro	Washington Water Power Co	554
4. Hungry Horse	Hydro	Bureau of Reclamation	428
5. Yellowtail	Hydro	Bureau of Reclamation	250

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996 (Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Montana Power Co	2,733	2,216	5	70	--	443
B. Bureau of Reclamation	728	--	--	--	--	728
C. USCE-North Pacific Division	604	--	--	--	--	604
D. Washington Water Power Co	554	--	--	--	--	554
E. USCE-Missouri River District	213	--	--	--	--	213
Total	4,832	2,216	5	70	--	2,542
Percentage of Industry Capability	95.4	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

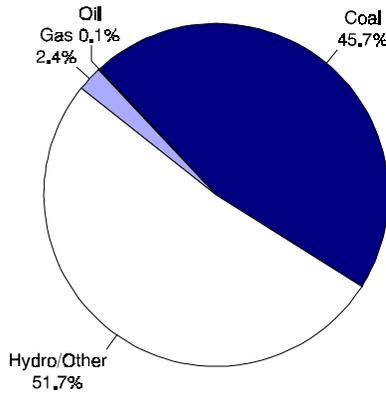


Figure 2. Utility Generation by Primary Energy Source, 1996

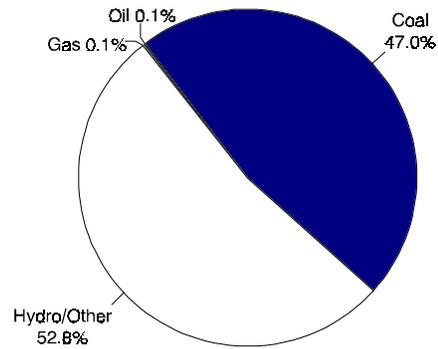


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

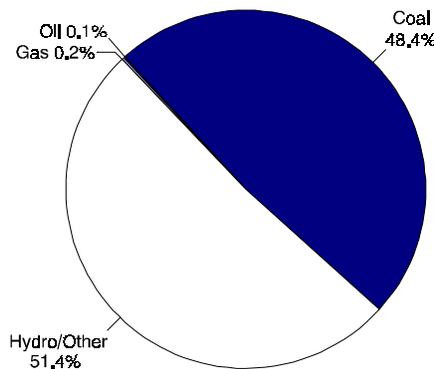


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996 (Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	2,303	2,260	2,260	45.9	46.8	45.7
Oil	24	--	5	0.5	--	0.1
Gas	120	120	120	2.4	2.5	2.4
Nuclear	--	--	--	--	--	--
Hydro/Other	2,573	2,449	2,558	51.3	50.7	51.7
Total Utility	5,019	4,828	4,943	100.0	100.0	100.0
Total Nonutility	W	W	121	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996 (Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	11,469,259	16,131,955	12,242,093	51.1	57.3	47.0
Oil	8,514	17,598	18,256	(s)	0.1	0.1
Gas	52,044	24,370	38,217	0.2	0.1	0.1
Nuclear	--	--	--	--	--	--
Hydro/Other	10,918,494	11,983,405	13,740,575	48.6	42.6	52.8
Total Utility	22,448,311	28,157,328	26,039,141	100.0	100.0	100.0
Total Nonutility	W	W	798,284	--	--	--

-- = Not applicable. (s) = Nonzero percentage less than 0.05. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996 (Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.127	0.174	0.133	52.6	58.3	48.4
Oil	(s)	(s)	(s)	0.1	0.1	0.1
Gas	(s)	(s)	(s)	0.2	0.1	0.2
Nuclear	--	--	--	--	--	--
Hydro/Other	0.114	0.124	0.142	47.2	41.5	51.4
Total Utility	0.242	0.299	0.276	100.0	100.0	100.0
Total Nonutility	W	W	0.024	--	--	--

-- = Not applicable. (s) = Nonzero value less than 0.0005. W = Withheld.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

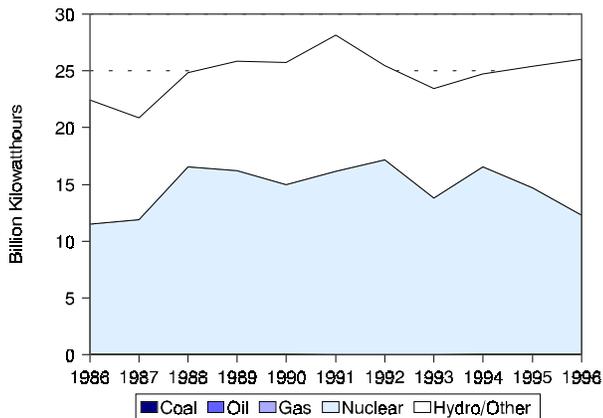


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996 (1996 Dollars)

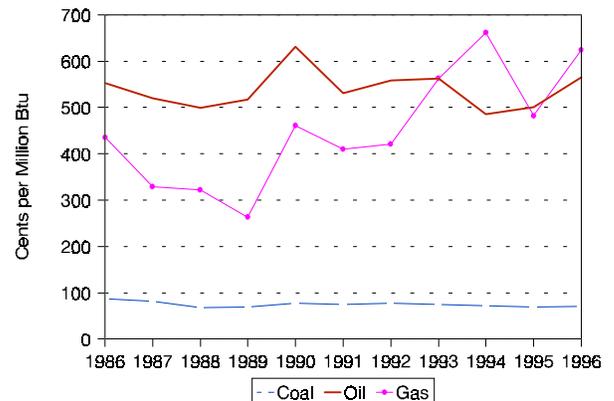


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	87.1	75.5	70.5	-2.1
Oil	553.0	530.2	564.9	0.2
Gas	435.5	410.1	624.3	3.7

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	24	23	21	-1.0
Nitrogen Oxides ^d . .	53	71	48	-1.0
Carbon Dioxide ^d . . .	14,581	20,465	16,241	1.1

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

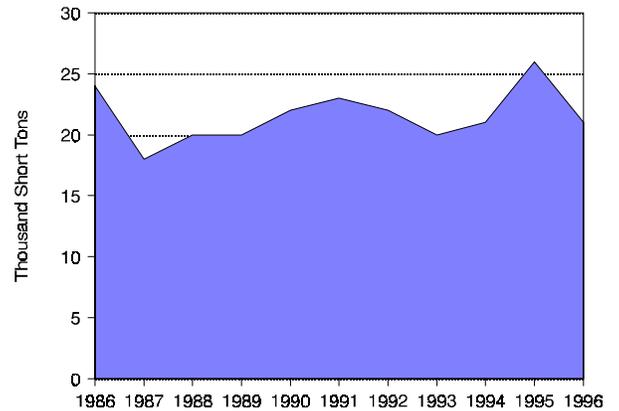


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

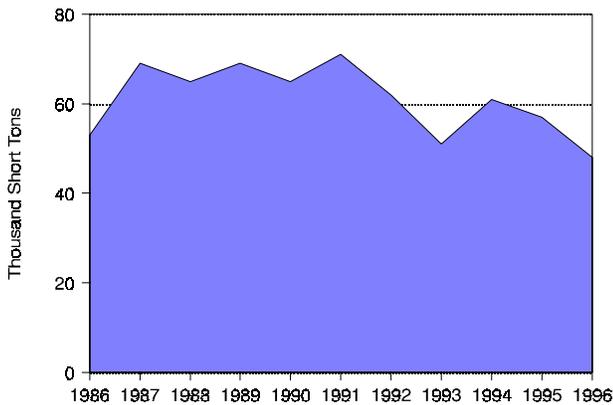


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

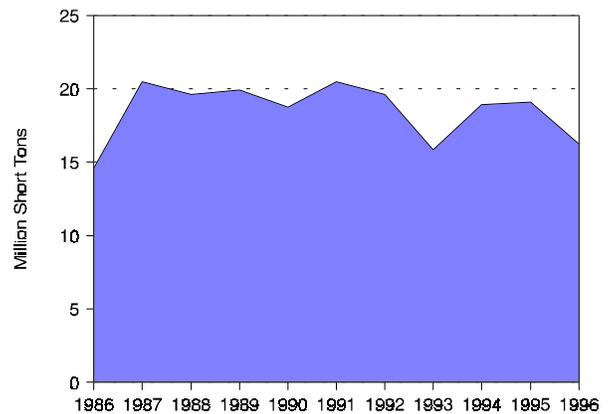


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	3,213,799	3,458,893	3,910,516	2.0	23.3	25.8	28.3
Commercial	2,402,763	2,818,850	3,298,600	3.2	17.4	21.0	23.9
Industrial . . .	6,150,334	6,622,098	6,305,683	0.2	44.5	49.4	45.6
Other	2,053,115	506,759	304,757	-17.4	14.9	3.8	2.2
Total	13,820,011	13,406,600	13,819,556	-0.0	100.0	100.0	100.0

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	6	1	2	31	40
Number of Retail Customers	297,180	14,316	22	95,571	407,089
Retail Sales (MWh)	7,280,895	230,798	4,669,295	1,639,023	13,820,011
Percentage of Retail Sales	52.7	1.7	33.8	11.9	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	382,734	11,445	82,294	109,394	609,814
Percentage of Revenue	62.8	1.9	17.4	17.9	100.0
1991					
Number of Utilities	5	1	3	30	39
Number of Retail Customers	303,816	897	14,272	100,544	419,529
Retail Sales (MWh)	8,140,517	13,945	3,476,408	1,775,730	13,406,600
Percentage of Retail Sales	60.7	0.1	25.9	13.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	420,791	706	77,013	116,262	624,321
Percentage of Revenue	67.4	0.1	13.9	18.6	100.0
1996					
Number of Utilities	5	1	3	30	39
Number of Retail Customers	332,061	877	14,889	112,228	460,055
Retail Sales (MWh)	8,497,966	14,517	1,999,571	3,307,502	13,819,556
Percentage of Retail Sales	61.5	0.1	14.5	23.9	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	436,355	792	59,715	155,747	652,609
Percentage of Revenue	66.9	0.1	9.2	23.9	100.0

Nebraska

Nebraska is the only State with no investor-owned utilities operating within its borders. Its population is the fourteenth smallest in the Nation. It is also fourteenth lowest in utility generating capability. Most of the State's capability is powered by coal (55 percent) but there is also a significant share of nuclear capability (22 percent). In fact, two of the five largest plants in the State, Cooper and Fort Calhoun, are nuclear plants. The remaining three are coal-fired. The Gentleman plant, which lies in the west central part of the State, is the largest plant in Nebraska and is owned by the largest utility—the Nebraska Public Power District. The remainder of the five largest plants lie on the Missouri River in the easternmost part of the State. Although 10 percent of Nebraska's generating capability is fired by oil and 10 percent by gas, generation by these two sources were only 0.1 percent and 0.7 percent, respectively, in 1996.

While no coal is mined in the State, Nebraska's close proximity to the Powder River Basin's low-sulfur subbituminous coal deposits explains the prevalence of coal in the State's fuel mix. In 1996, 99.95 percent of coal delivered to electric utilities in Nebraska was from nearby Wyoming.¹ Low coal transportation costs (half is delivered by truck and half by rail) are also one of the major factors in accounting for Nebraska's relatively low cost of electricity. At an average price of 5.32 cents per kilowatthour, Nebraska ranks as the twelfth lowest in the Nation, and is significantly below the national average price of 6.86 cents per kilowatthour of electricity, despite its nuclear capability.

The State's use of low-sulfur coal also accounts for the State's low emissions of sulfur dioxide (SO₂), nitrogen oxides (NO_x), and carbon dioxide (CO₂). No Nebraska

generators were cited by the Clean Air Act Amendments of 1990 to begin compliance with stricter emissions standards for SO₂ and NO_x. Emissions of SO₂, NO_x, and CO₂ ranked thirty-fifth, thirty-third, and thirty-eighth in 1996. The concentrations of these pollutants per square mile ranked forty-first, thirty-ninth, and forty-fourth, respectively, in 1996. Emissions for all three pollutants increased from 1986 to 1991, and then rose again from 1991 to 1996.

Nebraska was a net exporter of electricity in 1996. Retail sales in the State grew by 3.1 percent annually from 1986 to 1996. Sales to the industrial sector grew the most, at an annual rate of 5.1 percent. As mentioned above, Nebraska's average price of electricity across all customer classes was 5.32 cents per kilowatthour. The average price of electricity for the residential sector was 6.29, for the commercial sector it was 5.49, for the industrial sector it was 3.68, and for the "other" sector it was 6.49 cents per kilowatthour. The other sector includes public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.²

Because Nebraska has no investor-owned utilities, Nebraska's stakes in the deregulation game differ from those of other States. In June 1996, legislation was enacted to allow a 3-year study of electric power industry restructuring, with reports due in December 1997 and December 1999. In February 1998, the first report was issued. It focuses on the existing structure of the industry in the State and how to improve it. The second report, due for completion in December 1999, will address competition issues and policy changes that are needed to keep public power viable in Nebraska.³

¹ Energy Information Administration, *Coal Distribution January-December 1996*, DOE/EIA-0125(96/4Q) (Washington, DC, April 1997).

² Energy Information Administration, *Electric Power Annual 1996 Volume II*, DOE/EIA-0348(96)/2 (Washington, DC, December 1997), Table 7.

³ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

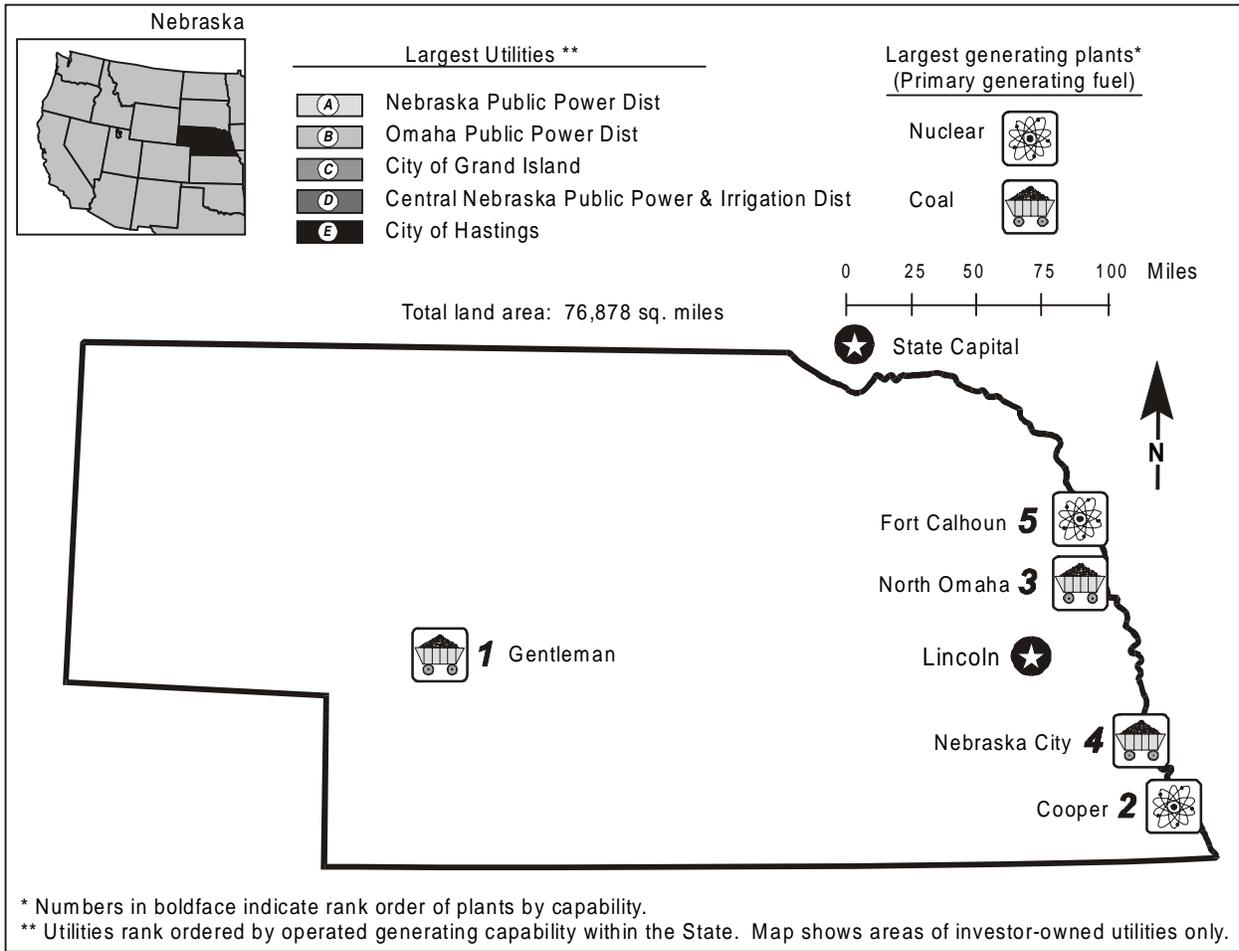


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		WSCC/MAPP	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	5,632	37
State Primary Generating Fuel		Coal	Generation (MWh)	27,322,697	37
Population (as of 7/96)	1,648,696	37	Average Age of Coal Plants	21 years	
Average Revenue (cents/kWh)	5.32	^a 12	Average Age of Oil-fired Plants	21 years	
Industry			Average Age of Gas-fired Plants	30 years	
Capability (MWe)	W	^b W	Average Age of Nuclear Plants	22 years	
Generation (MWh)	W	^b W	Average Age of Hydroelectric Plants	46 years	
Capability/person (KWe/person)	W	^b W	Average Age of Other Plants	--	
Generation/person (MWh/person)	W	^b W	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	61	35	Capability (MWe)	W	W
Nitrogen Oxide Emissions (Thousand Short Tons)	84	33	Percentage Share of Capability	W	W
Carbon Dioxide Emissions (Thousand Short Tons)	18,593	38	Generation (MWh)	W	W
Sulfur Dioxide/sq. mile (Tons)	0.79	41	Percentage Share of Generation	W	W
Nitrogen Oxides/sq. mile (Tons)	1.09	39			
Carbon Dioxide/sq. mile (Tons)	241.85	44			

-- = Not applicable. W = Withheld.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Gentleman	Coal	Nebraska Public Power District	1,365
2. Cooper	Nuclear	Nebraska Public Power District	774
3. North Omaha	Coal	Omaha Public Power District	645
4. Nebraska City	Coal	Omaha Public Power District	585
5. Fort Calhoun	Nuclear	Omaha Public Power District	476

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Nebraska Public Power District . .	2,614	1,590	159	17	774	75
B. Omaha Public Power District	2,027	1,229	321	--	476	--
C. City of Grand Island	207	100	--	107	--	--
D. Central Nebraska Pub P&I Dist . .	199	--	--	107	--	92
E. City of Hastings	123	72	--	51	--	--
Total	5,170	2,991	480	282	1,250	167
Percentage of Utility Capability . . .	91.8	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

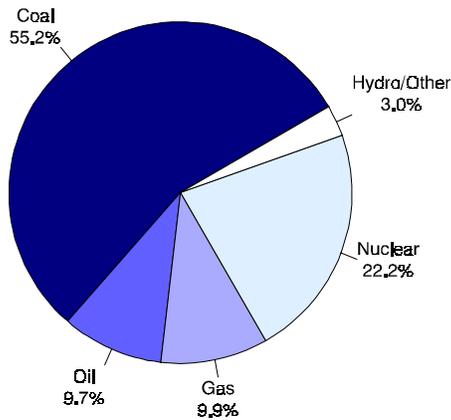


Figure 2. Utility Generation by Primary Energy Source, 1996

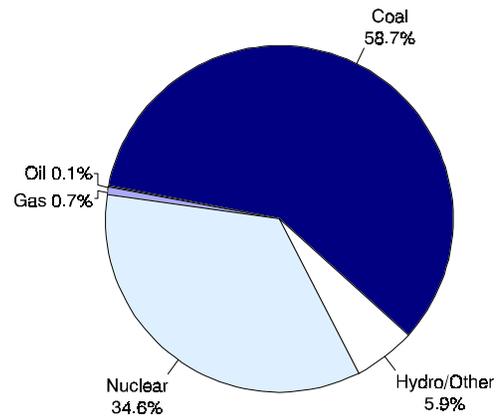


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

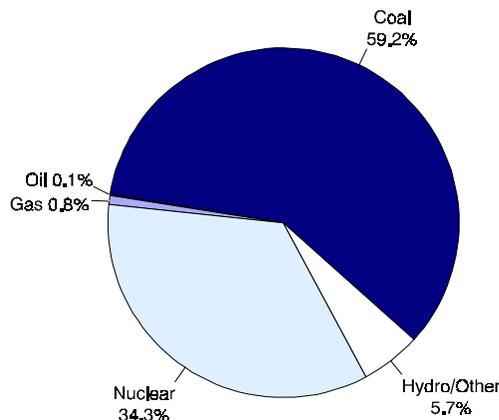


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996 (Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	2,947	3,087	3,111	53.1	56.6	55.2
Oil	468	311	544	8.4	5.7	9.7
Gas	730	630	559	13.2	11.6	9.9
Nuclear	1,236	1,254	1,250	22.3	23.0	22.2
Hydro/Other	170	168	167	3.1	3.1	3.0
Total Utility	5,550	5,450	5,632	100.0	100.0	100.0
Total Nonutility	W	W	W	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996 (Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	9,319,057	13,562,815	16,040,775	49.5	59.0	58.7
Oil	54,115	13,459	19,973	0.3	0.1	0.1
Gas	130,519	303,327	191,682	0.7	1.3	0.7
Nuclear	7,657,529	8,047,662	9,456,814	40.6	35.0	34.6
Hydro/Other	1,677,998	1,044,671	1,613,453	8.9	4.5	5.9
Total Utility	18,839,218	22,971,934	27,322,697	100.0	100.0	100.0
Total Nonutility	W	W	W	--	--	--

-- = Not applicable. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996 (Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.103	0.146	0.173	50.2	59.1	59.2
Oil	0.001	(s)	(s)	0.3	0.1	0.1
Gas	0.002	0.004	0.002	0.9	1.4	0.8
Nuclear	0.083	0.086	0.100	40.1	35.1	34.3
Hydro/Other	0.018	0.011	0.017	8.5	4.4	5.7
Total Utility	0.206	0.247	0.293	100.0	100.0	100.0
Total Nonutility	W	W	W	--	--	--

-- = Not applicable. W = Withheld. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

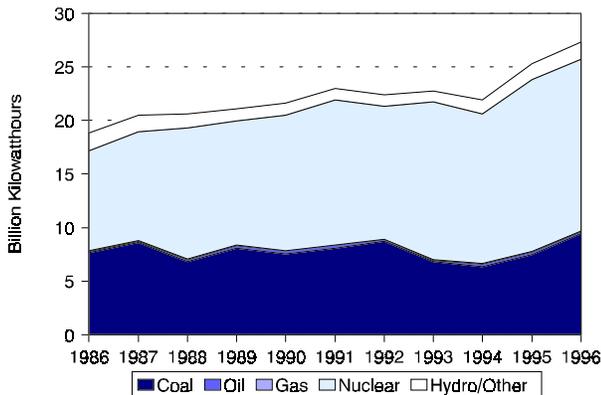


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996 (1996 Dollars)

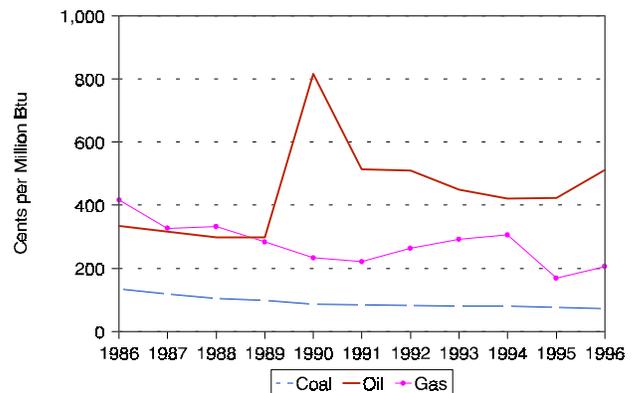


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	134.3	83.8	71.9	-6.0
Oil	334.5	514.0	511.4	4.3
Gas	414.2	221.2	206.1	-6.7

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	38	53	61	4.8
Nitrogen Oxides ^d . .	58	73	84	3.8
Carbon Dioxide ^d . .	11,026	15,701	18,593	5.4

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

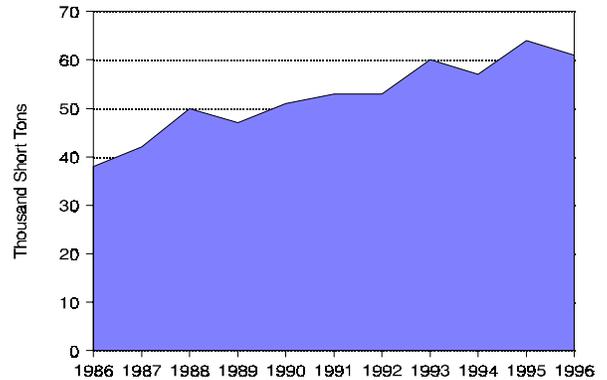


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

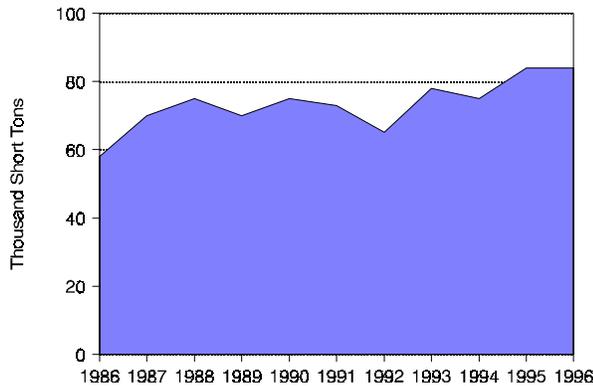


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

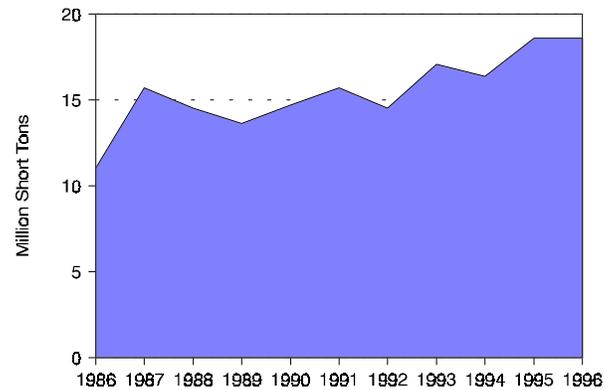


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	6,324,811	7,138,298	7,740,905	2.0	39.8	38.4	36.0
Commercial	4,662,389	5,291,350	6,271,903	3.0	29.4	28.4	29.2
Industrial . . .	3,757,402	4,689,782	6,193,276	5.1	23.7	25.2	28.8
Other	1,135,187	1,485,762	1,291,380	1.3	7.1	8.0	6.0
Total	15,879,797	18,605,192	21,497,484	3.1	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

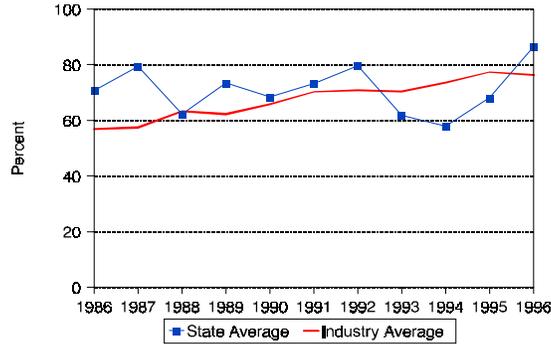


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	--	155	1	11	167
Number of Retail Customers	--	754,746	13	18,491	773,250
Retail Sales (MWh)	--	15,293,433	148,787	437,577	15,879,797
Percentage of Retail Sales	--	96.3	0.9	2.8	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	--	1,068,627	973	41,667	1,111,550
Percentage of Revenue	--	96.1	0.1	3.8	100.0
1991					
Number of Utilities	--	152	1	10	163
Number of Retail Customers	--	788,619	14	18,906	807,539
Retail Sales (MWh)	--	17,987,628	146,359	471,205	18,605,192
Percentage of Retail Sales	--	96.7	0.8	2.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	--	1,105,364	1,282	38,694	1,145,499
Percentage of Revenue	--	96.5	0.1	3.4	100.0
1996					
Number of Utilities	--	153	1	10	164
Number of Retail Customers	--	835,130	8	19,777	854,915
Retail Sales (MWh)	--	20,903,151	138,269	456,044	21,497,464
Percentage of Retail Sales	--	97.2	0.6	2.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	--	1,107,760	1,876	33,444	1,143,080
Percentage of Revenue	--	96.9	0.2	2.9	100.0

-- = Not applicable.

Nevada

Nevada had the thirteenth smallest population and the fifteenth lowest utility generating capability in 1996. Nonutility capability as a share of total generating capability was relatively large at 11.7 percent, the thirteenth highest total in the United States. At an average cost of 5.95 cents per kilowatthour, the price of electricity in Nevada was the nineteenth lowest in the United States, well below the national average cost of 6.86 cents per kilowatthour.

The State has a significant amount of generating capability fired by coal, gas, and hydroelectric sources, but no nuclear generating units. Half is coal-fired, 31 percent is gas-fired, and almost 20 percent is hydroelectric. This can be attributed to Nevada's close proximity to western coalbeds, to Pacific gas resources, and to its share of the Hoover Dam, the second-largest hydroelectric generating station in the Nation, as well as other hydroelectric facilities. (Although the Dam is actually larger than Southern California Edison's coal-fired Mohave plant, for purposes of this report it does not outrank Mohave because Hoover's capability, generation, and other statistics are split equally between Nevada and Arizona since the Dam and its peripheral holdings and property are located on the border between both States.) Even split in half, Hoover Dam's net capability ranks it as the second largest plant in the State. The third and fourth largest plants, Clark which is gas-fired and Reid Gardner which is coal-fired, are operated by the Nevada Power Company, the utility with the largest generating capability in the State. Most of Nevada's largest plants, no matter the fuel source, lie in relatively close proximity to each other in the southeastern part of the State near Las Vegas.

Nevada's coal-fired electric utilities receive most of their coal (64 percent) from the Black Mesa coal field in northeastern Arizona. There is a unique transportation link between the mine in Arizona and the Mohave power plant in southeastern Nevada. It is a 273-mile long, 18-inch pipeline which is the only long-distance slurry pipeline in the Nation. Coal is delivered as a slurry—a mixture of half finely ground coal and half

water, by weight—and is pumped at a rate of about 3.5 miles per hour.¹ Another 32 percent of coal shipped to the State's utilities was mined in Utah and delivered by railroad. The remaining 4 percent was mined in Wyoming and Colorado and also arrived by railroad.²

In 1986, coal units represented 48.3 percent of Nevada's utility generating capability and 73.0 percent of its utility net generation. In 1996, the coal share of capability rose to 49.7 percent, while the net generation share had fallen to 68.6 percent. Gas capability and generation, on the other hand, were 20.5 percent and 2.8 percent respectively, in 1986. By 1996, the gas shares had risen to 30.9 percent and 20.9 percent, respectively. Retail sales by Nevada utilities almost doubled when comparing 1996 levels with those of 1986.

Like all States west of Kansas, Nevada had no generating units that were cited in Title IV of the Clean Air Act Amendments of 1990 to begin compliance with stricter emissions standards for sulfur dioxide and nitrogen oxides. In fact, the concentration of these pollutants as well as carbon dioxide in the State caused Nevada to be ranked as one of the 10 lowest emitters in the Nation.

Nevada has been one of the leaders in the move toward a deregulated environment for electricity. The fact that there is no nuclear power in the State and, therefore, minimum stranded costs, may account for the rather aggressive approach to restructuring Nevada's electric power industry. Legislation was passed in July 1997 that directs the State's Public Utility Commission (PUC) to establish a market in which customers have access to potentially competitive electric services from alternative suppliers no later than December 31, 1999. In June 1998, the PUC issued an order that defines which utility-related services, aside from selling electricity, could be open to competition. These areas include metering, billing, and customer service. In July 1998, Sierra Pacific and Nevada Power filed a joint merger application with the PUC wherein the utilities proposed to sell their generation assets. They filed their application with the Federal Energy Regulatory Commission in October 1998.³

¹Energy Information Administration, *State Coal Profiles*, DOE/EIA-0576 (Washington, DC, January 1994), p. 11.

²Energy Information Administration, *Coal Distribution January-December 1996*, DOE/EIA-0125(96/4Q) (Washington, DC), Table 34.

³Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

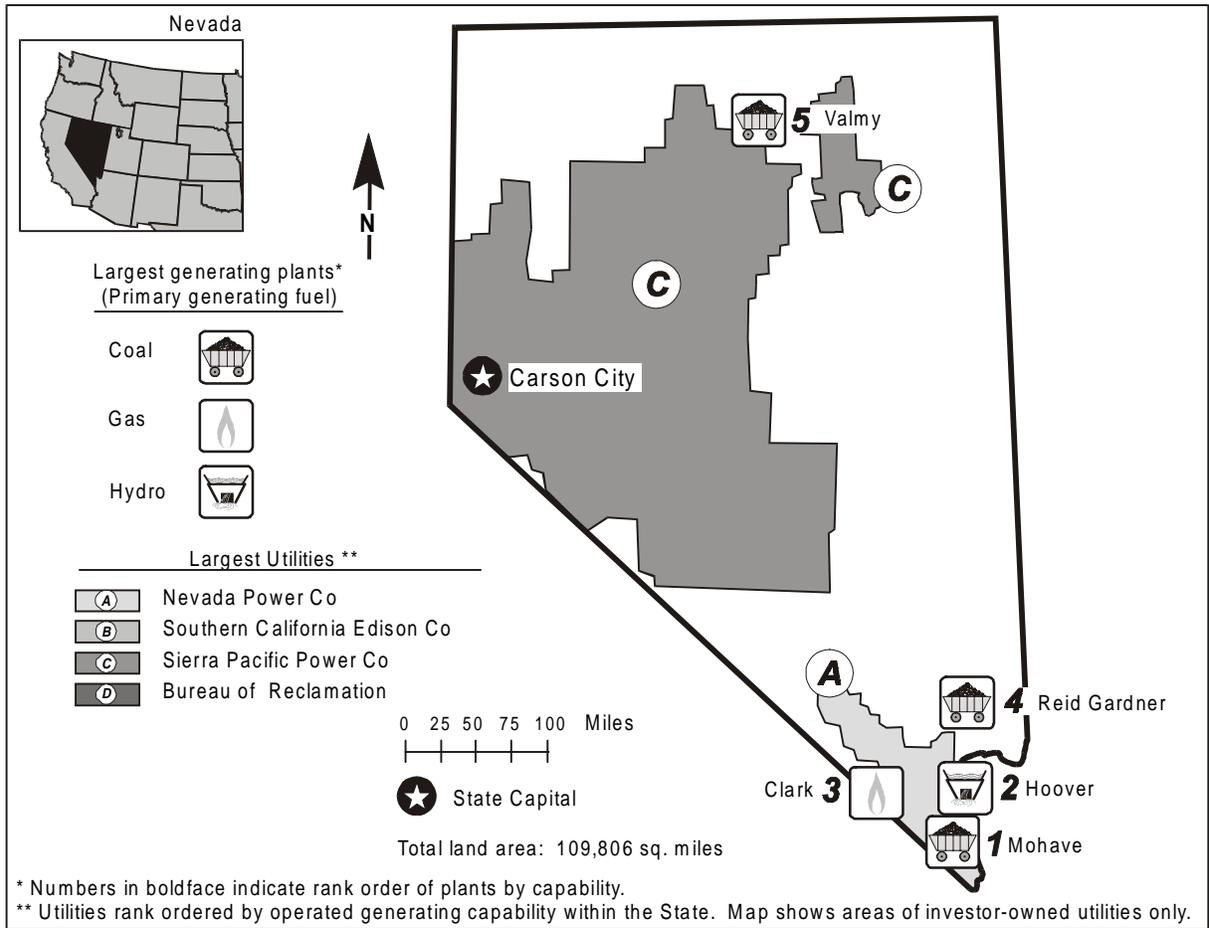


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		WSCC	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	5,643	36
State Primary Generating Fuel		Coal	Generation (MWh)	21,362,057	39
Population (as of 7/96)	1,600,810	38	Average Age of Coal Plants	21 years	
Average Revenue (cents/kWh)	5.95	^a 19	Average Age of Oil-fired Plants	34 years	
Industry			Average Age of Gas-fired Plants	18 years	
Capability (MWe)	6,392	^b 32	Average Age of Nuclear Plants	--	
Generation (MWh)	25,619,540	^b 34	Average Age of Hydroelectric Plants	55 years	
Capability/person			Average Age of Other Plants	--	
(KWe/person)	3.99	^b 10	Nonutility^c		
Generation/person			Capability (MWe)	749	21
(MWh/person)	16.00	^b 13	Percentage Share of Capability	11.7	13
Sulfur Dioxide Emissions			Generation (MWh)	4,257,483	20
(Thousand Short Tons)	52	37	Percentage Share of Generation	16.6	12
Nitrogen Oxide Emissions					
(Thousand Short Tons)	78	34	-- = Not applicable.		
Carbon Dioxide Emissions					
(Thousand Short Tons)	23,110	35			
Sulfur Dioxide/sq. mile (Tons)	0.47	43			
Nitrogen Oxides/sq. mile (Tons)	0.71	44			
Carbon Dioxide/sq. mile (Tons)	210.46	45			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Mohave	Coal	Southern California Edison Co	1,580
2. Hoover	Hydro	Bureau of Reclamation	1,037
3. Clark	Gas/Other	Nevada Power Co	684
4. Reid Gardner	Coal	Nevada Power Co	605
5. Valmy	Coal	Sierra Pacific Power Co	532

Table 3. Top Four Utilities with Largest Generating Capability, and Type, Within the State, 1996 (Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Nevada Power Co	1,726	605	--	1,121	--	--
B. Southern California Edison Co ...	1,580	1,580	--	--	--	--
C. Sierra Pacific Power Co	1,300	622	46	622	--	9
D. Bureau of Reclamation	1,037	--	--	--	--	1,037
Total	5,643	2,807	46	1,743	--	1,046
Percentage of Industry Capability	88.3	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

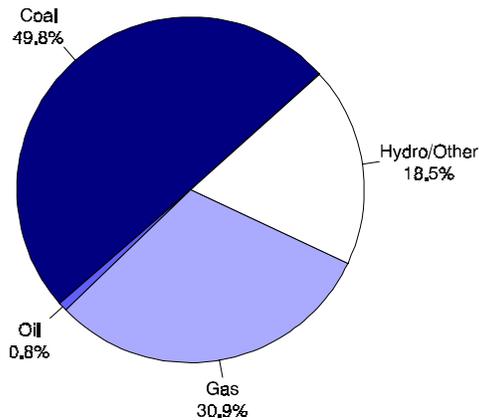


Figure 2. Utility Generation by Primary Energy Source, 1996

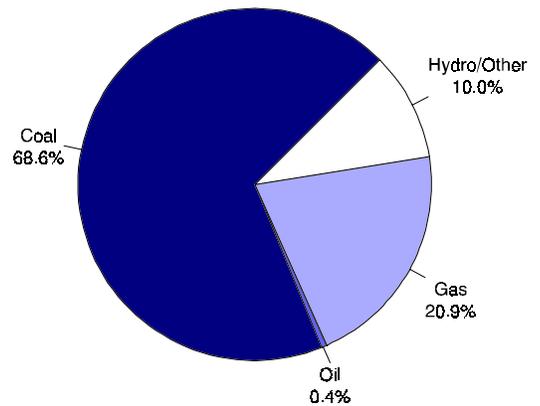


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

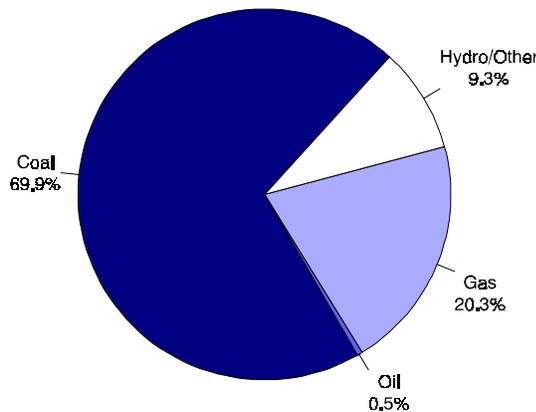


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	2,692	2,692	2,807	48.3	52.5	49.7
Oil	79	260	46	1.4	5.1	0.8
Gas	1,142	1,142	1,743	20.5	22.3	30.9
Nuclear	--	--	--	--	--	--
Hydro/Other	1,659	1,031	1,046	29.8	20.1	18.5
Total Utility	5,572	5,125	5,643	100.0	100.0	100.0
Total Nonutility	34	W	749	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	14,489,639	16,365,730	14,656,868	73.0	78.2	68.6
Oil	225,809	238,321	93,811	1.1	1.1	0.4
Gas	558,257	1,956,571	4,468,076	2.8	9.4	20.9
Nuclear	--	--	--	--	--	--
Hydro/Other	4,584,406	2,361,817	2,143,302	23.1	11.3	10.0
Total Utility	19,858,111	20,922,439	21,362,057	100.0	100.0	100.0
Total Nonutility	232,474	W	4,257,483	--	--	--

-- = Not applicable. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.158	0.176	0.166	73.2	78.0	69.9
Oil	0.003	0.003	0.001	1.5	1.2	0.5
Gas	0.007	0.022	0.048	3.2	9.9	20.3
Nuclear	--	--	--	--	--	--
Hydro/Other	0.048	0.024	0.022	22.1	10.9	9.3
Total Utility	0.217	0.225	0.237	100.0	100.0	100.0
Total Nonutility	(s)	W	0.026	--	--	--

-- = Not applicable. W = Withheld. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

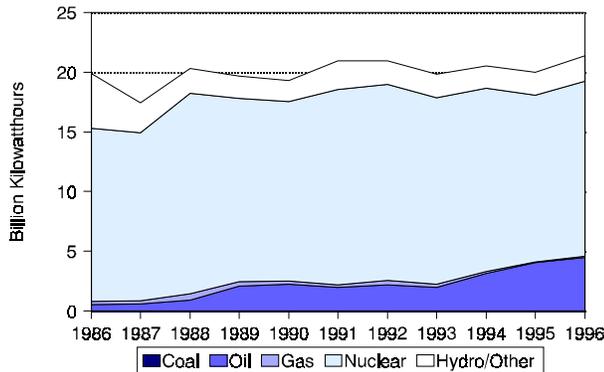


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

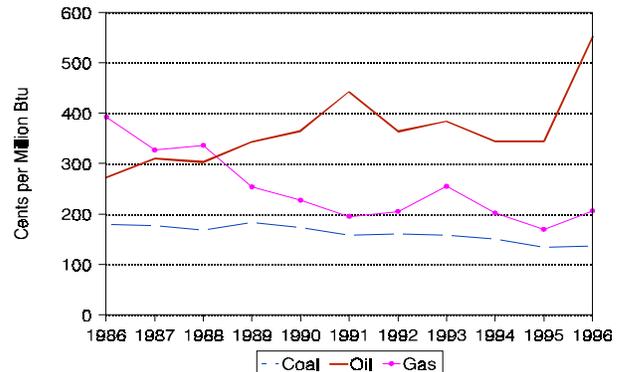


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	179.6	158.1	136.6	-2.7
Oil	272.2	442.0	551.5	7.3
Gas	392.0	194.9	206.0	-6.2

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	57	55	52	-0.9
Nitrogen Oxides ^d . .	58	65	78	3.0
Carbon Dioxide ^d . . .	18,264	20,887	23,110	2.4

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

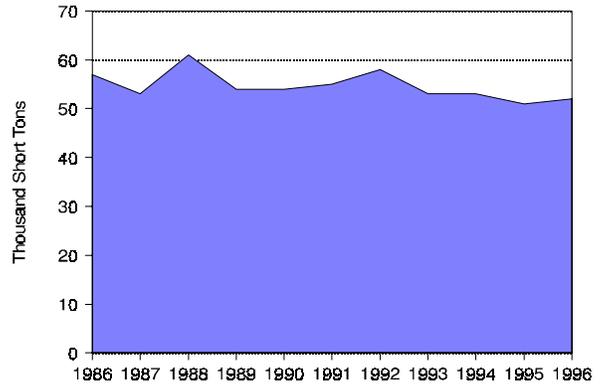


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

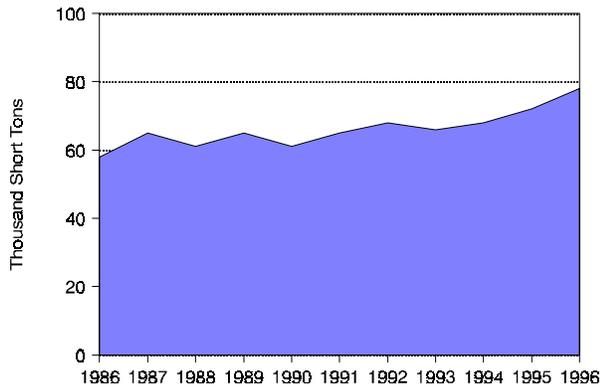


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

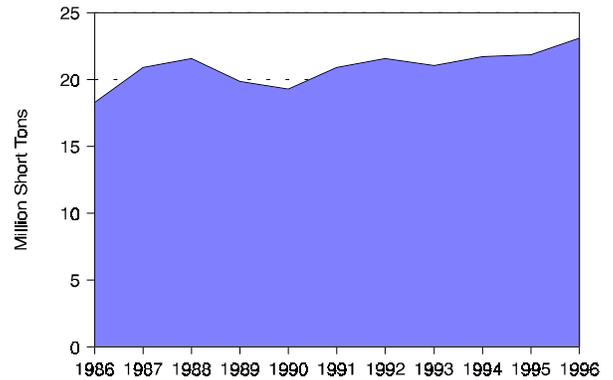


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	4,096,958	5,781,827	7,526,332	6.3	35.2	34.8	33.3
Commercial	2,981,885	3,986,737	5,150,392	5.6	25.6	24.0	22.8
Industrial . . .	4,103,229	6,172,512	9,074,624	8.3	35.2	37.1	40.2
Other	472,134	684,343	822,681	5.7	4.1	4.1	3.6
Total	11,654,207	16,625,419	22,574,029	6.8	100.0	100.0	100.0

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	5	7	1	8	21
Number of Retail Customers	413,928	11,480	1	14,558	439,967
Retail Sales (MWh)	10,177,133	1,051,250	465	425,359	11,654,207
Percentage of Retail Sales	87.3	9.0	(s)	3.7	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	817,543	24,625	3	30,014	872,185
Percentage of Revenue	93.7	2.8	(s)	3.4	100.0
1991					
Number of Utilities	4	8	1	9	22
Number of Retail Customers	560,558	14,182	3	19,169	593,912
Retail Sales (MWh)	14,752,651	981,885	17,613	873,270	16,625,419
Percentage of Retail Sales	88.7	5.9	0.1	5.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	969,784	29,387	196	47,945	1,047,336
Percentage of Revenue	92.6	2.8	(s)	4.6	100.0
1996					
Number of Utilities	4	8	1	9	22
Number of Retail Customers	705,219	18,481	2	24,136	747,838
Retail Sales (MWh)	19,741,513	1,236,822	25,844	1,569,850	22,574,029
Percentage of Retail Sales	87.5	5.5	0.1	7.0	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,231,256	37,092	166	73,598	1,342,112
Percentage of Revenue	91.7	2.8	(s)	5.5	100.0

(s) = Nonzero percentage less than 0.05.

New Hampshire

Only nine other States and the District of Columbia had smaller populations than New Hampshire in 1996. Even though it is a relatively small State, it has been one of the leaders in the move toward competition, probably because of the fact that, at an average cost of 11.59 cents per kilowatthour, it has the second most expensive electricity in the United States. (Hawaii is first at 12.12 cents per kilowatthour.)

Most of the utility electricity in New Hampshire is generated at the Seabrook nuclear plant, the largest plant in the State. Seabrook's operator, the North Atlantic Energy Service Company, is the largest utility in the State with 1,162 megawatts of net summer capability.¹ There is also a significant amount of coal capability but it has been in a downward trend since Seabrook came on line in 1990. In fact, in 1986, utility coal units represented 34.8 percent of New Hampshire's net generation, but only 19.4 percent in 1996. Utility oil generation also fell dramatically over the same period from 38.2 percent to 4.9 percent. Also due in part to Seabrook, the State's emissions of sulfur dioxide (SO₂) and nitrogen oxides (NO_x) decreased from 1986 to 1996.

The Clean Air Act Amendments of 1990 specified a number of utility plants to begin compliance with stricter emissions standards for SO₂ and NO_x. The law cited 460 megawatts of nameplate capacity at Public Service of New Hampshire's Merrimack plant. Emissions of SO₂, NO_x and carbon dioxide (CO₂) from New Hampshire generators ranked thirty-eighth, forty-seventh, and forty-fifth, respectively, in 1996. The concentrations of these pollutants per square mile in New Hampshire ranked twenty-fourth, thirty-sixth, and twenty-eighth, respectively, in 1996. Emissions of SO₂ and NO_x from New Hampshire generators were less in 1996 than they were in 1986. However, the SO₂ total for 1991 was less than the 1996 total. The NO_x total was substantially higher in 1991 than in 1996. CO₂ emissions increased in both time periods. New Hampshire is

part of the Ozone Transport Commission (OTC).² Each of the thirteen States of the OTC is responsible for enacting regulations in order to achieve region-wide NO_x reductions in a consistent, enforceable manner and for allocating its NO_x Budget Program allowances among NO_x sources in the State. The targets in this program are large industrial boilers and all electricity generating facilities with a rated output of 15 megawatts or more.

As early as 1996, legislation was enacted that required the New Hampshire Public Utilities Commission (PUC) to implement retail choice for all customers of electric utilities under its jurisdiction by January 1998 or at the earliest date which the PUC determined to be in the public interest. The law also mandated that this could happen no later than July 1998. However, competition was delayed due to stranded costs issues. (Stranded costs in New Hampshire would be higher than average, as is the price of electricity, due to the addition of the Seabrook nuclear plant.) Even as far back as June 1995, legislation was enacted to direct the PUC to establish a statewide pilot program for retail competition for about 17,000 customers. In May 1996, the PUC began the 2-year statewide pilot program covering approximately 3 percent of the load served by 6 utilities. The results of this pilot were released in February 1997 and indicated that a 15- to 20-percent savings had been achieved. Although New Hampshire has been actively pursuing the implementation of competition for some time, delays due to battles between utilities and the PUC in State and Federal courts have caused lengthy delays. Recently, the Unitil Corporation, which includes as its subsidiaries Concord Electric, Exeter & Hampton Electric, and Fitchburg Gas & Electric, filed its restructuring settlement agreement with the PUC. Unitil will sell its New Hampshire power supply portfolio and be allowed to recover 100 percent of its stranded costs over 12 years under the agreement. Customer choice will be phased in beginning March 1, 1999.³

¹ The Seabrook Station has been one of the most controversial and litigated reactors in the United States. The facility provides electricity for one million New England homes - more than 8 million megawatthours of electricity a year. For 1996, it maintained an operating capacity factor of 96.8 percent. On May 10, 1997, Seabrook Station ended a 463-day run generating electricity, the longest continuous run ever by a nuclear plant in New England. It is owned jointly by 11 New England utilities. Source: <http://www.nu.com/aboutNU/power/sea.htm>.

² The Ozone Transport Region comprises the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Delaware, the northern counties of Virginia, and the District of Columbia.

³ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

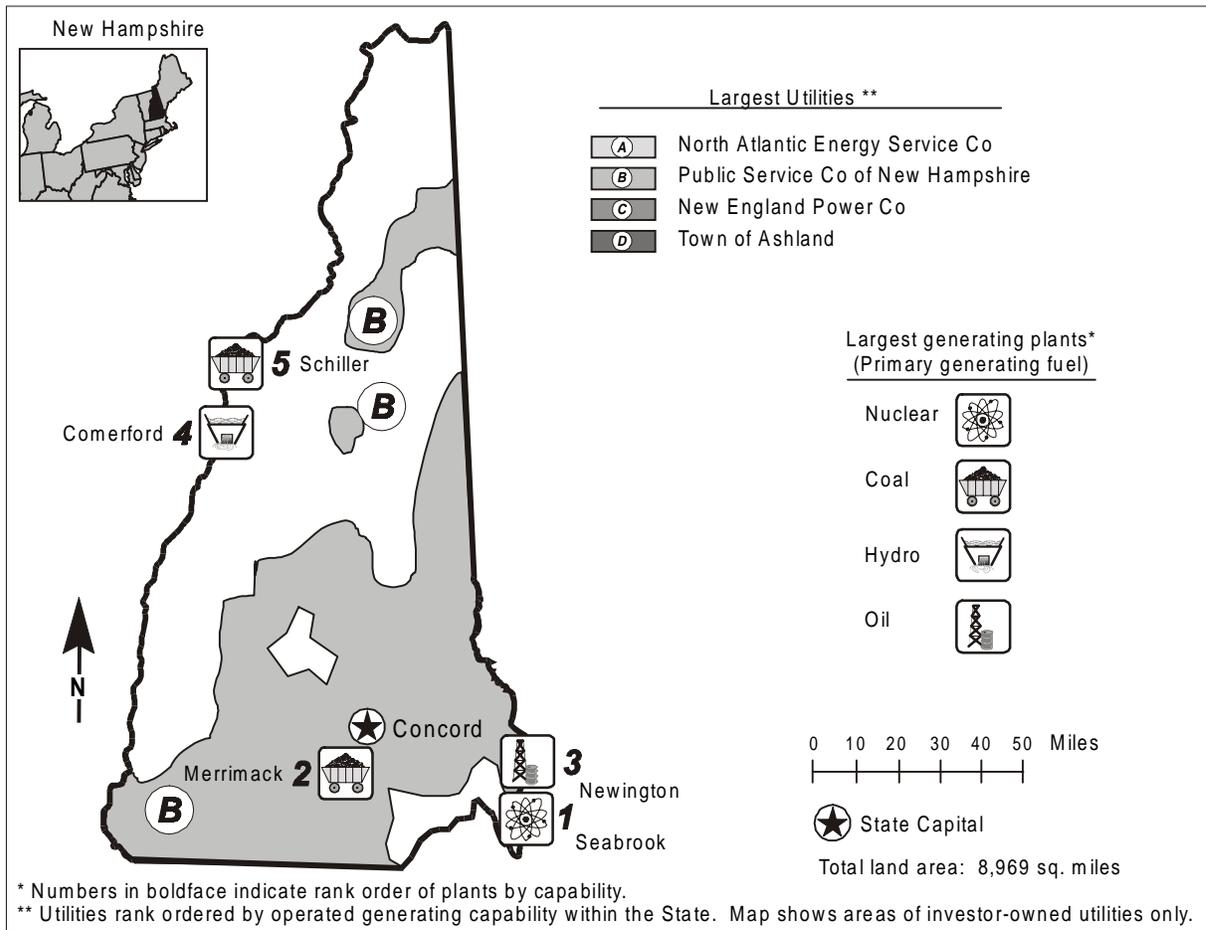


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		WPCC	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	2,512	44
State Primary Generating Fuel		Nuclear	Generation (MWh)	15,418,562	42
Population (as of 7/96)	1,160,213	42	Average Age of Coal Plants	33 years	
Average Revenue (cents/kWh)	11.59	^a 50	Average Age of Oil-fired Plants	23 years	
Industry			Average Age of Gas-fired Plants	--	
Capability (MWe)	2,767	^b 39	Average Age of Nuclear Plants	6 years	
Generation (MWh)	17,075,153	^b 36	Average Age of Hydroelectric Plants	60 years	
Capability/person (KWe/person)	2.38	^b 33	Average Age of Other Plants	--	
Generation/person (MWh/person)	14.72	^b 19	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	49	38	Capability (MWe)	255	36
Nitrogen Oxide Emissions (Thousand Short Tons)	13	47	Percentage Share of Capability	9.2	17
Carbon Dioxide Emissions (Thousand Short Tons)	7,490	45	Generation (MWh)	1,656,591	33
Sulfur Dioxide/sq. mile (Tons)	5.46	24	Percentage Share of Generation	9.7	17
Nitrogen Oxides/sq. mile (Tons)	1.45	36			
Carbon Dioxide/sq. mile (Tons)	835.10	28	-- = Not applicable.		

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capacity (MWe)
1. Seabrook	Nuclear	North Atlantic Eny Serv Corp	1,162
2. Merrimack	Coal	Public Service Co of NH	467
3. Newington	Oil	Public Service Co of NH	406
4. Comerford	Hydro	New England Power Co	164
5. Schiller	Coal/Oil	Public Service Co of NH	162

Table 3. Top Four Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. North Atlantic Energy Svc Corp . .	1,162	--	--	--	1,162	--
B. Public Service Co of NH	1,130	578	489	--	--	64
C. New England Power Co	220	--	--	--	--	220
D. Town of Ashland	--	--	--	--	--	--
Total	2,512	578	489	--	1,162	284
Percentage of Industry Capability	90.8	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

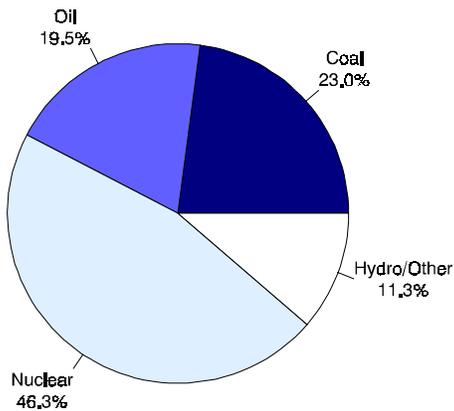


Figure 2. Utility Generation by Primary Energy Source, 1996

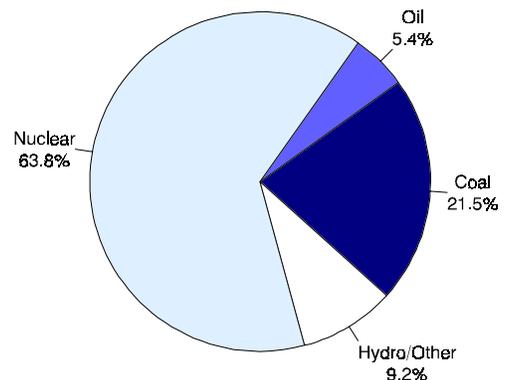


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

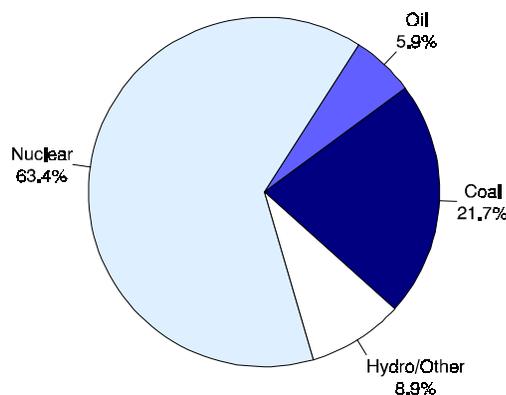


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	610	622	578	38.8	22.2	20.9
Oil	549	546	489	34.9	19.5	17.7
Gas	--	--	--	--	--	--
Nuclear	--	1,150	1,162	--	41.0	42.0
Hydro/Other	268	291	284	17.0	10.4	10.3
Total Utility	1,426	2,609	2,512	90.7	93.0	90.8
Total Nonutility	146	196	255	9.3	7.0	9.2
Industry	1,572	2,805	2,767	100.0	100.0	100.0

-- = Not applicable.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	2,392,477	3,168,054	3,309,695	34.8	22.6	19.4
Oil	2,621,004	1,561,485	838,243	38.2	11.2	4.9
Gas	--	(s)	280	--	(s)	(s)
Nuclear	--	6,787,851	9,844,744	--	48.5	57.7
Hydro/Other	1,104,407	1,187,758	1,425,600	16.1	8.5	8.3
Total Utility	6,117,888	12,705,147	15,418,562	89.1	90.8	90.3
Total Nonutility	750,643	1,283,512	1,656,591	10.9	9.2	9.7
Industry	6,868,531	13,988,659	17,075,153	100.0	100.0	100.0

-- = Not applicable. (s) = Nonzero percentage less than 0.05 if value is positive and greater than -0.05 if value is negative.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.025	0.033	0.036	24.8	21.7	18.5
Oil	0.030	0.018	0.010	29.9	11.7	5.0
Gas	--	--	(s)	--	--	--
Nuclear	--	0.073	0.105	--	48.3	53.9
Hydro/Other	0.012	0.012	0.015	11.7	8.2	7.6
Total Utility	0.066	0.136	0.165	66.4	89.9	85.0
Total Nonutility	0.033	0.015	0.029	33.6	10.1	15.0
Industry	0.099	0.151	0.194	100.0	100.0	100.0

-- = Not applicable. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

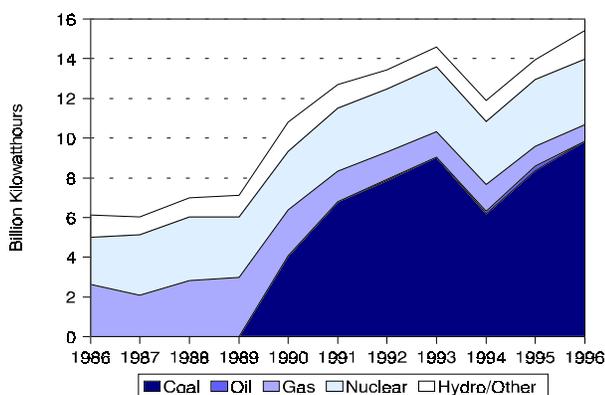


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996

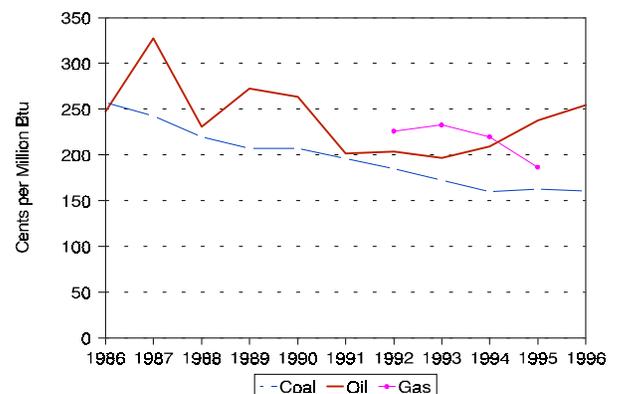


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	256.9	196.0	160.6	-4.6
Oil	247.4	201.8	254.4	0.3
Gas	--	--	--	--

-- = Not applicable.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	64	47	49	-2.6
Nitrogen Oxides ^d . .	18	22	13	-3.2
Carbon Dioxide ^d . . .	4,902	6,616	7,490	4.3

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

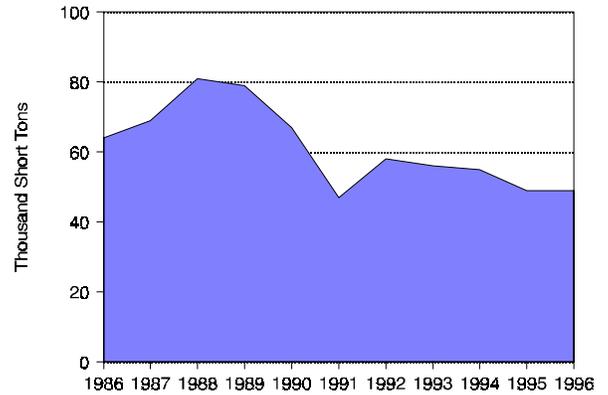


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

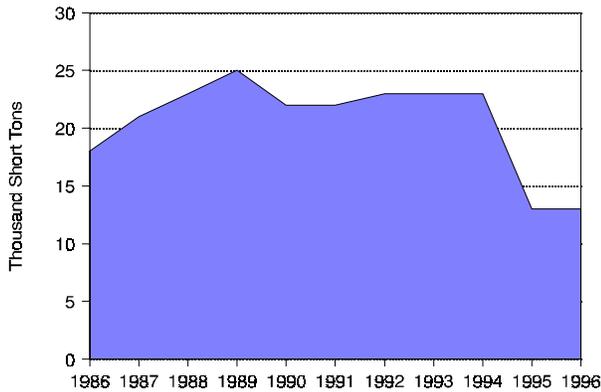


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

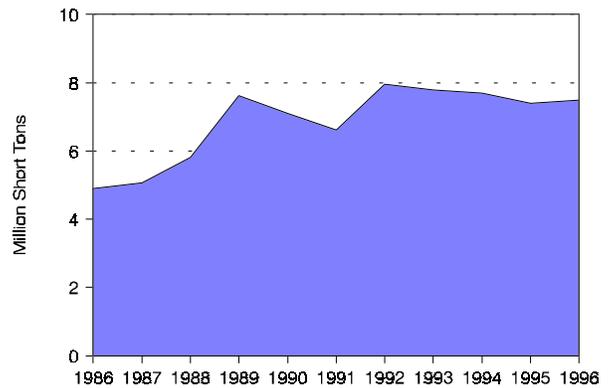


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	3,074,522	3,356,705	3,427,415	1.1	39.1	38.3	37.6
Commercial	1,663,357	2,029,125	3,238,893	6.9	21.1	23.2	35.5
Industrial . . .	3,079,066	3,265,025	2,334,068	-2.7	39.1	37.3	25.6
Other	55,087	110,919	127,058	8.7	0.7	1.3	1.4
Total	7,872,031	8,761,774	9,127,434	1.5	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

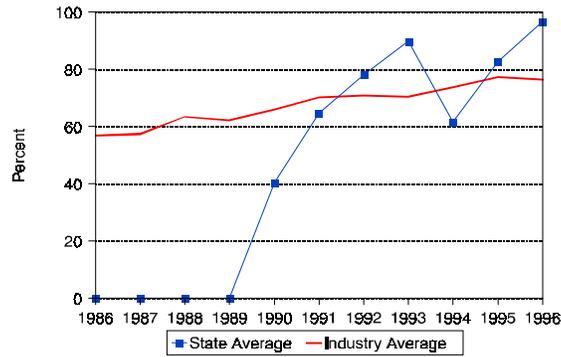


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	7	5	--	1	13
Number of Retail Customers	435,541	9,610	--	52,884	498,035
Retail Sales (MWh)	7,291,454	115,741	--	464,836	7,872,031
Percentage of Retail Sales	92.6	1.5	--	5.9	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	696,409	9,885	--	47,794	754,089
Percentage of Revenue	92.4	1.3	--	6.3	100.0
1991					
Number of Utilities	7	5	--	1	13
Number of Retail Customers	494,782	10,438	--	63,535	568,755
Retail Sales (MWh)	8,045,618	140,917	--	575,239	8,761,774
Percentage of Retail Sales	91.8	1.6	--	6.6	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	831,677	12,328	--	55,279	899,284
Percentage of Revenue	92.5	1.4	--	6.2	100.0
1996					
Number of Utilities	6	5	--	1	12
Number of Retail Customers	516,836	10,420	--	68,136	595,392
Retail Sales (MWh)	8,333,324	163,979	--	630,131	9,127,434
Percentage of Retail Sales	91.3	1.8	--	6.9	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	963,874	14,802	--	79,475	1,058,151
Percentage of Revenue	91.1	1.4	--	7.5	100.0

-- = Not applicable.

New Jersey

Although New Jersey has only the ninth largest population, it is the most densely populated State in the Nation due to its size. Also reflecting on its relatively small area is the fact that, even though emissions of sulfur dioxide (SO₂), nitrogen oxides (NO_x) and carbon dioxide (CO₂) from New Jersey electricity generation are lower than most States, the concentration rankings per square mile of NO_x and CO₂ are among the top 10 in the United States. Atlantic City Electric's B L England plant was among the plants which were named to begin compliance with the stricter emissions standards for SO₂ set forth in the Clean Air Act Amendments of 1990 (CAAA90). In addition, New Jersey is one of the 13 States represented on the Ozone Transport Commission, which was created by CAAA90 to coordinate the regional development of control plans for ground-level ozone in the Northeast and Mid-Atlantic States.¹ It is likely that New Jersey will need to design a State implementation plan for reducing ground-level ozone in response to a proposal released by the Environmental Protection Agency (EPA) in October 1998. The EPA proposal does not mandate which sources must reduce pollution. However, EPA states that utilities would be one of the most likely sources of NO_x emissions reductions.

Most of the utility electricity in New Jersey is generated at nuclear plants. Two of the three largest plants in the State are nuclear plants (Salem and Hope Creek) and are located in the southernmost part of the State along the mouth of the Delaware River. In 1986, nuclear units represented 50.1 percent of its net generation but in 1996 the nuclear share dropped to 29.3 percent. This sharp decline was the result of Public Service Electric and Gas Company (PSE&G) voluntarily taking the Salem plant out of service in the Spring of 1995 after a series of

problems with personnel and equipment.² Since that time, PSE&G has spent several hundred million dollars to refurbish the plant. Its Unit 2 was brought back on line in the Fall of 1998 and Unit 1 is expected to be back on line in late 1998.³

A noteworthy fact regarding New Jersey's electricity generation is the rapid growth in nonutility generation. In 1986, nonutility generation accounted for 2.4 percent of the State's total but, by 1996, this figure had climbed to 47.5 percent. Only Rhode Island (58.6 percent) and Maine (48.5 percent) had larger shares of electricity generated by nonutilities.

Another significant factor in New Jersey is the average price of electricity. At 10.50 cents per kilowatthour, it ranks fifth most expensive in the Nation. These high prices were one of the forces behind New Jersey's aggressive approach to restructuring. While the legislative session that ended in June 1998 failed to pass restructuring legislation, a bill supported by the governor and the State's investor-owned utilities, the Electric Discount and Energy Competition Act, was introduced in September 1998. If passed, it would begin a 4-month phase-in for customer choice by June 1999; open up metering and billing to competition after 1 year; implement rate reductions of 5 to 10 percent within 4 months; unbundle rates; require disclosure of emissions and fuel mix; and give the Board of Public Utilities authority to determine the amount of stranded costs and recovery mechanisms, including securitization. The pilot program, which was begun in September 1997 by Jersey Central Power & Light for customers in Monroe Township, was extended through December 31, 1998. New Jersey Assembly and Senate committees are expected to vote on the restructuring legislation in early 1999.⁴

¹ The Ozone Transport Region comprises the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Delaware, the northern counties of Virginia, and the District of Columbia.

² <http://www.bergenrecord.com/region/nuke13199802135.htm>.

³ <http://www.nj.com/business/ledger/stories/543cld.htm>.

⁴ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

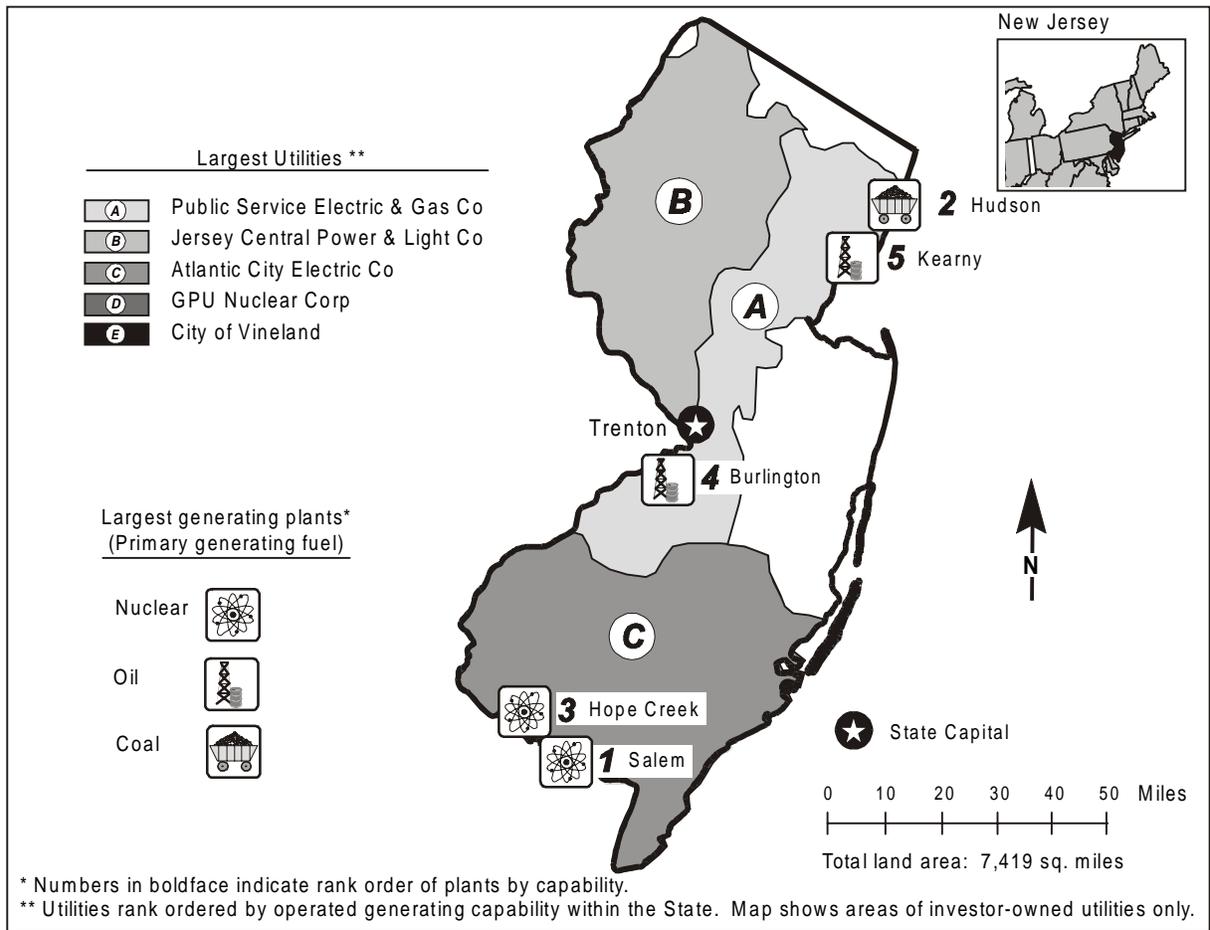


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		MACC	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	13,645	22
State Primary Generating Fuel		Nuclear	Generation (MWh)	19,790,697	40
Population (as of 7/96)	8,001,850	9	Average Age of Coal Plants	32 years	
Average Revenue (cents/kWh)	10.50	^a 47	Average Age of Oil-fired Plants	32 years	
Industry			Average Age of Gas-fired Plants	28 years	
Capability (MWe)	16,828	^b 18	Average Age of Nuclear Plants	16 years	
Generation (MWh)	37,663,185	^b 28	Average Age of Hydroelectric Plants	31 years	
Capability/person (KWe/person)	2.10	^b 37	Average Age of Other Plants	--	
Generation/person (MWh/person)	4.71	^b 44	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	47	39	Capability (MWe)	3,183	6
Nitrogen Oxide Emissions (Thousand Short Tons)	77	36	Percentage Share of Capability	18.9	5
Carbon Dioxide Emissions (Thousand Short Tons)	22,837	36	Generation (MWh)	17,872,488	6
Sulfur Dioxide/sq. mile (Tons)	6.34	21	Percentage Share of Generation	47.5	3
Nitrogen Oxides/sq. mile (Tons)	10.38	7	-- = Not applicable.		
Carbon Dioxide/sq. mile (Tons)	3,078.18	8			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capacity (MWe)
1. Salem	Nuclear	Public Service Electric&Gas Co	2,250
2. Hudson	Coal/Gas/Oil	Public Service Electric&Gas Co	1,112
3. Hope Creek	Nuclear	Public Service Electric&Gas Co	1,031
4. Burlington	Oil/Gas	Public Service Electric&Gas Co	809
5. Kearny	Oil/Gas	Public Service Electric&Gas Co	796

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Public Service Electric & Gas Co	9,926	1,242	2,139	3,302	3,243	--
B. Jersey Central Power & Light Co	1,820	--	212	1,208	--	400
C. Atlantic City Electric Co	1,188	364	422	402	--	--
D. GPU Nuclear Corp	619	--	--	--	619	--
E. City of Vineland	92	23	69	--	--	--
Total	13,645	1,629	2,842	4,912	3,862	400
Percentage of Industry Capability	81.1	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

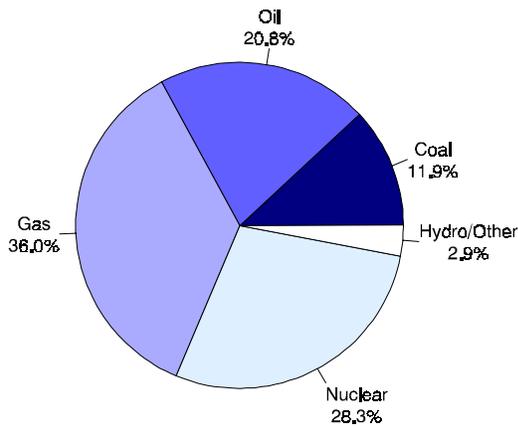


Figure 2. Utility Generation by Primary Energy Source, 1996

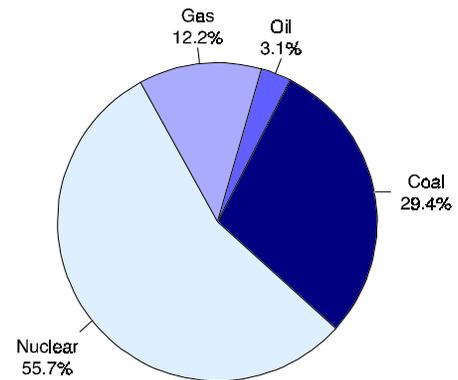


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

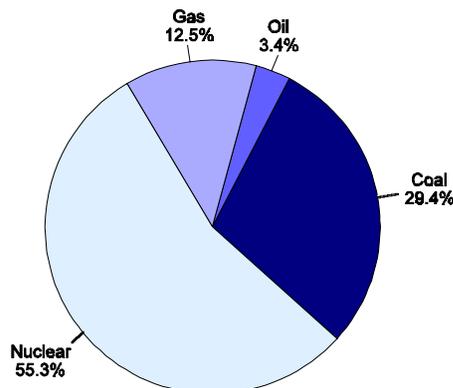


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	1,652	1,652	1,629	12.1	11.1	9.7
Oil	3,922	3,360	2,842	28.7	22.5	16.9
Gas	3,728	4,530	4,912	27.3	30.4	29.2
Nuclear	3,885	3,853	3,862	28.5	25.8	22.9
Hydro/Other	330	330	400	2.4	2.2	2.4
Total Utility	13,517	13,725	13,645	99.0	92.0	81.1
Total Nonutility	137	1,188	3,183	1.0	8.0	18.9
Industry	13,654	14,913	16,828	100.0	100.0	100.0

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	6,287,682	5,237,132	5,826,375	21.3	12.1	15.5
Oil	4,952,983	1,798,775	611,361	16.8	4.2	1.6
Gas	3,060,622	5,341,636	2,439,308	10.4	12.3	6.5
Nuclear	14,770,208	24,806,606	11,027,886	50.1	57.3	29.3
Hydro/Other	-289,234	-155,184	-114,233	-1.0	-0.4	-0.3
Total Utility	28,782,260	37,028,965	19,790,697	97.6	85.5	52.5
Total Nonutility	699,000	6,275,746	17,872,488	2.4	14.5	47.5
Industry	29,481,260	43,304,711	37,663,185	100.0	100.0	100.0

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.069	0.056	0.062	18.1	11.6	14.9
Oil	0.057	0.020	0.007	14.8	4.2	1.7
Gas	0.038	0.064	0.026	10.0	13.3	6.3
Nuclear	0.160	0.266	0.117	41.7	55.5	28.0
Hydro/Other	-0.003	-0.002	-0.001	-0.8	-0.3	-0.3
Total Utility	0.321	0.405	0.212	83.9	84.2	50.6
Total Nonutility	0.062	0.076	0.207	16.1	15.8	49.4
Industry	0.382	0.480	0.419	100.0	100.0	100.0

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

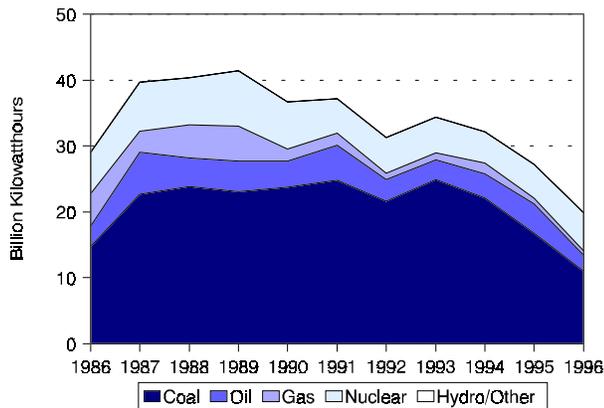


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

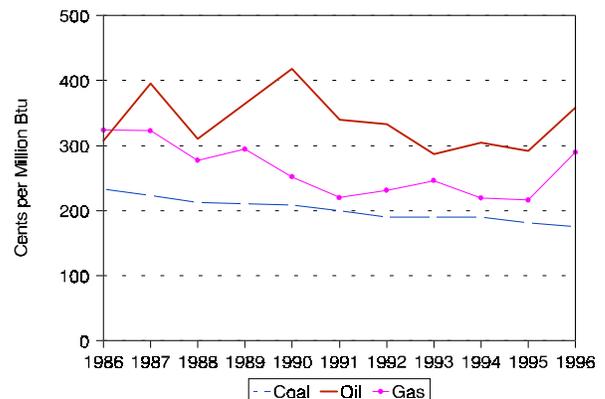


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	233.4	200.3	175.2	-2.8
Oil	307.3	339.5	358.7	1.6
Gas	323.8	219.9	289.8	-1.1

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	85	67	47	-5.8
Nitrogen Oxides ^d . .	57	58	77	3.1
Carbon Dioxide ^d . . .	14,643	17,564	22,837	4.5

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

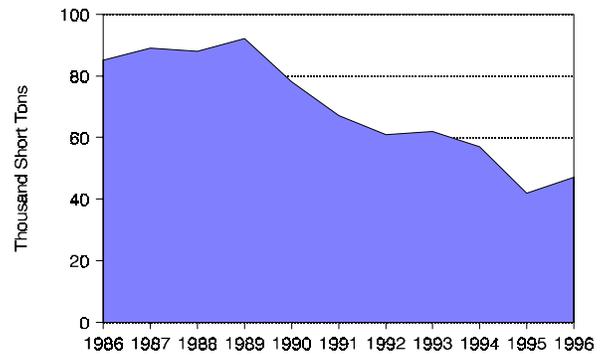


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

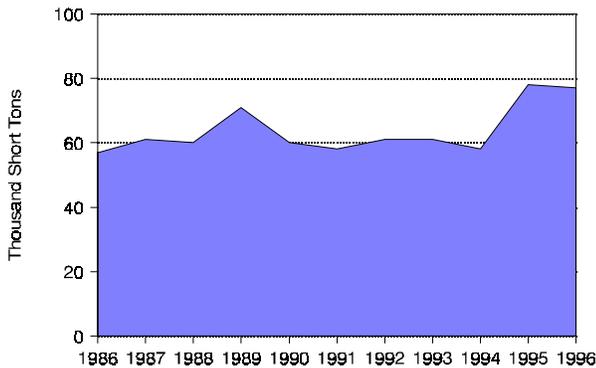


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

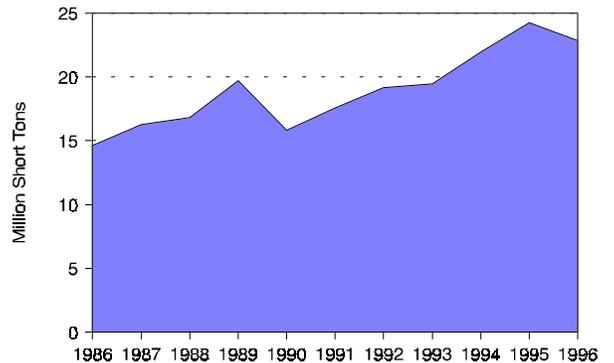


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	18,088,869	21,539,103	22,632,226	2.3	32.3	33.3	33.8
Commercial	21,805,435	27,627,097	30,152,284	3.3	38.9	42.7	45.1
Industrial . . .	15,630,557	15,031,232	13,602,503	-1.4	27.9	23.2	20.3
Other	467,687	485,119	502,417	0.7	0.8	0.7	0.8
Total	55,992,548	64,682,551	66,889,430	1.8	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

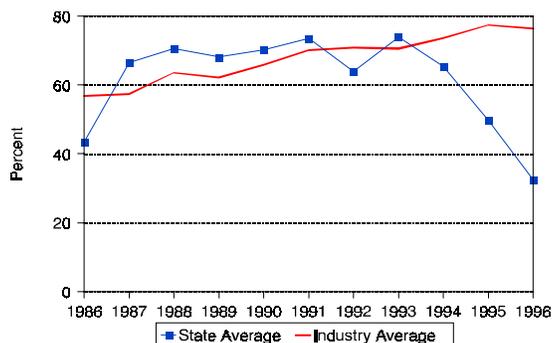


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	4	9	--	1	14
Number of Retail Customers	3,030,371	45,282	--	8,846	3,084,499
Retail Sales (MWh)	55,216,073	687,542	--	88,933	55,992,548
Percentage of Retail Sales	98.6	1.2	--	0.2	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	6,686,358	78,295	--	13,494	6,778,146
Percentage of Revenue	98.7	1.2	--	0.2	100.0
1991					
Number of Utilities	4	9	--	1	14
Number of Retail Customers	3,261,904	51,159	--	9,802	3,322,865
Retail Sales (MWh)	63,766,817	814,155	--	101,579	64,682,551
Percentage of Retail Sales	98.6	1.3	--	0.2	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	6,778,895	86,247	--	13,353	6,878,494
Percentage of Revenue	98.6	1.3	--	0.2	100.0
1996					
Number of Utilities	4	9	--	1	14
Number of Retail Customers	3,373,195	53,546	--	10,408	3,437,149
Retail Sales (MWh)	65,912,025	864,669	--	112,736	66,889,430
Percentage of Retail Sales	98.5	1.3	--	0.2	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	6,934,345	78,614	--	13,455	7,026,414
Percentage of Revenue	98.7	1.1	--	0.2	100.0

-- = Not applicable.

New Mexico

New Mexico is sparsely populated—only 13 other States have a lower population. As a result, the State's generating capability is also low compared to the rest of the Nation. Ninety percent of New Mexico's utility generation of electricity in 1996 was coal-fired. This can be attributed to the abundant supply of low-sulfur bituminous coal mined within the State, mostly in northern New Mexico at the San Juan and Raton basins.¹ Coal is produced in the State mainly for the use of electric utilities and, in 1996, 62.3 percent² of total coal production was shipped to electric utilities within the State.³ The largest coal-fired power plant is the 2,040-megawatt Four Corners plant, operated by the Arizona Public Service Company, the utility with the largest generating capability in the State. The second largest plant, the San Juan plant, operated by the Public Service Company of New Mexico, is also coal-fired. Both Four Corners and San Juan are in the northwestern corner of the State in San Juan County. The third and fourth largest plants are gas-fired. They are the Rio Grande plant, located in the El Paso area, and the Cunningham facility, located in the extreme southeastern corner of New Mexico. The State has no nuclear generating capability and a very small amount of oil-fired and hydroelectric capability. They are a net exporter of electricity.

Another result of the State's use of low-sulfur coal is the relatively low amount of sulfur dioxide, nitrogen oxides, and carbon dioxide emitted from their coal-fired facilities. In fact, their concentrations of emissions from all three sources ranked among the 10 lowest in the

United States. Like all States west of Kansas, New Mexico had no generating units that were subject to mandatory emissions reductions pursuant to the Clean Air Act Amendments of 1990.

The average price of electricity in New Mexico was 6.76 cents per kilowatthour in 1996, just under the national average of 6.86 cents. Retail sales by utilities in the State have experienced an annual growth rate of 3.7 percent during the period 1986 to 1996. The largest share of retail sales (34.5 percent) went to the industrial sector at an average price of 4.35 cents per kilowatthour. The commercial sector share was 30.8 percent at 7.93 cents per kilowatthour; the residential sector share was 25.2 percent at 8.93 cents per kilowatthour; and the "other" sector (i.e., sales for public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales) was 9.5 percent at 5.93 cents per kilowatthour.⁴

New Mexico has taken a relatively slow approach to restructuring when compared to other States. Legislation which would have set the date for retail competition at January 1, 2001 was introduced in early 1998, but was tabled shortly thereafter. New legislation is expected to be introduced into the 1999 legislative session. Meanwhile, the Public Service Commission has ordered Public Service of New Mexico to conduct a pilot program with its Albuquerque customers, opening about 16 megawatts of their load to competition.⁵

¹ Energy Information Administration, *State Coal Profiles*, DOE/EIA-0576 (Washington, DC, January 1994), p. 63.

² Energy Information Administration, *Coal Distribution Report January-December 1996*, DOE/EIA-0125(96/4) (Washington, DC), Tables 33 and 34.

³ It is interesting to note that coal production in New Mexico was on the rise in the early 1900s but trended downward in mid-century, due chiefly to mine closings resulting from competition from natural gas and crude oil produced in New Mexico and neighboring States. In the late 1960s the State's coal industry was re-established with the opening of large mines to supply fuel for new coal-burning power plants built in New Mexico and Arizona to meet the growing demand for electricity in the Southwest. Rising almost steadily since then, the State's coal production in 1976 was over 25 million short tons.

⁴ Energy Information Administration, *Electric Power Annual 1996 Volume II*, DOE/EIA-0348(96)/2 (Washington, DC, December 1997), Table 7.

⁵ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

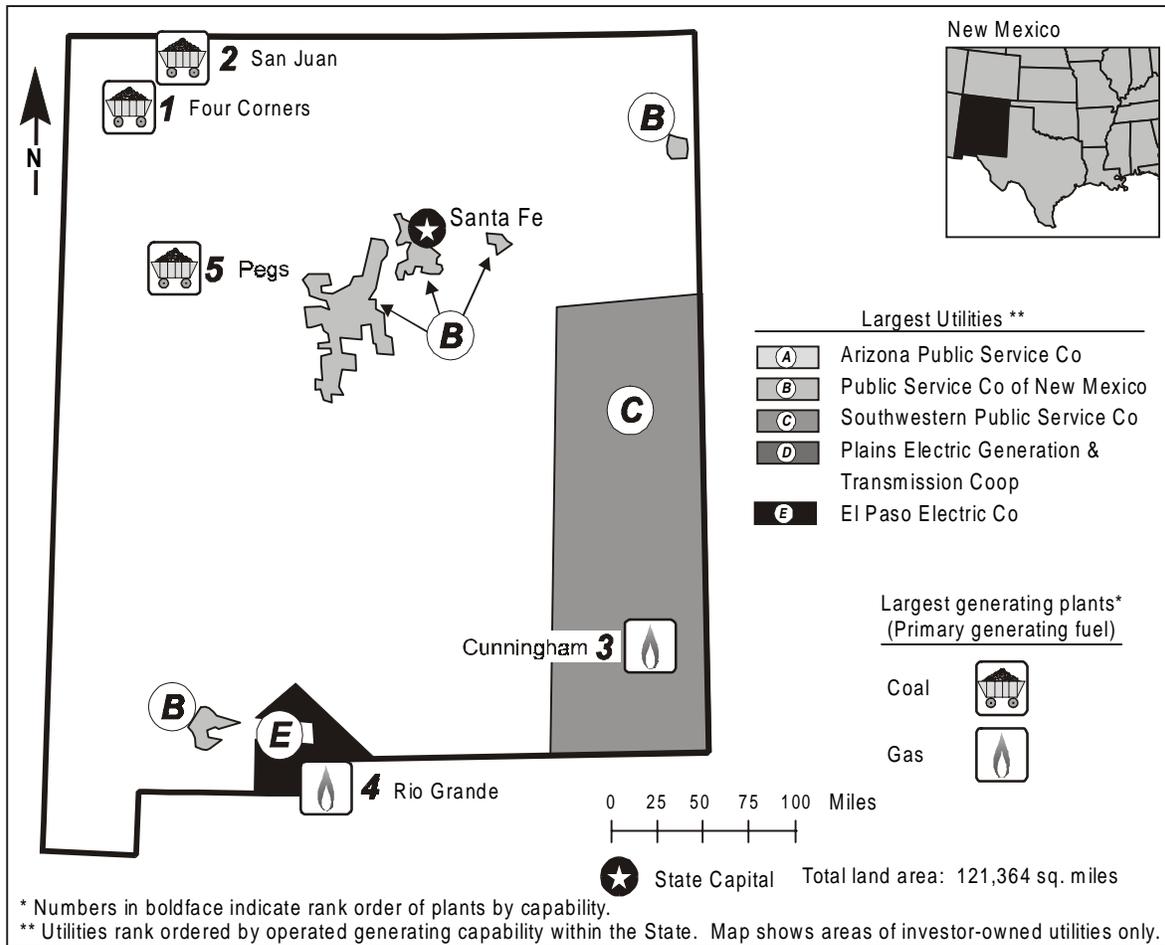


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		SPP/WSCC	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	5,077	38
State Primary Generating Fuel		Coal	Generation (MWh)	29,364,389	34
Population (as of 7/96)	1,711,256	36	Average Age of Coal Plants	23 years	
Average Revenue (cents/kWh)	6.76	^a 32	Average Age of Oil-fired Plants	29 years	
Industry			Average Age of Gas-fired Plants	31 years	
Capability (MWe)	5,314	^b 33	Average Age of Nuclear Plants	--	
Generation (MWh)	30,185,827	^b 32	Average Age of Hydroelectric Plants	31 years	
Capability/person (KWe/person)	3.11	^b 20	Average Age of Other Plants	--	
Generation/person (MWh/person)	17.64	^b 9	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	61	36	Capability (MWe)	237	37
Nitrogen Oxide Emissions (Thousand Short Tons)	122	28	Percentage Share of Capability	4.5	30
Carbon Dioxide Emissions (Thousand Short Tons)	31,271	32	Generation (MWh)	821,438	37
Sulfur Dioxide/sq. mile (Tons)	0.50	42	Percentage Share of Generation	2.7	38
Nitrogen Oxides/sq. mile (Tons)	1.01	42			
Carbon Dioxide/sq. mile (Tons)	257.66	43			

-- = Not applicable.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Four Corners	Coal	Arizona Public Service Co	2,040
2. San Juan	Coal	Public Service Co of NM	1,614
3. Cunningham	Gas	Southwestern Public Service Co	267
4. Rio Grande	Gas	El Paso Electric Co	246
5. Pegs	Coal	Plains Elec Gen&Trans Coop Inc	235

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Arizona Public Service Co	2,040	2,040	--	--	--	--
B. Public Service Co of NM	1,788	1,614	--	174	--	--
C. Southwestern Public Service Co	491	--	14	477	--	--
D. Plains Elec Gen&Trans Coop Inc	280	235	--	45	--	--
E. El Paso Electric Co	246	--	--	241	--	--
Total	4,845	3,889	14	942	--	--
Percentage of Industry Capability	91.2	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

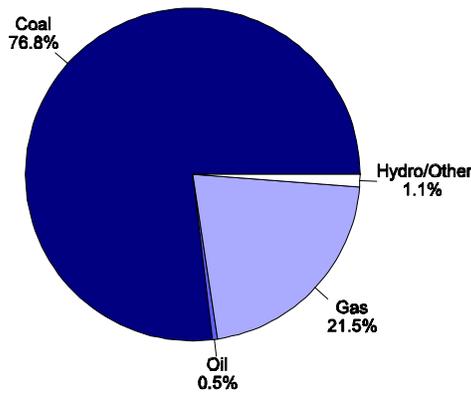


Figure 2. Utility Generation by Primary Energy Source, 1996

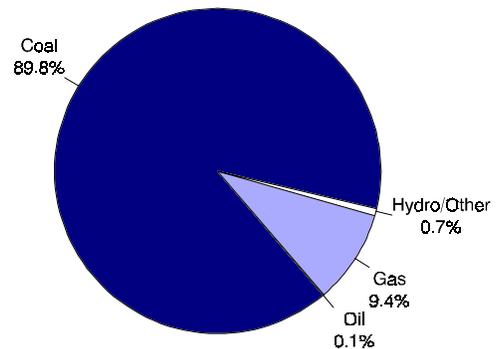


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

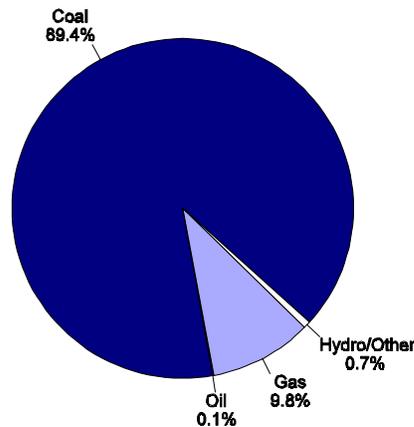


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	3,894	3,901	3,901	75.7	77.3	76.8
Oil	25	24	24	0.5	0.5	0.5
Gas	1,197	1,063	1,094	23.3	21.1	21.5
Nuclear	--	--	--	--	--	--
Hydro/Other	25	58	58	0.5	1.1	1.1
Total Utility	5,141	5,045	5,077	100.0	100.0	100.0
Total Nonutility	W	W	237	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	21,504,999	22,129,312	26,357,179	91.1	88.3	89.8
Oil	37,660	32,240	22,452	0.2	0.1	0.1
Gas	1,891,676	2,665,953	2,773,259	8.0	10.6	9.4
Nuclear	--	--	--	--	--	--
Hydro/Other	166,340	237,108	211,499	0.7	0.9	0.7
Total Utility	23,600,676	25,064,613	29,364,389	100.0	100.0	100.0
Total Nonutility	W	W	821,438	--	--	--

-- = Not applicable. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.240	0.233	0.277	91.2	88.1	89.4
Oil	(s)	(s)	(s)	0.2	0.1	0.1
Gas	0.021	0.029	0.030	8.0	10.8	9.8
Nuclear	--	--	--	--	--	--
Hydro/Other	0.002	0.002	0.002	0.7	0.9	0.7
Total Utility	0.263	0.265	0.310	100.0	100.0	100.0
Total Nonutility	W	W	0.011	--	--	--

-- = Not applicable. W = Withheld. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of electricity by Primary Energy Source, 1986-1996

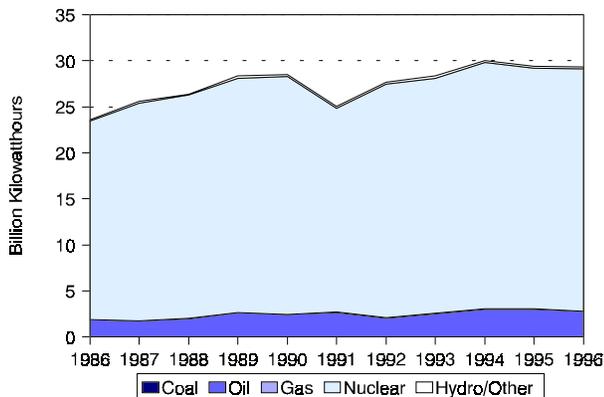


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

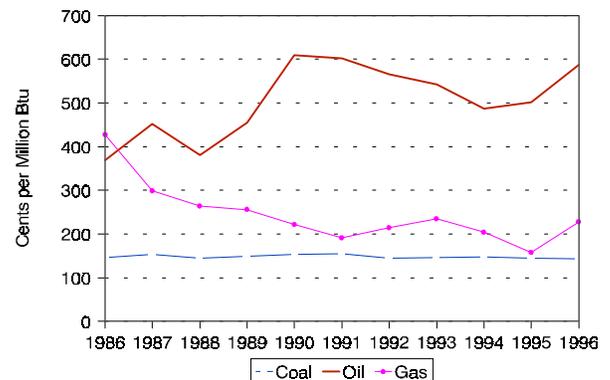


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	146.3	154.7	142.8	-0.2
Oil	369.3	601.7	586.8	4.7
Gas	427.3	191.2	227.9	-6.1

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	40	50	61	4.3
Nitrogen Oxides ^d . .	136	103	122	-1.1
Carbon Dioxide ^d . . .	27,544	26,633	31,271	1.3

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

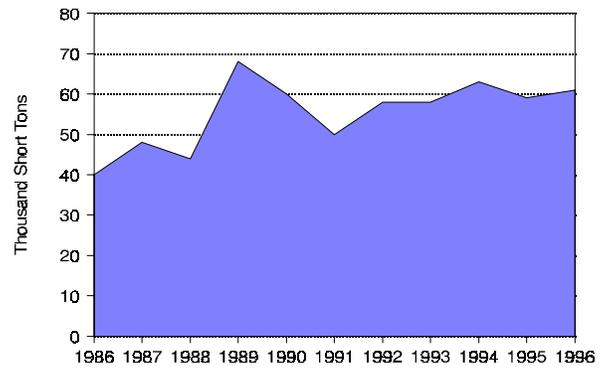


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

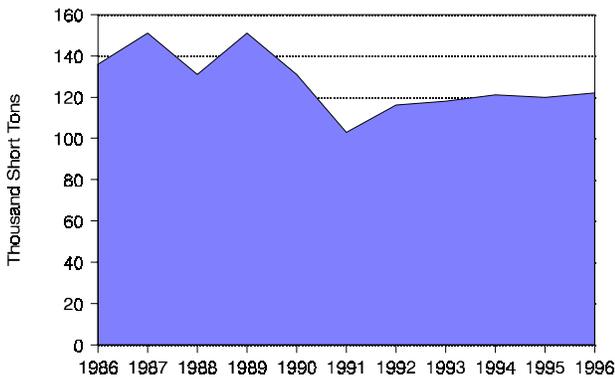


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

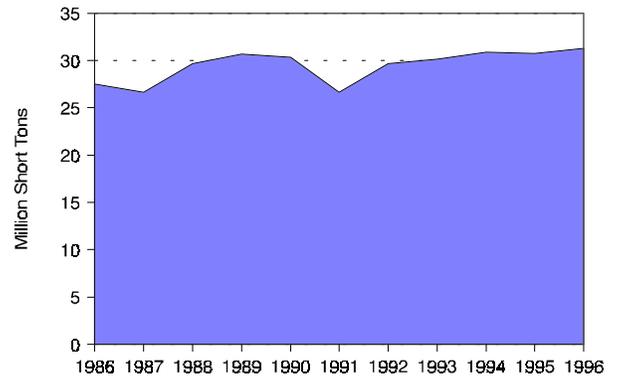


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	3,143,717	3,665,112	4,328,452	3.2	26.4	26.0	25.2
Commercial	3,802,181	4,532,876	5,295,854	3.4	31.9	32.2	30.8
Industrial . . .	3,902,152	4,546,441	5,920,823	4.3	32.8	32.3	34.5
Other	1,052,833	1,339,515	1,628,264	4.5	8.8	9.5	9.5
Total	11,900,888	14,083,944	17,173,393	3.7	100.0	100.0	100.0

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	4	7	2	20	33
Number of Retail Customers	436,672	54,195	5,702	128,664	625,233
Retail Sales (MWh)	8,579,909	864,336	188,270	2,268,373	11,900,888
Percentage of Retail Sales	72.1	7.3	1.6	19.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	806,366	83,217	5,357	243,955	1,140,454
Percentage of Revenue	70.7	7.3	0.6	21.4	100.0
1991					
Number of Utilities	4	8	1	20	33
Number of Retail Customers	482,696	63,802	4	140,690	687,192
Retail Sales (MWh)	10,205,063	1,268,559	117,926	2,492,396	14,083,944
Percentage of Retail Sales	72.5	9.0	0.8	17.7	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	817,032	97,850	2,316	212,016	1,129,501
Percentage of Revenue	72.3	8.7	0.2	18.8	100.0
1996					
Number of Utilities	4	8	1	20	33
Number of Retail Customers	547,430	69,521	5	162,478	779,434
Retail Sales (MWh)	12,243,814	1,434,702	178,185	3,316,692	17,173,393
Percentage of Retail Sales	71.3	8.4	1.0	19.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	825,999	102,203	3,864	228,527	1,160,593
Percentage of Revenue	71.2	8.8	0.3	19.7	100.0

New York

The history of the State of New York is full of major milestones in the development of the electric power industry. The first practical generator in the United States began operation in Ithaca in 1875 and was used to provide lighting for Cornell University.¹ On September 4, 1882, three years after the invention of the incandescent lamp,² Thomas Edison opened the Pearl Street Station in downtown New York City,³ an event which marked the beginning of the electric utility industry. In 1896, the AC transmission line from Niagara Falls to Buffalo opened, providing the blue print for future development of U.S. transmission and distribution systems and marking the beginning of the hydroelectric power industry.

New York had the third largest population and the fifth largest utility generating capability in 1996. New York's electricity capability, generation, and consumption encompass a diverse mixture of fuel sources. The largest share of electricity generated in New York comes from nuclear plants. The largest share of capability (38 percent) is fired by oil, while the largest share of utility generation and energy consumed at electric utilities (33 percent) comes from nuclear plants. The State is also reliant upon their rapidly growing nonutility generation. Two of the four largest plants in the State, oil-fired Ravenswood and Astoria, are found within New York City. Both of these plants are operated by Consolidated Edison, the largest utility in the State. The average price of electricity in New York, 11.13 cents per kilowatthour, was the third highest in the Nation.

The Clean Air Act Amendments of 1990 specified 2,408 megawatts of nameplate capacity at five New York plants to begin compliance with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x). As a result, emissions of SO₂ in 1996 were lower than they were in 1986. It is likely that New York will need to design a State implementation plan for reducing ground-level ozone in response to a proposal released by the Environmental Protection Agency (EPA) in

in October 1998. The EPA proposal does not mandate which sources must reduce pollution. However, EPA states that utilities would be one of the most likely sources of NO_x emissions reductions. New York is also part of the Ozone Transport Commission (OTC).⁴ Each of the thirteen States of the OTC is responsible for enacting regulations in order to achieve region-wide NO_x reductions in a consistent, enforceable manner and for allocating its NO_x Budget Program allowances among NO_x sources in the State. The targets in this program are large industrial boilers and all electricity generating facilities with a rated output of 15 megawatts or more.

In May 1996, the New York Public Service Commission (PSC) issued its decision to restructure New York's electric power industry. In its Competitive Opportunities Case, the PSC expressed their desire to have a competitive wholesale market by 1997, and a competitive retail market by early 1998. Electric utilities were required to submit restructuring plans by October 1996. The Case also had the provision that utilities should have a reasonable opportunity to recover stranded costs which, in the State of New York, are very high due mostly to the number of nuclear plants. In February 1998, a bill was introduced to provide an alternative deregulation plan to the PSC, arguing that the PSC plan as written does not go far enough to protect consumers. In June 1998, the PSC set rules for a systems benefit charge to fund research and development related to energy service, storage, generation, renewables, pilot programs for energy management for low-income consumers, and environmental protection.⁵ The New York Power Pool (NYPP) has filed with the Federal Energy Regulatory Commission to form an independent system operator (ISO) and a power exchange to serve the competitive wholesale market in New York. The NYPP ISO and marketplace will be tested beginning January 5, 1999 through the end of March. They are hoping to be officially up and running by April 1999.

¹ Jack Riley, *Carolina Power and Light Company, 1908-1958*, Edwards and Broughton (Raleigh, NC, 1977), p. 4.

² *1995 World Almanac*, St. Martin's Press (Mahwah, NJ, 1994), p. 175.

³ Energy Information Administration, *The Changing Structure of the Electric Power Industry*, DOE/EIA-0562(96) (Washington, DC, December 1996), p. 105.

⁴ The Ozone Transport Region comprises the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Delaware, the northern counties of Virginia, and the District of Columbia.

⁵ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

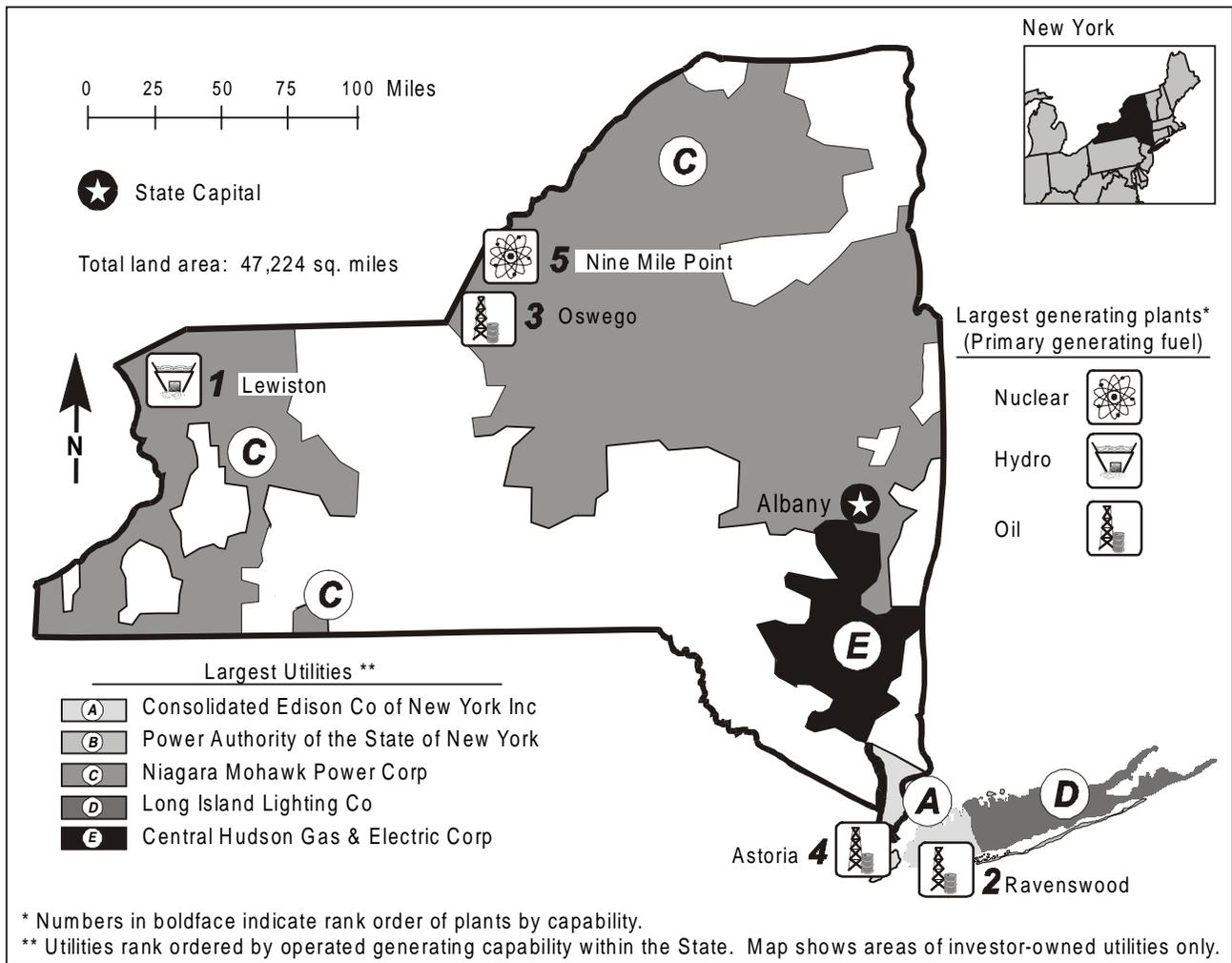


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		NPCC	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	30,060	6
State Primary Generating Fuel		Nuclear	Generation (MWh)	104,360,081	10
Population (as of 7/96)	18,134,226	3	Average Age of Coal Plants	35 years	
Average Revenue (cents/kWh)	11.13	^a 49	Average Age of Oil-fired Plants	26 years	
Industry			Average Age of Gas-fired Plants	30 years	
Capability (MWe)	35,712	^b 5	Average Age of Nuclear Plants	20 years	
Generation (MWh)	135,820,641	^b 7	Average Age of Hydroelectric Plants	37 years	
Capability/person			Average Age of Other Plants	--	
(KWe/person)	1.97	^b 40	Nonutility^c		
Generation/person			Capability (MWe)	5,652	3
(MWh/person)	7.49	^b 40	Percentage Share of Capability	15.8	8
Sulfur Dioxide Emissions			Generation (MWh)	31,460,560	3
(Thousand Short Tons)	268	17	Percentage Share of Generation	23.2	8
Nitrogen Oxide Emissions					
(Thousand Short Tons)	159	20	-- = Not applicable.		
Carbon Dioxide Emissions					
(Thousand Short Tons)	66,346	14			
Sulfur Dioxide/sq. mile (Tons)	5.68	23			
Nitrogen Oxides/sq. mile (Tons)	3.37	25			
Carbon Dioxide/sq. mile (Tons)	1,404.92	22			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capacity (MWe)
1. Lewiston	Hydro	Power Authority of State of NY	2,400
2. Ravenswood	Oil/Gas	Consolidated Edison Co-NY Inc	2,170
3. Oswego	Oil	Niagara Mohawk Power Corp	1,724
4. Astoria	Oil/Gas	Consolidated Edison Co-NY Inc	1,709
5. Nine Mile Point	Nuclear	Niagara Mohawk Power Corp	1,662

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Consolidated Edison Co-NY Inc . .	7,158	--	4,752	1,475	931	--
B. Power Authority of State of NY . .	7,021	--	825	136	1,790	4,270
C. Niagara Mohawk Power Corp	5,731	1,344	1,726	385	1,662	615
D. Long Island Lighting Co	4,061	--	2,100	1,961	--	--
E. Central Hudson Gas & Elec Corp	1,795	364	1,385	--	--	46
Total	25,766	1,708	10,788	3,957	4,383	4,931
Percentage of Industry Capability	72.1	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

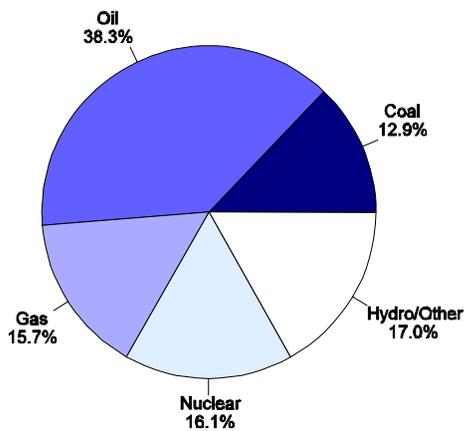


Figure 2. Utility Generation by Primary Energy Source, 1996

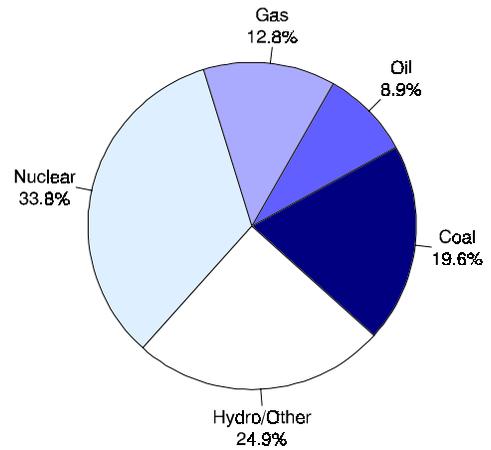


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

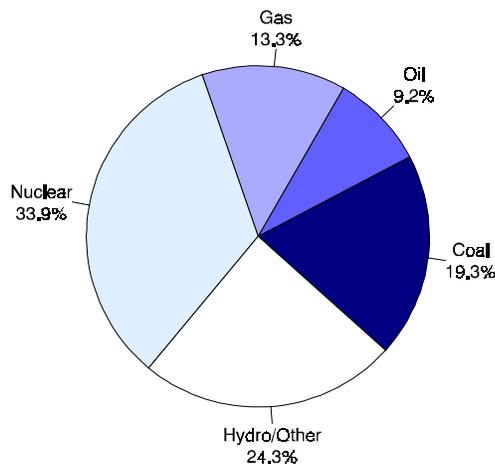


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	3,077	3,897	3,891	10.1	11.8	10.9
Oil	12,087	9,869	11,500	39.8	29.9	32.2
Gas	5,813	7,634	4,718	19.1	23.1	13.2
Nuclear	3,694	4,866	4,853	12.1	14.7	13.6
Hydro/Other	5,105	5,084	5,097	16.8	15.4	14.3
Total Utility	29,776	31,349	30,060	97.9	95.0	84.2
Total Nonutility	629	1,646	5,652	2.1	5.0	15.8
Industry	30,405	32,995	35,712	100.0	100.0	100.0

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	15,349,131	24,938,199	20,444,407	13.4	18.6	15.1
Oil	31,910,616	27,753,893	9,324,758	27.8	20.7	6.9
Gas	12,470,911	20,030,696	13,355,011	10.9	14.9	9.8
Nuclear	22,084,475	28,448,293	35,225,806	19.3	21.2	25.9
Hydro/Other	29,479,739	24,905,749	26,010,099	25.7	18.6	19.2
Total Utility	111,294,872	126,076,830	104,360,081	97.1	94.0	76.8
Total Nonutility	3,378,219	8,020,630	31,460,560	2.9	6.0	23.2
Industry	114,673,091	134,097,460	135,820,641	100.0	100.0	100.0

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.160	0.254	0.213	13.1	17.6	14.8
Oil	0.335	0.287	0.101	27.4	19.9	7.0
Gas	0.138	0.218	0.147	11.3	15.1	10.2
Nuclear	0.238	0.306	0.374	19.5	21.2	26.0
Hydro/Other	0.308	0.258	0.268	25.2	17.9	18.6
Total Utility	1.181	1.323	1.103	96.5	91.6	76.6
Total Nonutility	0.043	0.121	0.338	3.5	8.4	23.4
Industry	1.224	1.444	1.441	100.0	100.0	100.0

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

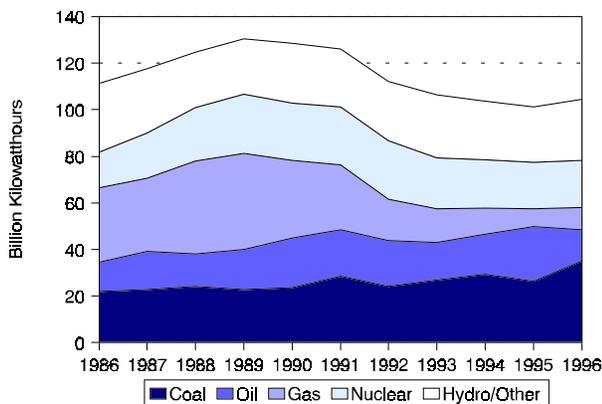


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

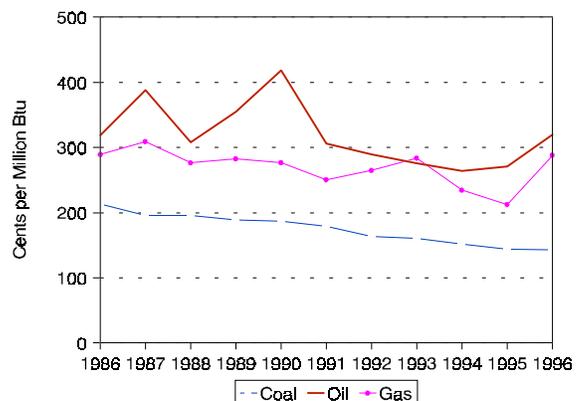


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	212.9	179.1	142.8	-3.9
Oil	318.9	305.6	319.2	0.0
Gas	289.1	250.4	287.9	(s)

(s) = Nonzero percentage less than 0.05.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	382	413	268	-3.5
Nitrogen Oxides ^d . .	116	115	159	3.2
Carbon Dioxide ^d . . .	55,084	78,288	66,346	1.9

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

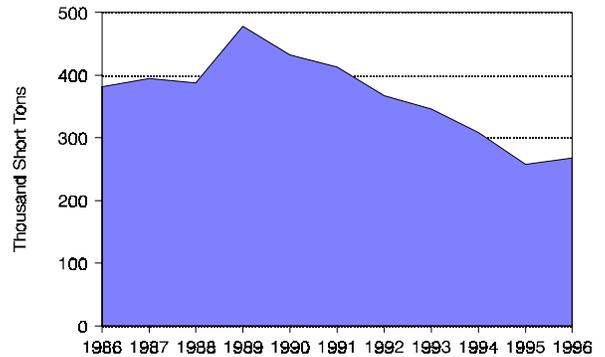


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

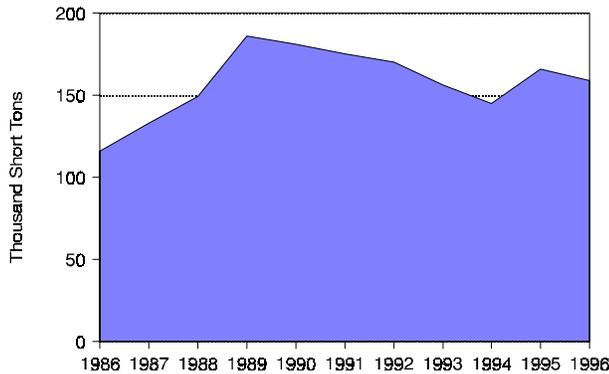


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

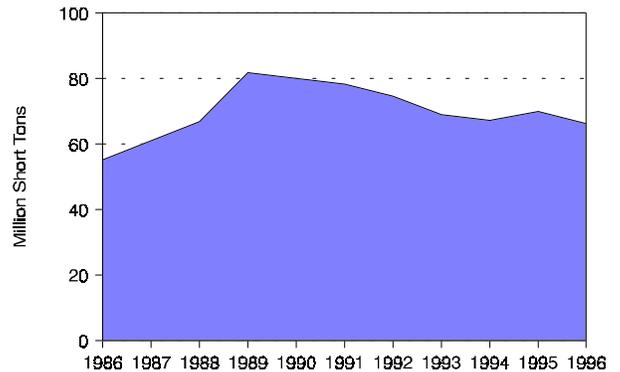


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	33,771,097	39,177,425	40,284,542	1.8	29.4	30.3	30.6
Commercial	42,201,589	46,981,962	52,915,305	2.3	36.7	36.3	40.2
Industrial . . .	28,106,715	31,111,530	25,947,477	-0.8	24.5	24.0	19.7
Other	10,828,958	12,140,050	12,379,862	1.3	9.4	9.4	9.4
Total	114,908,359	129,410,967	131,527,186	1.4	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

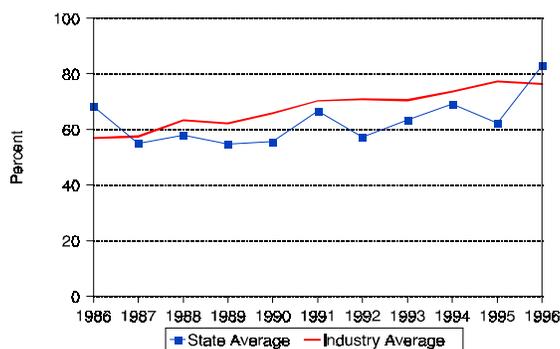


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	12	49	--	4	65
Number of Retail Customers	6,632,032	144,166	--	11,584	6,787,782
Retail Sales (MWh)	99,086,706	15,701,661	--	119,992	114,908,359
Percentage of Retail Sales	86.2	13.7	--	0.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	12,180,966	891,713	--	9,751	13,082,430
Percentage of Revenue	93.1	6.8	--	0.1	100.0
1991					
Number of Utilities	10	48	--	4	62
Number of Retail Customers	7,006,005	151,649	--	13,311	7,170,965
Retail Sales (MWh)	112,596,079	16,675,281	--	139,607	129,410,967
Percentage of Retail Sales	87.0	12.9	--	0.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	13,325,742	896,791	--	12,355	14,234,888
Percentage of Revenue	93.6	6.3	--	0.1	100.0
1996					
Number of Utilities	10	48	--	4	62
Number of Retail Customers	7,197,479	157,451	--	15,126	7,370,056
Retail Sales (MWh)	114,383,703	16,983,839	--	159,644	131,527,186
Percentage of Retail Sales	87.0	12.9	--	0.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	13,676,640	944,007	--	12,845	14,633,492
Percentage of Revenue	93.5	6.5	--	0.1	100.0

-- = Not applicable.

North Carolina

In 1881, the first electric power generation in North Carolina took place in Salem. On October 19, 1885, the Thomson-Houston Electric Light Company began operations in Raleigh. The first lights were turned on in Raleigh on December 3, 1885. By as early as 1908, Carolina Power and Light had two hydroelectric plants, a one-megawatt steam plant, and a three-quarter-megawatt steam plant.¹

North Carolina had the eleventh largest population and utility generating capability in the Nation in 1996. Most of the electricity in the State is generated at coal-fired plants. Most of the coal (62.8 percent) delivered to electric utilities in North Carolina was shipped by rail from Kentucky. Another 32 percent came from West Virginia and 5.2 percent from Virginia, mostly by rail.² North Carolina is also very reliant on nuclear power and the nuclear facilities in the State are considered some of the best run in the country. Three of the five largest plants in the State, including the largest, Roxboro, are coal-fired. The other two are the McGuire and Brunswick nuclear plants. The largest utility in the State is the Duke Power Company, which is the fourth largest utility in the country and the largest utility presence in South Carolina as well.

While concentrations of sulfur dioxide (SO₂), nitrogen oxides (NO_x), and carbon dioxide (CO₂) per square mile were rather high compared to the other States, no generators within North Carolina were targeted by the Clean Air Act Amendments of 1990 to reduce their emissions. SO₂ totals rose from 1986 to 1991 and then again in 1996. NO_x emission totals were the same in 1986 and 1991 but increased in 1996. CO₂ emissions rose over both time frames. It is likely that North Carolina will need to design a State implementation plan for reducing ground-level ozone in response to a proposal released by the Environmental Protection Agency (EPA) in October 1998. The EPA proposal does not

mandate which sources must reduce pollution. However, EPA states that utilities would be one of the most likely sources of NO_x emissions reductions.

In 1996, the average price of electricity in North Carolina, 6.53 cents per kilowatt-hour, was just under the average price of 6.86 for the Nation. The average price in North Carolina for the residential sector was 8.05, for the commercial sector was 6.39, for the industrial sector was 4.79, and for the "other" sector was 7.02. (The other sector includes public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.)³ As is typical of a southern State due mainly to the frequent use of air conditioning, North Carolina's residential sector use of electricity is very high. The average annual growth rate in utility retail sales to all sectors was 3.4 percent during the period 1986 to 1996 with the commercial sector having the highest annual growth rate of 4.7 percent.

Both coal-fired generating capability and net generation decreased during the period 1986 to 1996 while nuclear generating capability and net generation increased. The nonutility share of electricity generated in North Carolina rose from 4.8 percent of the total in 1986 to 8.5 percent in 1996. The State is the tenth largest in the Nation in terms of nonutility capability.

North Carolina has not been as aggressive as a lot of other States in moving to restructure its electricity industry. In April of 1997, a bill was passed that established a 23-member commission on restructuring which is to deliver a report by 1999 to the State legislature. In order to protect the economy of North Carolina and its cities, mayors and city officials have urged the legislature to pass restructuring legislation to prevent large industrial users from relocating to other States in order to attain lower electricity prices.⁴

¹ Jack Riley, *Carolina Power and Light Company, 1908-1958*, Edwards and Broughton (Raleigh, NC, 1958), p. 63.

² Energy Information Administration, *Coal Distribution January-December 1996*, DOE/EIA-0125(96/4Q) (Washington, DC), Table 34.

³ Energy Information Administration, *Electric Power Annual 1996 Volume II*, DOE/EIA-0348(96)/2 (Washington, DC, December 1997), Table 7.

⁴ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

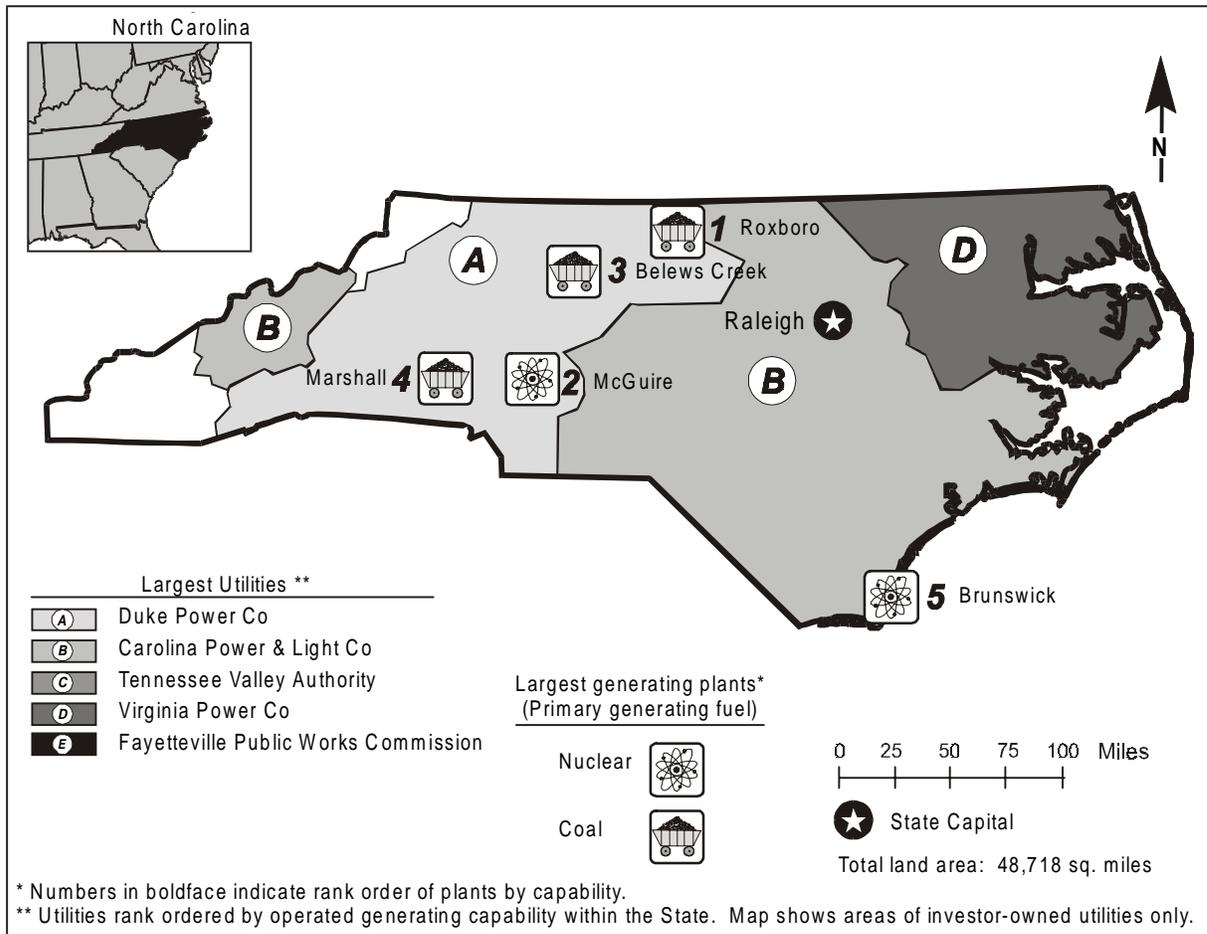


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		SERC	Utility		
Net Exporter or Importer		Importer	Capacity (MWe)	20,923	11
State Primary Generating Fuel		Coal	Generation (MWh)	102,786,590	11
Population (as of 7/96)	7,309,055	11	Average Age of Coal Plants	28 years	
Average Revenue (cents/kWh)	6.53	^a 31	Average Age of Oil-fired Plants	26 years	
Industry			Average Age of Gas-fired Plants	4 years	
Capacity (MWe)	22,773	^b 11	Average Age of Nuclear Plants	15 years	
Generation (MWh)	112,358,955	^b 11	Average Age of		
Capacity/person			Hydroelectric Plants	48 years	
(KWe/person)	3.12	^b 19	Average Age of Other Plants . . .	--	
Generation/person			Nonutility^c		
(MWh/person)	15.37	^b 18	Capacity (MWe)	1,850	10
Sulfur Dioxide Emissions			Percentage Share of Capacity	8.1	19
(Thousand Short Tons)	490	12	Generation (MWh)	9,572,365	11
Nitrogen Oxide Emissions			Percentage Share of Generation	8.5	21
(Thousand Short Tons)	238	12	-- = Not applicable.		
Carbon Dioxide Emissions					
(Thousand Short Tons)	83,496	12			
Sulfur Dioxide/sq. mile (Tons)	10.06	14			
Nitrogen Oxides/sq. mile (Tons)	4.89	17			
Carbon Dioxide/sq. mile (Tons)	1,713.86	16			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Roxboro	Coal	Carolina Power & Light Co	2,477
2. McGuire	Nuclear	Duke Power Co	2,258
3. Belews Creek	Coal	Duke Power Co	2,240
4. Marshall	Coal	Duke Power Co	2,090
5. Brunswick	Nuclear	Carolina Power & Light Co	1,521

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996 (Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Duke Power Co	11,587	7,329	298	1,200	2,258	502
B. Carolina Power & Light Co	8,169	5,111	431	28	2,381	218
C. Tennessee Valley Authority	406	--	--	--	--	406
D. Virginia Power Co	365	--	44	--	--	321
E. Fayetteville Public Works Comm	286	--	--	286	--	--
Total	20,813	12,440	773	1,514	4,639	1,447
Percentage of Industry Capability	91.4	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

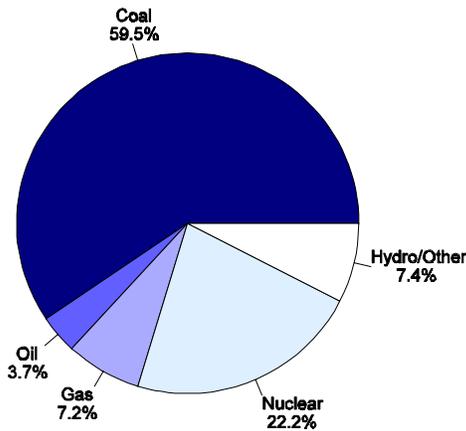


Figure 2. Utility Generation by Primary Energy Source, 1996

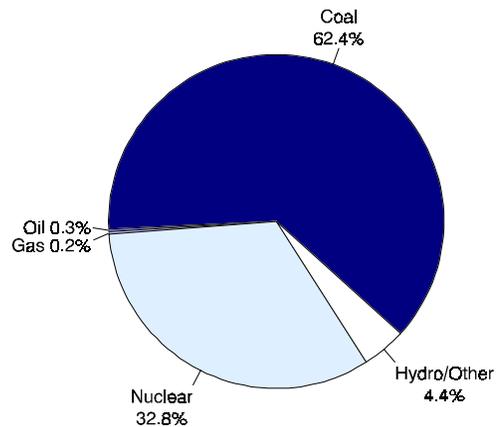


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

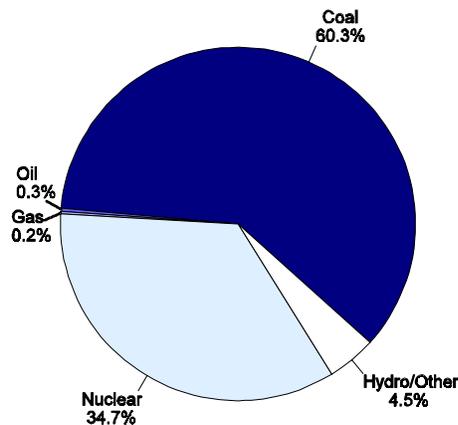


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	12,366	12,500	12,440	62.8	58.9	54.6
Oil	574	773	776	2.9	3.6	3.4
Gas	390	257	1,514	2.0	1.2	6.6
Nuclear	3,880	4,639	4,639	19.7	21.9	20.4
Hydro/Other	1,862	1,962	1,554	9.5	9.2	6.8
Total Utility	19,072	20,131	20,923	96.8	94.9	91.9
Total Nonutility	626	1,088	1,850	3.2	5.1	8.1
Industry	19,698	21,219	22,773	100.0	100.0	100.0

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	53,757,897	46,762,330	64,097,781	66.6	52.4	57.0
Oil	171,277	174,136	259,252	0.2	0.2	0.2
Gas	64,136	247,496	194,555	0.1	0.3	0.2
Nuclear	20,286,433	30,312,425	33,718,182	25.1	33.9	30.0
Hydro/Other	2,517,538	6,023,676	4,516,820	3.1	6.7	4.0
Total Utility	76,797,281	83,520,063	102,786,590	95.2	93.5	91.5
Total Nonutility	3,867,014	5,766,820	9,572,365	4.8	6.5	8.5
Industry	80,664,295	89,286,883	112,358,955	100.0	100.0	100.0

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.515	0.451	0.623	55.4	45.9	50.7
Oil	0.002	0.002	0.003	0.2	0.2	0.3
Gas	0.001	0.003	0.002	0.1	0.3	0.2
Nuclear	0.219	0.326	0.358	23.6	33.2	29.2
Hydro/Other	0.026	0.062	0.047	2.8	6.4	3.8
Total Utility	0.764	0.844	1.034	82.2	86.0	84.2
Total Nonutility	0.166	0.138	0.195	17.8	14.0	15.8
Industry	0.929	0.982	1.228	100.0	100.0	100.0

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

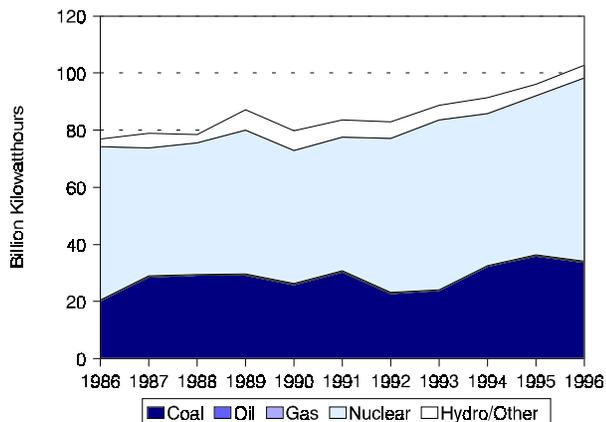


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

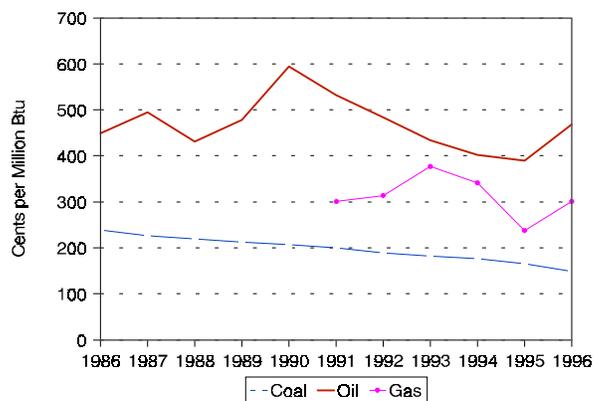


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	238.6	199.9	148.4	-4.6
Oil	449.6	532.2	468.2	0.4
Gas	--	300.7	300.5	--

-- = Not applicable.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	353	373	490	3.3
Nitrogen Oxides ^d . .	200	200	238	1.8
Carbon Dioxide ^d . . .	52,772	59,871	83,496	4.7

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

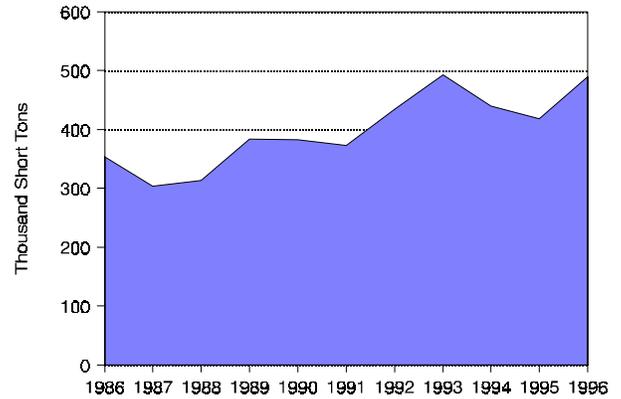


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

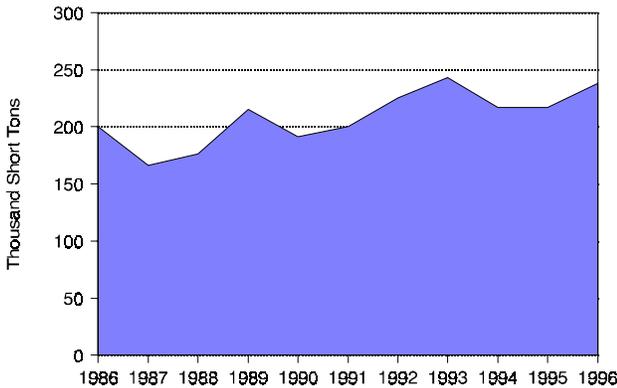


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

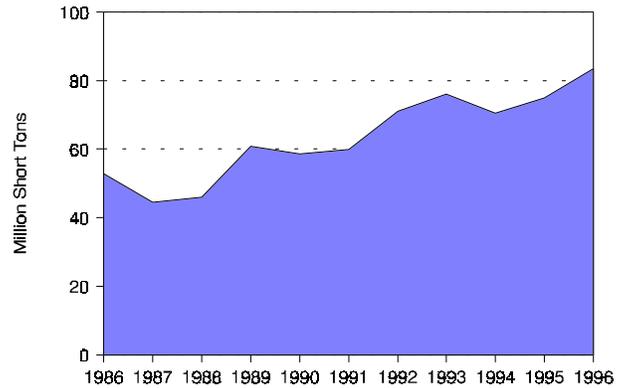


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	29,505,698	34,390,834	41,591,843	3.5	38.1	37.3	38.4
Commercial	19,305,737	24,675,721	30,662,155	4.7	24.9	26.7	28.3
Industrial . . .	27,071,812	31,514,220	34,141,749	2.3	35.0	34.1	31.5
Other	1,552,340	1,735,708	1,900,647	2.0	2.0	1.9	1.8
Total	77,435,595	92,316,483	108,296,394	3.4	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

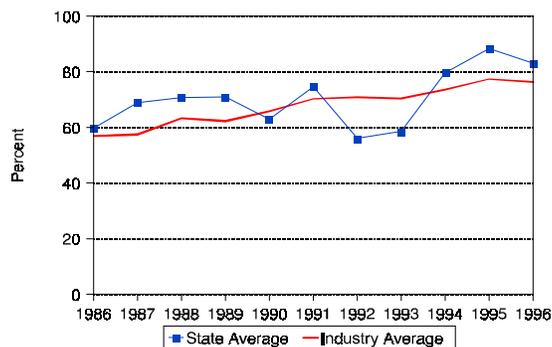


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	5	72	1	32	110
Number of Retail Customers	1,963,703	415,131	5	539,076	2,917,915
Retail Sales (MWh)	61,095,797	9,544,268	5,038	6,790,492	77,435,595
Percentage of Retail Sales	78.9	12.3	(s)	8.8	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	4,684,529	818,126	249	650,421	6,153,398
Percentage of Revenue	76.1	13.3	(s)	10.6	100.0
1991					
Number of Utilities	5	72	1	32	110
Number of Retail Customers	2,222,528	451,697	4	627,965	3,302,194
Retail Sales (MWh)	72,627,416	11,187,922	6,023	8,495,122	92,316,483
Percentage of Retail Sales	78.7	12.1	(s)	9.2	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	4,933,590	952,916	319	826,336	6,713,200
Percentage of Revenue	73.5	14.2	(s)	12.3	100.0
1996					
Number of Utilities	4	72	1	32	109
Number of Retail Customers	2,480,121	485,622	5	728,175	3,693,923
Retail Sales (MWh)	83,955,414	13,048,400	7,840	11,284,740	108,296,394
Percentage of Retail Sales	77.5	12.1	(s)	10.4	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	5,070,291	1,031,452	237	972,571	7,074,551
Percentage of Revenue	71.7	14.6	(s)	13.8	100.0

(s) = Nonzero percentage less than 0.05.

North Dakota

Most of the electricity in North Dakota (90 percent) is generated at coal-fired power plants. The four largest plants in the State, including the largest, Antelope Valley, are coal-fired. North Dakota is also reliant on its only hydroelectric power plant, Garrison, which is the fifth largest plant in the State, for 10 percent of its electricity. These five largest power plants are all located in the vicinity of Bismarck in the central part of the State. The largest utility is the Basin Electric Power Cooperative. The State enjoys the sixteenth lowest-cost retail electricity, with an average revenue per kilowatthour of 5.65 cents, below the national average of 6.89 cents.

No North Dakota generating units are required to begin compliance with the stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x) in Title IV of the Clean Air Act Amendments of 1990. North Dakota's emissions of SO₂, NO_x, and carbon dioxide ranked about in the middle of all of the States in the Nation in 1996, and contributed about 1 percent of the national total of each pollutant.

The investor-owned utilities in North Dakota (Otter Tail Power, Northern States Power, and Montana-Dakota Utilities) sell more than 50 percent of retail electricity in the State. Basin Electric Cooperative, Coop Power Association, and Minnkota Power, major cooperative generation suppliers, and the U.S. Army Corps of Engineers (USCE) provide most of the rest of the State's electric power. Net generation in North Dakota exceeds retail sales, decreasing the necessity of importing higher priced power from other regions.

The North Dakota Public Service Commission (PSC) opened a generic investigation into the restructuring of

their electric power industry in February 1996. An order was issued in September 1996 to continue the study of restructuring and its implications. Stated in the order was "Restructuring efforts are normally pursued when prices become too high or the service is unacceptable. Neither is the case in North Dakota." After public hearings and comments, the PSC concluded that restructuring was not an immediate need. However, they felt that they should continue to study the issues to be prepared in the event that a Federal mandate is passed or all other States adopt retail competition. In February 1997, the PSC adopted the National Association of Regulatory Utility Commissioners principles to serve as a guide to possible restructuring. Two general principals stress that restructuring should occur when two specific goals are met: improved economic efficiency and serving the broader public interest.

A joint legislative committee was created in March 1997 to investigate restructuring. The 6-year standing committee is required to study and make recommendations for the 1999 legislative session. The committee began a series of meetings in July 1997. Discussions have included tax implications of restructuring; rates of investor-owned and cooperative utilities; impacts of competition on generation, transmission, and distribution of electricity; proposed Federal legislation; the Federal Energy Regulatory Commission wholesale competition orders; energy efficiency and low-income programs; and the current tax structure for the State's investor-owned utilities. Tax issues have been a major focus of study, and legislation may be introduced in 1999 to address them. A final report from the committee was due in late 1998.¹

¹ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

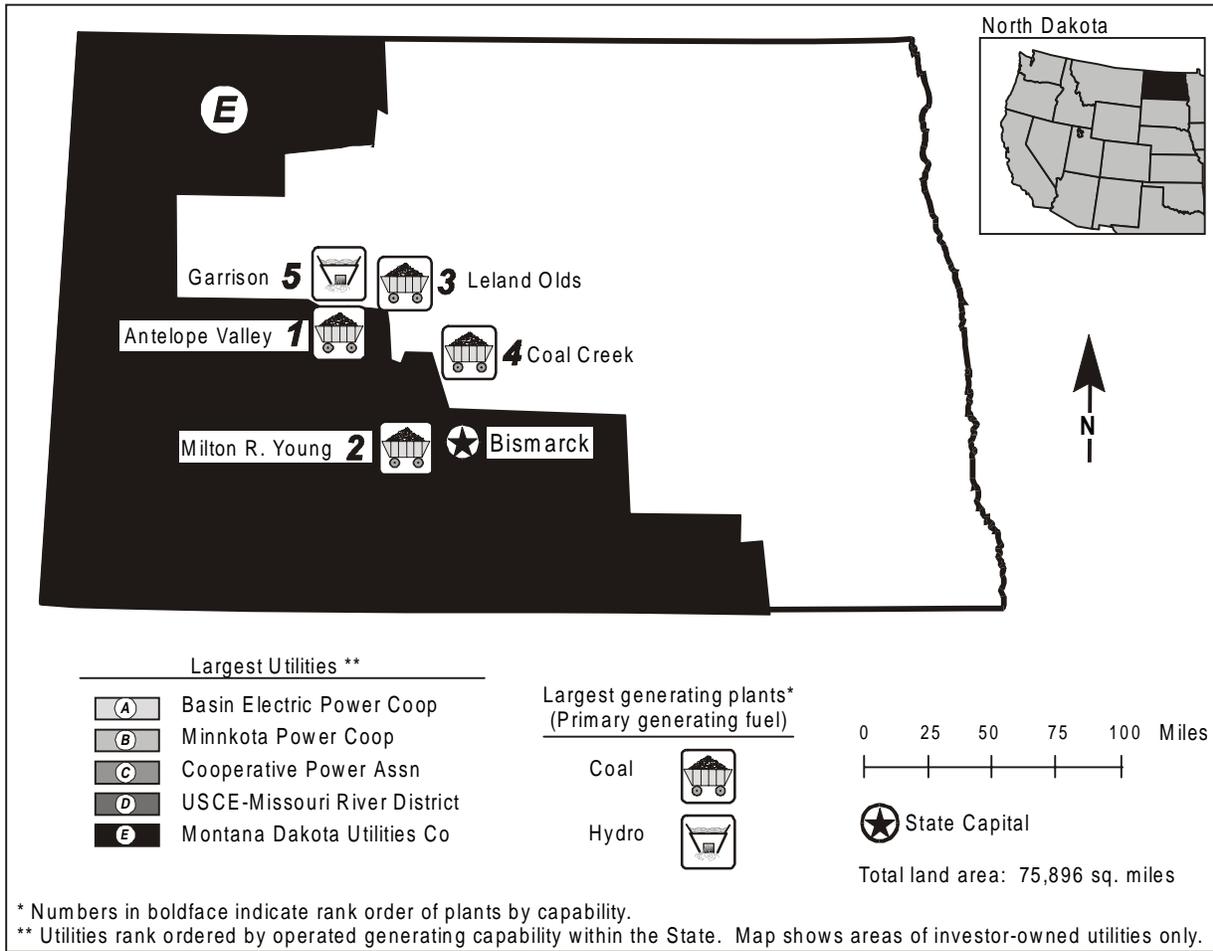


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		MAPP	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	4,207	41
State Primary Generating Fuel		Coal	Generation (MWh)	30,769,712	33
Population (as of 7/96)	642,633	47	Average Age of Coal Plants	19 years	
Average Revenue (cents/kWh)	5.65	^a 16	Average Age of Oil-fired Plants	27 years	
Industry			Average Age of Gas-fired Plants	43 years	
Capability (MWe)	W	^b W	Average Age of Nuclear Plants	--	
Generation (MWh)	W	^b W	Average Age of Hydroelectric Plants	39 years	
Capability/person (KWe/person)	W	^b W	Average Age of Other Plants	--	
Generation/person (MWh/person)	W	^b W	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	139	22	Capability (MWe)	W	W
Nitrogen Oxide Emissions (Thousand Short Tons)	113	30	Percentage Share of Capability	W	W
Carbon Dioxide Emissions (Thousand Short Tons)	34,459	31	Generation (MWh)	W	W
Sulfur Dioxide/sq. mile (Tons)	2.01	29	Percentage Share of Generation	W	W
Nitrogen Oxides/sq. mile (Tons)	1.64	34			
Carbon Dioxide/sq. mile (Tons)	499.45	34			

-- = Not applicable. W = Withheld.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Antelope Valley	Coal	Basin Electric Power Coop	900
2. Milton R Young	Coal	Minnkota Power Coop Inc	670
3. Leland Olds	Coal	Basin Electric Power Coop	650
4. Coal Creek	Coal	Coop Power Assn	605
5. Garrison	Hydro	USCE-Missouri River District	545

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Basin Electric Power Coop	1,550	1,550	--	--	--	--
B. Minnkota Power Coop Inc	685	670	15	--	--	--
C. Coop Power Assn	605	604	1	--	--	--
D. USCE-Missouri River District	545	--	--	--	--	545
E. Montana-Dakota Utilities Co	533	523	--	10	--	0
Total	3,918	3,347	16	10	--	545
Percentage of Utility Capability	93.1	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

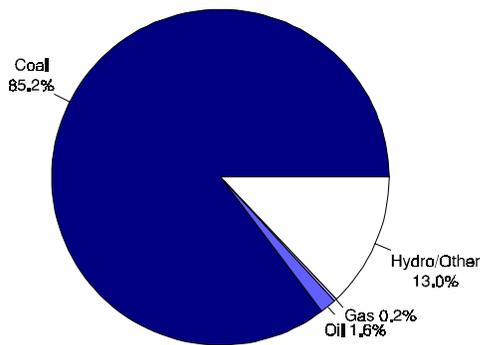


Figure 2. Utility Generation by Primary Energy Source, 1996

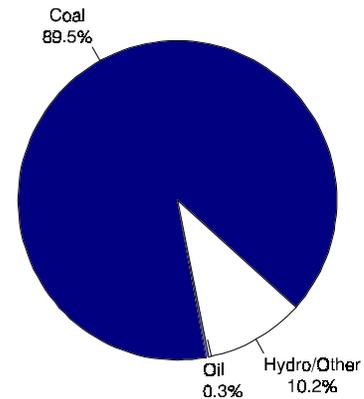


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

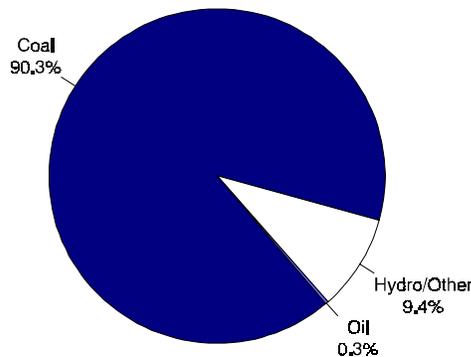


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	3,876	3,903	3,585	85.6	85.9	85.2
Oil	95	88	68	2.1	1.9	1.6
Gas	10	10	10	0.2	0.2	0.2
Nuclear	--	--	--	--	--	--
Hydro/Other	545	545	545	12.0	12.0	13.0
Total Utility	4,526	4,546	4,207	100.0	100.0	100.0
Total Nonutility	W	W	W	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	19,835,472	25,750,792	27,529,906	89.4	93.5	89.5
Oil	20,496	27,636	88,834	0.1	0.1	0.3
Gas	6	-78	99	(s)	(s)	(s)
Nuclear	--	--	--	--	--	--
Hydro/Other	2,326,291	1,756,684	3,150,873	10.5	6.4	10.2
Total Utility	22,182,265	27,535,034	30,769,712	100.0	100.0	100.0
Total Nonutility	W	W	W	--	--	--

-- =Not applicable. (s) = Nonzero percentage less than 0.05 if the value is positive and greater than -0.05 if value is negative. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.228	0.293	0.312	90.2	94.0	90.3
Oil	(s)	(s)	0.001	0.1	0.1	0.3
Gas	(s)	(s)	(s)	--	--	--
Nuclear	--	--	--	--	--	--
Hydro/Other	0.024	0.018	0.032	9.6	5.8	9.4
Total Utility	0.252	0.311	0.345	100.0	100.0	100.0
Total Nonutility	W	W	W	--	--	--

-- = Not applicable. (s) = Nonzero value less than 0.0005. W = Withheld.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

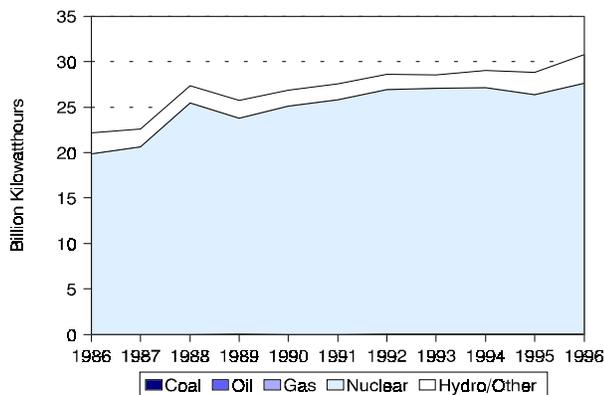


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

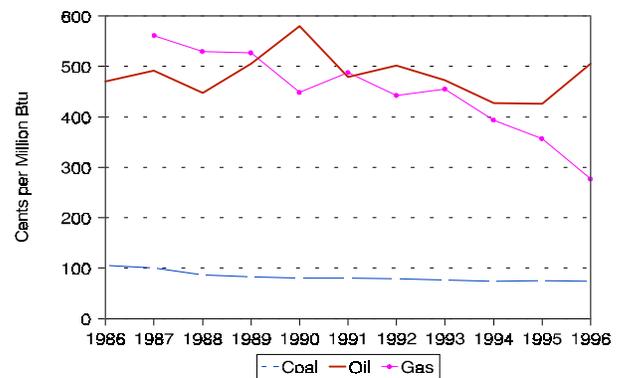


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	106.0	79.7	73.7	-3.6
Oil	470.5	478.9	505.1	0.7
Gas	--	487.7	276.6	--

-- = Not applicable.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	88	187	139	4.7
Nitrogen Oxides ^d ..	85	110	113	2.9
Carbon Dioxide ^d ..	25,516	32,026	34,459	3.1

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

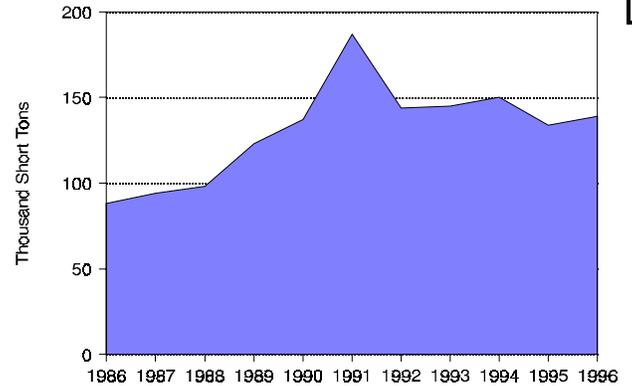


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

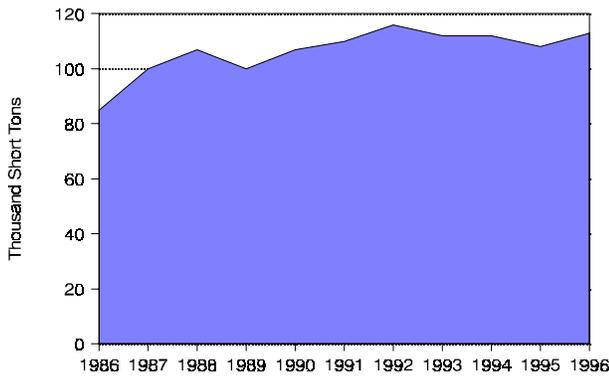


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

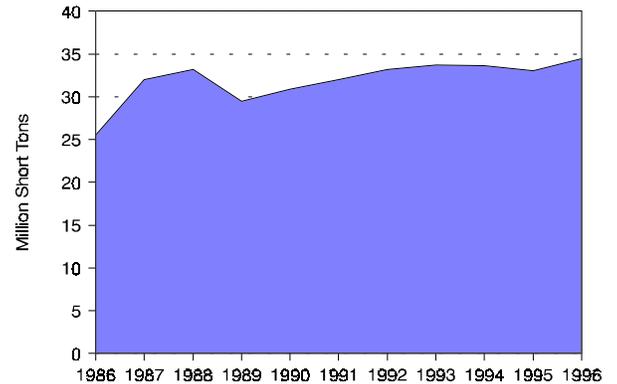


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential ..	2,953,892	3,096,207	3,601,630	2.0	43.1	42.7	43.3
Commercial	1,514,547	1,875,987	2,377,747	4.6	22.1	25.9	28.6
Industrial ...	1,890,301	1,762,080	1,835,276	-0.3	27.6	24.3	22.1
Other	490,072	520,927	499,506	0.2	7.2	7.2	6.0
Total	6,848,812	7,255,201	8,314,159	2.0	100.0	100.0	100.0

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	3	12	1	26	42
Number of Retail Customers	195,427	14,650	14	100,506	310,597
Retail Sales (MWh)	3,541,251	262,995	88,982	2,955,584	6,848,812
Percentage of Retail Sales	51.7	3.8	1.3	43.2	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	270,733	13,157	702	223,671	508,467
Percentage of Revenue	53.2	2.6	0.2	44.0	100.0
1991					
Number of Utilities	3	11	1	25	40
Number of Retail Customers	200,898	11,219	16	104,660	316,793
Retail Sales (MWh)	3,958,268	237,906	140,364	2,918,663	7,255,201
Percentage of Retail Sales	54.6	3.3	1.9	40.2	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	251,768	11,628	1,408	204,370	469,349
Percentage of Revenue	53.6	2.5	0.3	43.5	100.0
1996					
Number of Utilities	3	12	1	25	41
Number of Retail Customers	208,443	10,899	11	113,385	332,738
Retail Sales (MWh)	4,493,524	270,622	101,487	3,448,526	8,314,159
Percentage of Retail Sales	54.1	3.3	1.2	41.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	253,019	11,753	1,493	203,232	469,497
Percentage of Revenue	53.9	2.5	0.3	43.3	100.0

Ohio

Ohio had both the seventh largest population and utility generating capability, the latter of which is almost entirely fired by coal. All five of Ohio's largest plants are coal-fired. Four of the five lie along the Ohio River, including General J. M. Gavin, the largest. The State has no hydroelectric power capability, but does rely to a small degree on two nuclear power plants, Davis-Besse and Perry. The largest utility in the State in 1996 was the Cincinnati Gas and Electric Company. A significant amount of industry operates in the State and is reflected in the fact that over 46 percent of retail sales in Ohio goes to the industrial sector. During the period 1986 to 1996, the nonutility share of generation in Ohio remained stable at just over 1.0 percent of the State total. The average revenue for electric utilities in Ohio was 6.30 cents per kilowatthour, below the national average of 6.86 cents, but above the median price of 6.16 cents per kilowatthour (the price in Texas).

Coal is the most important mineral commodity in Ohio. Of the coal originating in Ohio in 1996, 79 percent was delivered to electric utilities within the State.¹ The coal reserves of Ohio are part of the Appalachian coal basin and consist entirely of high-sulfur bituminous coal.² That would certainly account for the fact that Ohio generators led the Nation in emissions of sulfur dioxide (SO₂) in 1996, accounting for more than 10 percent of the Nation's total SO₂ emissions. It also is the reason that 14,252 megawatts of nameplate capacity at 15 Ohio plants were targeted by the Clean Air Act Amendments of 1990 (CAAA90) to begin compliance with stricter emissions standards for SO₂ and nitrogen oxides (NO_x). No other State in the Nation had more nameplate capacity specified by the CAAA90. Emissions of both NO_x and carbon dioxide (CO₂) from Ohio generators ranked third in the Nation. While emissions of SO₂ and CO₂ in 1996 fell below the level seen in 1986, due mainly to CAAA90, NO_x emissions increased slightly during the

same time period. It is likely that Ohio will need to design a State implementation plan for reducing ground-level ozone in response to a proposal released by the U.S. Environmental Protection Agency (EPA) in October 1998. The EPA proposal does not mandate which sources must reduce pollution. However, EPA states that utilities would be one of the most likely sources of NO_x emissions reductions.

Although a restructuring study of Ohio's \$11 billion electricity industry was begun in early 1996, little progress has been made toward reaching a consensus plan. In March 1998, restructuring legislation was introduced (two identical bills introduced to each chamber) which would allow full retail competition beginning in 2000 and would set a five-year transition to full competition by December 2004. However, State education groups said the bills, which would also change Ohio's property tax code so that utilities would pay the same tax rate as other businesses, would cost school districts \$282 million in revenues. A study which was conducted to look into the tax matter found that replacing the existing property tax structure with a kilowatthour tax on distribution, while revenue-neutral on the bottom line, would shift tax streams away from local school districts, forcing them to pass tax levies or cut services. In August of 1998, in response to a request by the general assembly, the State's four major investor-owned utilities proposed a plan that calls for deregulation to start January 1, 2001, but freezes rates during a five-year transition period. Although most parties concerned with restructuring are eager to see legislation passed, the electricity deregulation bills introduced in 1998 were not acted upon. They will have to be reintroduced into the 1999 State assembly. Parties are optimistic that differences can be ironed out and that significant progress will be made early in the session.³

¹ Energy Information Administration, *Coal Distribution Report January-December 1996*, DOE/EIA-0125(96/4Q) (Washington, DC), Table 34.

² Energy Information Administration, *State Coal Profiles*, DOE/EIA-0576 (Washington, DC, January 1994), p. 71.

³ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/ch_str/tab5rev.html.

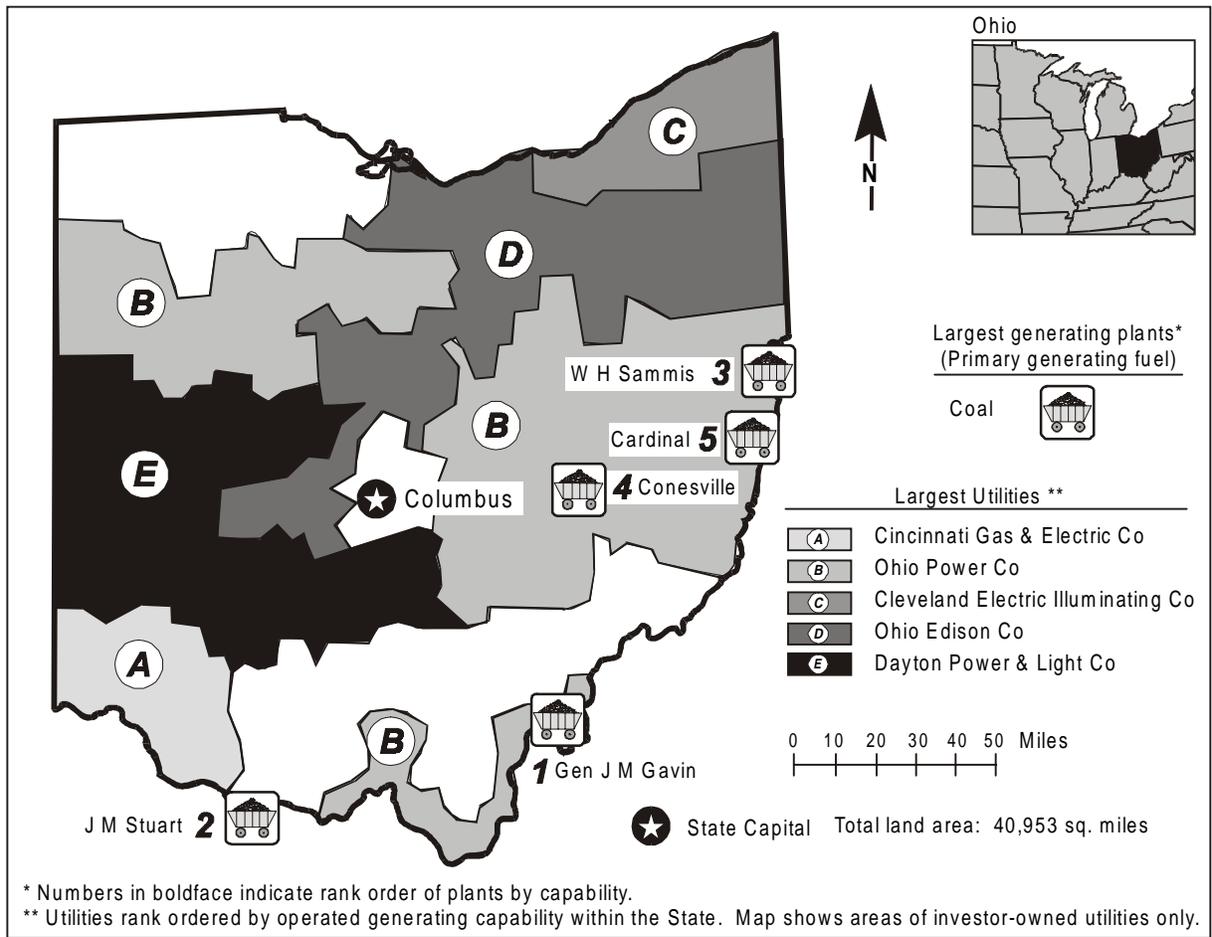


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		ECAR	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	27,278	7
State Primary Generating Fuel		Coal	Generation (MWh)	142,900,353	5
Population (as of 7/96)	11,162,797	7	Average Age of Coal Plants	28 years	
Average Revenue (cents/kWh)	6.30	^a 28	Average Age of Oil-fired Plants	24 years	
Industry			Average Age of Gas-fired Plants	17 years	
Capability (MWe)	27,613	^b 7	Average Age of Nuclear Plants	13 years	
Generation (MWh)	144,431,762	^b 6	Average Age of Hydroelectric Plants	14 years	
Capability/person (KWe/person)	2.47	^b 31	Average Age of Other Plants	13 years	
Generation/person (MWh/person)	12.94	^b 22	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	1,459	1	Capability (MWe)	335	34
Nitrogen Oxide Emissions (Thousand Short Tons)	571	3	Percentage Share of Capability	1.2	41
Carbon Dioxide Emissions (Thousand Short Tons)	144,353	3	Generation (MWh)	1,531,409	34
Sulfur Dioxide/sq. mile (Tons)	35.63	2	Percentage Share of Generation	1.1	41
Nitrogen Oxides/sq. mile (Tons)	13.94	5			
Carbon Dioxide/sq. mile (Tons)	3,524.85	7			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capacity (MWe)
1. Gen J M Gavin	Coal	Ohio Power Co	2,600
2. J M Stuart	Coal	Dayton Power & Light Co	2,340
3. W H Sammis	Coal	Ohio Edison Co	2,233
4. Conesville	Coal	Columbus Southern Power Co	1,925
5. Cardinal	Coal	Cardinal Operating Co	1,800

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Cincinnati Gas & Electric Co	4,598	3,661	369	568	--	--
B. Ohio Power Co	4,006	3,965	--	--	--	41
C. Cleveland Electric Illum Co	3,889	2,668	52	--	1,169	--
D. Ohio Edison Co	3,626	3,197	235	194	--	--
E. Dayton Power & Light Co	3,564	3,305	61	198	--	--
Total	19,683	16,796	717	960	1,169	41
Percentage of Industry Capability	71.3	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

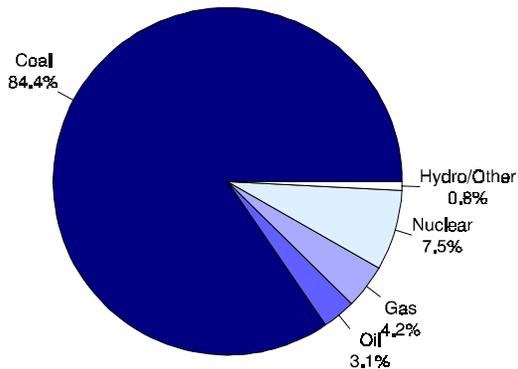


Figure 2. Utility Generation by Primary Energy Source, 1996

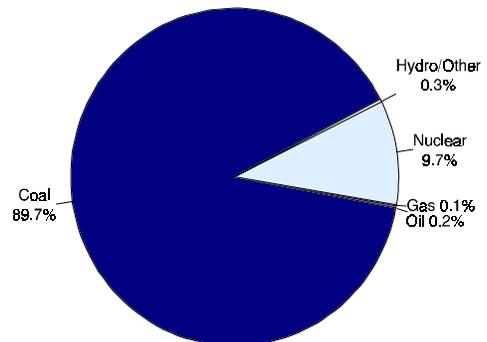


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

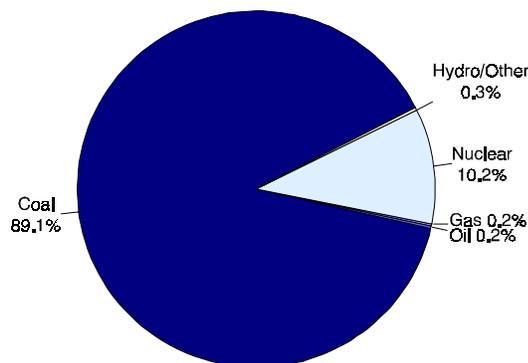


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	22,769	23,421	23,033	85.3	85.0	84.4
Oil	1,218	1,084	856	4.6	3.9	3.1
Gas	463	777	1,140	1.7	2.8	4.2
Nuclear	2,049	2,042	2,042	7.7	7.4	7.5
Hydro/Other	210	215	207	0.8	0.8	0.8
Total Utility	26,708	27,540	27,278	100.0	100.0	100.0
Total Nonutility	W	327	335	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	110,718,869	116,813,173	128,125,332	99.3	88.0	89.7
Oil	274,970	369,361	267,240	0.2	0.3	0.2
Gas	37,422	234,956	195,917	(s)	0.2	0.1
Nuclear	24,050	14,832,789	13,919,390	(s)	11.2	9.7
Hydro/Other	451,241	443,427	392,474	0.4	0.3	0.3
Total Utility	111,506,551	132,693,706	142,900,353	100.0	100.0	100.0
Total Nonutility	W	1,333,950	1,531,409	--	--	--

-- = Not applicable. (s) = Nonzero percentage less than 0.05. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	1.137	1.185	1.289	99.2	87.3	89.1
Oil	0.003	0.004	0.003	0.3	0.3	0.2
Gas	0.001	0.003	0.003	0.1	0.2	0.2
Nuclear	(s)	0.159	0.148	--	11.7	10.2
Hydro/Other	0.005	0.005	0.004	0.4	0.3	0.3
Total Utility	1.146	1.356	1.448	100.0	100.0	100.0
Total Nonutility	W	0.057	0.092	--	--	--

-- = Not applicable. (s) = Nonzero value less than 0.0005. W = Withheld.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

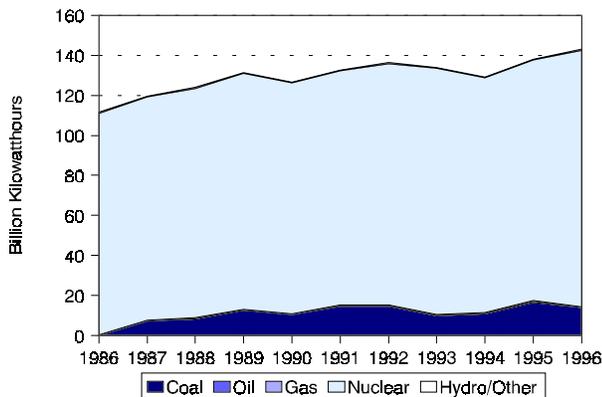


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

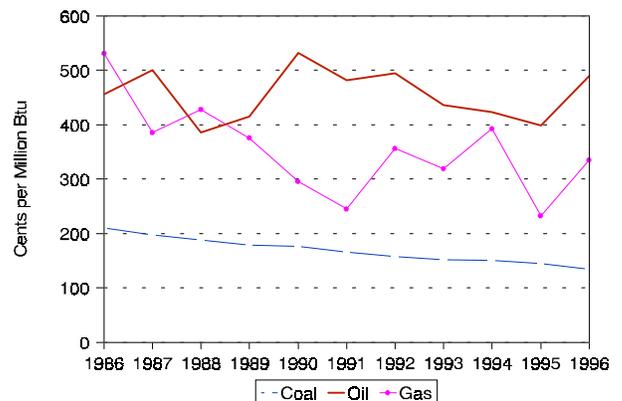


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	210.3	166.2	134.0	-4.4
Oil	455.7	481.8	489.6	0.7
Gas	602.7	244.9	335.0	-5.7

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	2,197	2,255	1,459	-4.0
Nitrogen Oxides ^d . .	530	554	571	0.7
Carbon Dioxide ^d . . .	145,002	129,416	144,353	0.0

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

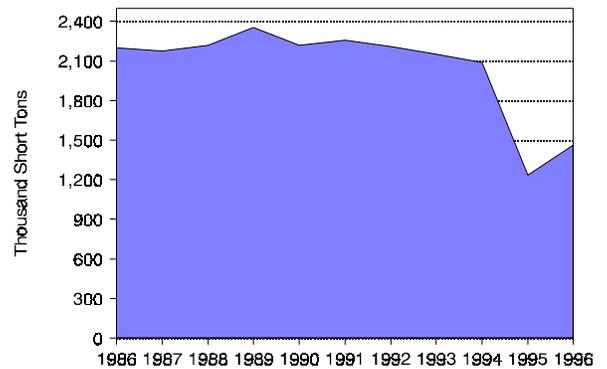


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

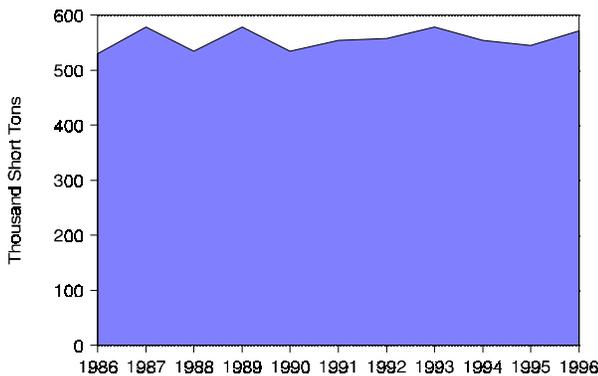


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

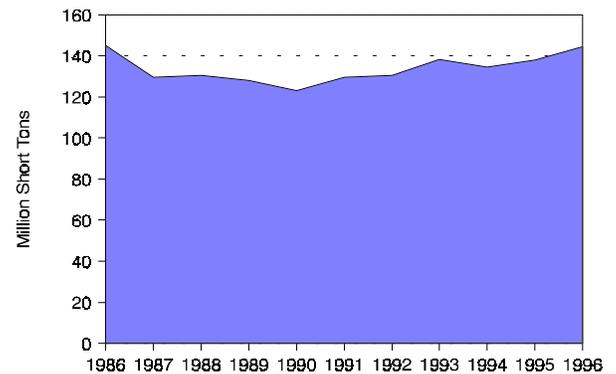


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	35,220,291	40,942,449	44,573,250	2.4	28.3	28.1	28.1
Commercial	26,431,390	32,325,493	36,034,487	3.1	21.3	22.2	22.7
Industrial . . .	58,497,270	67,856,138	73,394,154	2.3	47.1	46.6	46.3
Other	4,089,888	4,534,240	4,585,446	1.2	3.3	3.1	2.9
Total	124,238,842	145,658,320	158,587,337	2.5	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

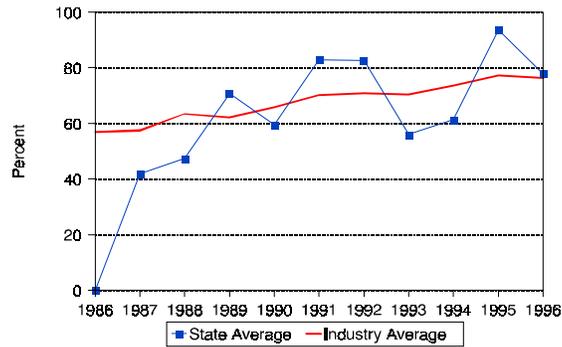


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	9	84	--	28	121
Number of Retail Customers	3,965,117	282,671	--	241,380	4,489,168
Retail Sales (MWh)	115,425,205	5,148,627	--	3,665,010	124,238,842
Percentage of Retail Sales	92.9	4.1	--	3.0	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	8,691,536	392,438	--	316,002	9,399,976
Percentage of Revenue	92.5	4.2	--	3.4	100.0
1991					
Number of Utilities	9	84	--	28	121
Number of Retail Customers	4,190,190	301,905	--	268,625	4,760,720
Retail Sales (MWh)	134,307,359	6,802,912	--	4,548,049	145,658,320
Percentage of Retail Sales	92.2	4.7	--	3.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	9,221,118	446,232	--	335,739	10,003,090
Percentage of Revenue	92.2	4.5	--	3.4	100.0
1996					
Number of Utilities	9	85	--	27	121
Number of Retail Customers	4,378,303	339,797	--	308,761	5,026,861
Retail Sales (MWh)	144,033,900	8,959,683	--	5,593,754	158,587,337
Percentage of Retail Sales	90.8	5.7	--	3.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	9,108,842	511,459	--	362,926	9,983,227
Percentage of Revenue	91.2	5.1	--	3.6	100.0

-- = Not applicable.

Oklahoma

Oklahoma ranks in the middle of the States in both population and generating capability. Most of the electricity in Oklahoma is generated at coal-fired plants. Only 5 percent of the coal distributed to Oklahoma electric utilities in 1996 was mined in the State. The State's coal deposits are all bituminous in rank and contain a high sulfur content averaging about 3 percent by weight.¹ The remaining 95 percent of coal distributed to electric utilities in Oklahoma was low-sulfur bituminous coal from the Powder River Basin in Wyoming.² Four of the five largest plants are coal-fired, three of which are in northeastern Oklahoma near Tulsa. The largest coal-fired generating units, totaling 1,699 megawatts, are at the Muskogee plant of Oklahoma Gas and Electric Company in Muskogee County. Oklahoma Gas and Electric is also the largest utility in the State.

Gas-fired power also plays a significant role due to the State's proximity to Texas, the Nation's largest producer of natural gas. The second-largest plant in the State, Seminole, is gas-fired and is also owned by Oklahoma Gas and Electric Company. There is no nuclear capability but there is hydroelectric power, which accounted for approximately 9 percent of capability in 1996. The average price of electricity in Oklahoma, 5.56 cents per kilowatthour, was well below the national average price of 6.86 cents per kilowatthour.

Although Oklahoma is heavily reliant on coal-fired generation, emissions of sulfur dioxide, nitrogen oxides, and carbon dioxide are relatively low. This can be attributed to the use of low-sulfur Wyoming coal. However, emissions of all three pollutants have increased steadily in the period 1986 to 1996.

Utility generation of electricity in 1996 was 47.5 megawatthours while retail sales were 43.3 megawatthours, making Oklahoma a net exporter of electricity. Compared to other States, the residential sector's share of retail sales is rather high at 40 percent, while the

"other" sector is relatively low at 5.3 percent. The other sector includes sales for public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales. As mentioned earlier, the average price of electricity to all sectors was 5.56 cents per kilowatthour. The average price in Oklahoma for the residential sector was 6.71, for the commercial sector was 5.80, for the industrial sector was 3.78, and for the other sector was 5.08 cents per kilowatthour. Utility retail sales to all sectors experienced a positive annual growth rate from 1986 to 1996, averaging out to almost a 2 percent annual growth rate for total retail sales.³

The Oklahoma State legislature passed a bill in April 1997 that would allow retail competition by July 2002. It also directed the State Corporation Commission to undertake a study of all relevant issues relating to restructuring the electricity industry in the State and to develop a framework for the restructuring. The bill stated that each concerned entity must propose a recovery plan for stranded costs and that transition charges would be collected over a 3- to 7-year period. In addition, the transition charges were not to cause the total price for electric power to exceed the cost per kilowatthour paid by consumers when the law was enacted during the transition period. Another bill was enacted in June 1998 which will allow some retail competition to begin as early as 1999. It will also speed up the time line for restructuring and requires that a task force conduct and complete studies regarding the rules for customer choice, reliability, and unbundling by October 1, 1999, along with a feasibility study regarding levying an across-the-board consumption tax to fund the transition to competition. The bill also contains a reciprocity agreement requiring out-of-State electric service companies to provide equal access to transmission and distribution facilities to Oklahoma facilities as a condition for competing in Oklahoma.⁴

¹ Energy Information Administration, *State Coal Profiles*, DOE/EIA-0576 (Washington, DC, January 1994), p. 75.

² Energy Information Administration, *Coal Distribution Report January-December 1996*, DOE/EIA-0125(96/4Q) (Washington, DC), Table 34.

³ Energy Information Administration, *Electric Power Annual 1996 Volume II*, DOE/EIA-0348(96)/2 (Washington, DC, December 1997), Table 7.

⁴ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

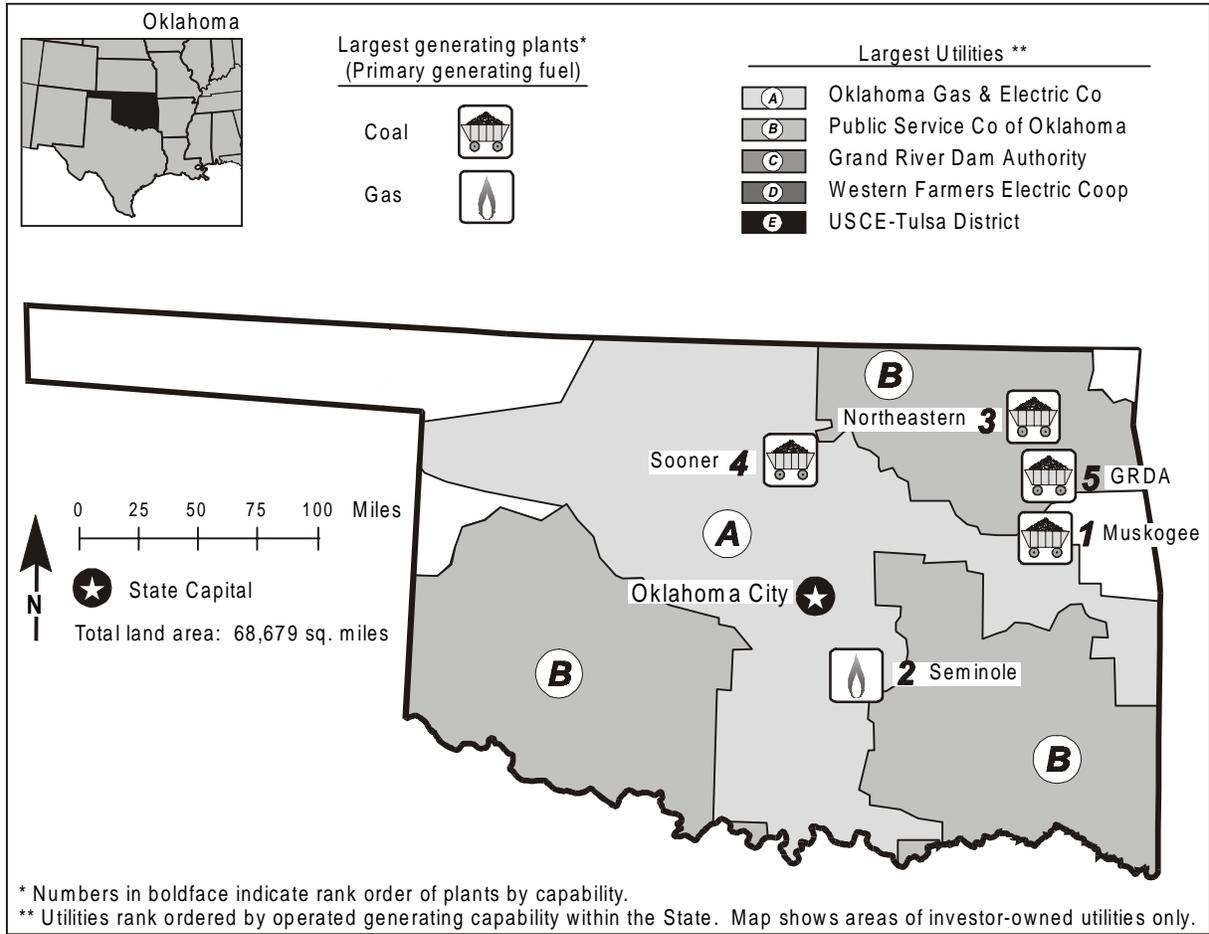


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		SPP	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	13,091	23
State Primary Generating Fuel		Coal	Generation (MWh)	47,544,649	24
Population (as of 7/96)	3,295,315	27	Average Age of Coal Plants	16 years	
Average Revenue (cents/kWh)	5.56	^a 15	Average Age of Oil-fired Plants	32 years	
Industry			Average Age of Gas-fired Plants	27 years	
Capability (MWe)	13,863	^b 21	Average Age of Nuclear Plants	--	
Generation (MWh)	52,036,045	^b 21	Average Age of		
Capability/person			Hydroelectric Plants	31 years	
(KWe/person)	4.21	^b 7	Average Age of Other Plants . . .	--	
Generation/person			Nonutility^c		
(MWh/person)	15.79	^b 16	Capability (MWe)	772	18
Sulfur Dioxide Emissions			Percentage Share of Capability	5.6	26
(Thousand Short Tons)	132	23	Generation (MWh)	4,491,396	17
Nitrogen Oxide Emissions			Percentage Share of Generation	8.6	19
(Thousand Short Tons)	165	18	-- = Not applicable.		
Carbon Dioxide Emissions					
(Thousand Short Tons)	49,633	20			
Sulfur Dioxide/sq. mile (Tons)	1.92	31			
Nitrogen Oxides/sq. mile (Tons)	2.40	29			
Carbon Dioxide/sq. mile (Tons)	722.68	30			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Muskogee	Coal/Gas	Oklahoma Gas & Electric Co	1,699
2. Seminole	Gas	Oklahoma Gas & Electric Co	1,556
3. Northeastern	Coal/Gas	Public Service Co of Oklahoma	1,541
4. Sooner	Coal	Oklahoma Gas & Electric Co	1,015
5. GRDA	Coal	Grand River Dam Authority	1,010

Table 3. Top Five Utilities with Largest Generating Capability and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Oklahoma Gas & Electric Co	5,827	2,530	--	3,297	--	--
B. Public Service Co of Oklahoma ..	3,792	900	25	2,867	--	--
C. Grand River Dam Authority	1,566	1,010	--	--	--	556
D. Western Farmers Elec Coop Inc	1,091	408	--	683	--	--
E. USCE-Tulsa District	539	--	--	--	--	539
Total	12,815	4,848	25	6,847	--	1,095
Percentage of Industry Capability	92.4	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

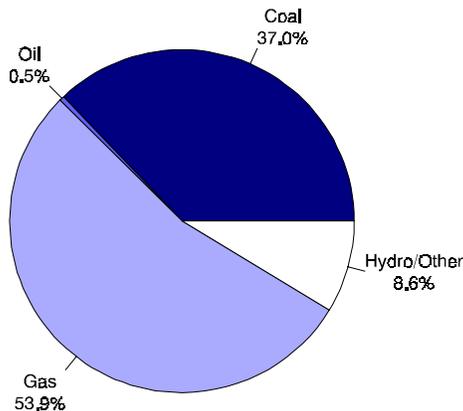


Figure 2. Utility Generation by Primary Energy Source, 1996

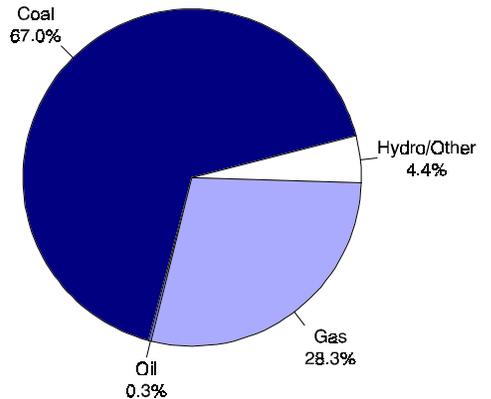


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

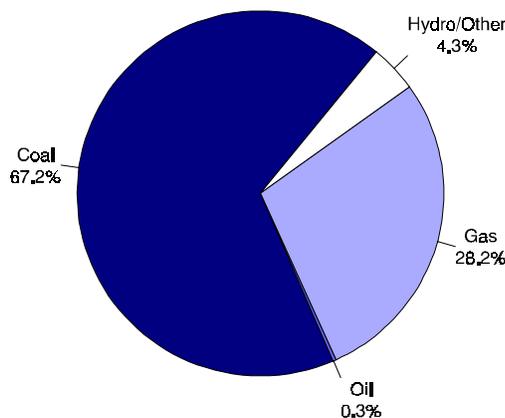


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	4,830	4,865	4,848	36.8	35.7	35.0
Oil	54	58	64	0.4	0.4	0.5
Gas	6,903	6,922	7,059	52.6	50.8	50.9
Nuclear	--	--	--	--	--	--
Hydro/Other	994	1,003	1,121	7.6	7.4	8.1
Total Utility	12,782	12,848	13,091	97.3	94.2	94.4
Total Nonutility	353	790	772	2.7	5.8	5.6
Industry	13,135	13,638	13,863	100.0	100.0	100.0

-- = Not applicable.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	18,696,283	26,027,968	31,876,730	44.2	53.0	61.3
Oil	35,257	18,533	124,951	0.1	0.0	0.2
Gas	19,390,913	16,946,803	13,464,787	45.8	34.5	25.9
Nuclear	--	--	--	--	--	--
Hydro/Other	2,950,993	1,856,785	2,078,181	7.0	3.8	4.0
Total Utility	41,073,446	44,850,089	47,544,649	97.0	91.4	91.4
Total Nonutility	1,265,506	4,239,159	4,491,396	3.0	8.6	8.6
Industry	42,338,952	49,089,248	52,036,045	100.0	100.0	100.0

-- = Not applicable.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.202	0.275	0.334	40.8	51.4	58.3
Oil	0.001	(s)	0.001	0.1	--	0.2
Gas	0.205	0.174	0.140	41.5	32.5	24.4
Nuclear	--	--	--	--	--	--
Hydro/Other	0.031	0.019	0.021	6.2	3.6	3.7
Total Utility	0.439	0.469	0.496	88.7	87.5	86.7
Total Nonutility	0.056	0.067	0.076	11.3	12.5	13.3
Industry	0.494	0.536	0.573	100.0	100.0	100.0

-- = Not applicable. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

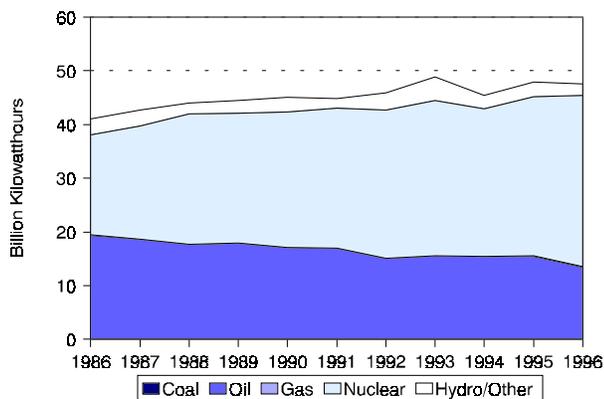


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

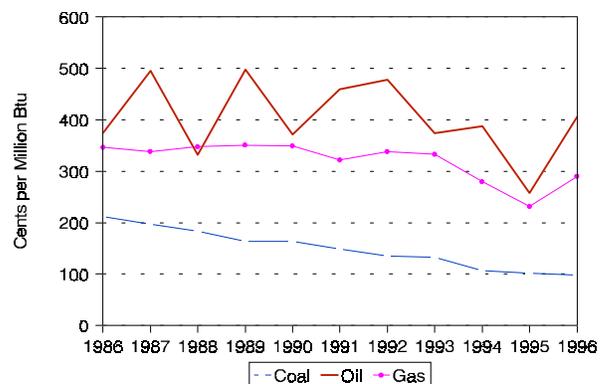


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	211.3	148.1	97.6	-7.4
Oil	373.8	459.4	406.7	0.8
Gas	346.3	322.0	290.1	-1.8

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	78	111	132	5.4
Nitrogen Oxides ^d	122	151	165	3.1
Carbon Dioxide ^d	32,622	43,091	49,633	4.3

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

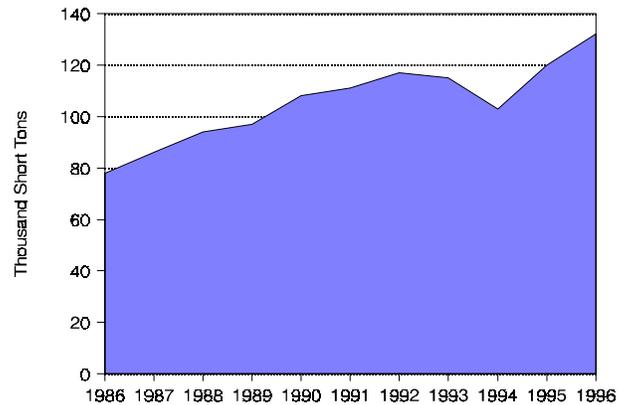


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

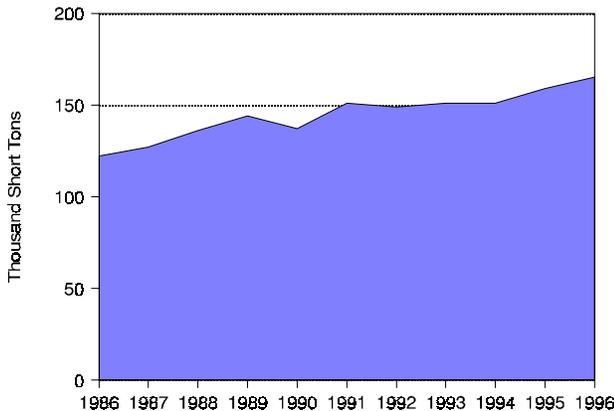


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

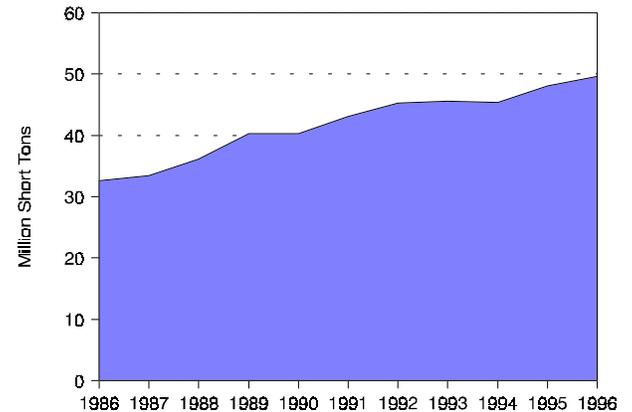


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential	13,903,115	15,324,941	17,302,792	2.2	38.9	38.9	40.0
Commercial	9,669,015	10,586,713	11,552,577	1.8	27.0	26.9	26.7
Industrial	10,206,306	11,414,862	12,160,194	1.8	28.5	29.0	28.1
Other	1,980,745	2,077,881	2,275,740	1.4	5.5	5.3	5.3
Total	35,759,175	39,404,397	43,291,303	1.9	100.0	100.0	100.0

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	4	63	--	32	99
Number of Retail Customers	1,053,008	178,385	--	341,237	1,572,630
Retail Sales (MWh)	27,027,151	3,601,147	--	5,130,877	35,759,175
Percentage of Retail Sales	75.6	10.1	--	14.4	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,037,822	267,076	--	474,896	2,779,793
Percentage of Revenue	73.3	9.6	--	17.1	100.0
1991					
Number of Utilities	4	63	--	31	98
Number of Retail Customers	1,057,098	162,875	--	354,226	1,574,199
Retail Sales (MWh)	30,307,182	3,576,931	--	5,520,284	39,404,397
Percentage of Retail Sales	76.9	9.1	--	14.0	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,870,361	235,172	--	454,607	2,560,140
Percentage of Revenue	73.1	9.2	--	17.8	100.0
1996					
Number of Utilities	4	62	--	30	96
Number of Retail Customers	1,111,908	173,675	--	382,296	1,667,879
Retail Sales (MWh)	33,049,270	4,061,305	--	6,180,728	43,291,303
Percentage of Retail Sales	76.3	9.4	--	14.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,731,433	239,645	--	433,902	2,404,980
Percentage of Revenue	72.0	10.0	--	18.0	100.0

-- = Not applicable.

Oregon

Unlike the vast majority of other States, most of the electricity in Oregon, 87 percent in 1996, was generated at hydroelectric/other plants. The four largest power plants in the State, including John Day, the largest, are hydroelectric plants on the Columbia River in the northern part of the State. The largest utility in Oregon is the United States Army Corps of Engineers (USCE), which operates most of the hydroelectric dams in Oregon. It follows that the average price of electricity, 4.77 cents per kilowatthour, was one of the lowest in the Nation because hydropower is the most inexpensive generator of electricity. Another fact resulting from the large presence of hydropower generation is that Oregon generators were among the lowest emitters of sulfur dioxide, nitrogen oxides, and carbon dioxide.

The nuclear share of total State capability in 1986 was 9.4 percent. Nuclear generation was 14.5 percent but, by 1996, the nuclear shares fell to zero. This was because of the shut-down of the 1,104 megawatt Trojan nuclear plant in November 1992, after it was determined that it would be uneconomical to repair the plant's steam generators. Portland General Electric Company (PGE), the owner of Trojan, decided in January 1993 to shut down the plant permanently, 19 years before the scheduled operating license expiration date of 2011. Through the integrated resource plan process, PGE and the Oregon Public Utility Commission (PUC) established that it would be more economical to phase out the Trojan plant rather than invest an estimated \$200 million to replace the steam generators, which PGE maintained were faulty due to premature corrosion and cracking.¹

The top five utilities in the State, in terms of operated generating capability within the State—USCE, Portland General Electric Company, Idaho Power Company, PacifiCorp, and the City of Eugene—accounted for 91.9 percent of total Oregon net summer capability. USCE alone accounted for 69.5 percent of utility net summer capability. In 1996, Oregon utilities generated 47.9

billion kilowatthours of electricity, while retail sales amounted to 47.2 billion kilowatthours. From 1986 to 1996, Oregon retail sales in all sectors experienced an annual growth rate of 3.0 percent. The “other” sector of retail sales, which includes sales for public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales, experienced a rather large growth rate of 6.1 percent. As mentioned earlier, Oregon's average price of electricity was 4.77 cents per kilowatthour, with electric utility average revenue from the residential sector averaging 5.69 cents; from the commercial sector averaging 5.15 cents; from the industrial sector averaging 3.41 cents; and from the other sector averaging 5.74 cents per kilowatthour.² The State is an exporter of electricity with a net difference of 0.7 billion kilowatthours between generation and sales.

Restructuring activities are proceeding rather slowly in Oregon, probably because of the low price of electricity and the small amount of stranded costs, due mostly to the fact that there are no nuclear plants in the State. A restructuring bill failed to pass the 1997 legislative session, but is expected to be reintroduced in the 1999 session. In July 1998, Pacific Power and Light Company (PPL) filed a proposal with the Oregon PUC for a “portfolio” pilot program for residential and small commercial consumers and direct access for large industrial consumers. The PUC approved a “shopping credit” of 1.98 cents per kilowatthour under an experimental program to introduce supplier choice for electricity customers of PPL.³ Groups of large-volume and commercial customers (and educational institutions) may contract directly with competitive suppliers, while residential and small commercial customers within an identified target area may choose from a portfolio of pricing options. The shopping credit reflected a recent 12-month average peak power price at the California-Oregon border.⁴

¹ Energy Information Administration, *World Nuclear Capacity and Fuel Cycle Requirements 1993*, DOE/EIA-0436(93) (Washington, DC, November 1993), p. 5.

² Energy Information Administration, *Electric Power Annual 1996 Volume II*, DOE/EIA-0348(96)/2 (Washington, DC, December 1997), Table 7.

³ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

⁴ *Public Utilities Fortnightly*, News Digest, State PUCs (August 1998), p. 18.

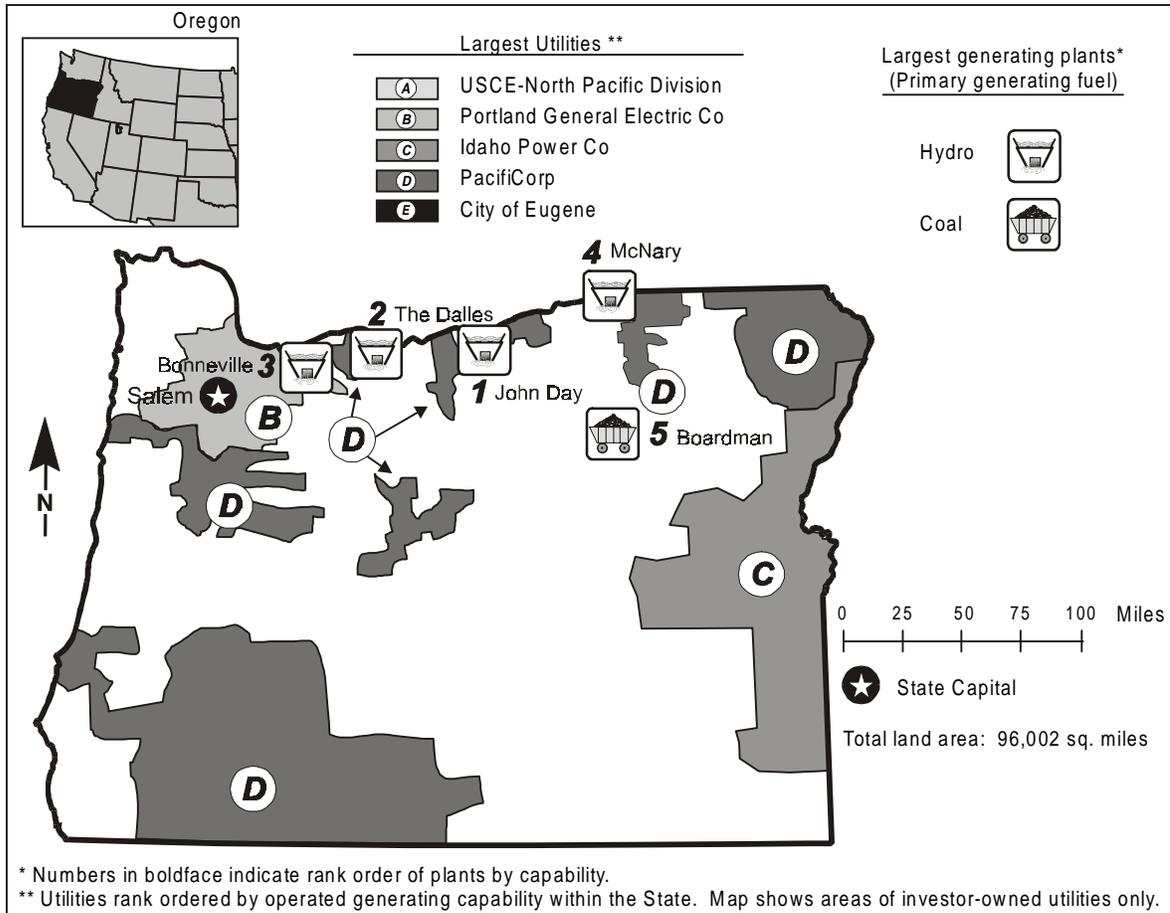


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		WSCC	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	10,526	26
State Primary Generating Fuel		Hydro	Generation (MWh)	47,883,913	23
Population (as of 7/96)	3,196,313	29	Average Age of Coal Plants	16 years	
Average Revenue (cents/kWh)	4.77	^a 6	Average Age of Oil-fired Plants	23 years	
Industry			Average Age of Gas-fired Plants	13 years	
Capability (MWe)	11,429	^b 24	Average Age of Nuclear Plants	--	
Generation (MWh)	51,044,645	^b 22	Average Age of Hydroelectric Plants	33 years	
Capability/person (KWe/person)	3.58	14	Average Age of Other Plants	26 years	
Generation/person (MWh/person)	15.97	14	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	9	47	Capability (MWe)	903	16
Nitrogen Oxide Emissions (Thousand Short Tons)	21	45	Percentage Share of Capability	7.9	20
Carbon Dioxide Emissions (Thousand Short Tons)	6,716	46	Generation (MWh)	3,160,732	26
Sulfur Dioxide/sq. mile (Tons)	0.09	49	Percentage Share of Generation	6.2	24
Nitrogen Oxides/sq. mile (Tons)	0.22	47			
Carbon Dioxide/sq. mile (Tons)	69.96	47			

-- = Not applicable.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. John Day	Hydro	USCE-North Pacific Division	2,484
2. The Dalles	Hydro	USCE-North Pacific Division	1,961
3. Bonneville	Hydro	USCE-North Pacific Division	1,212
4. McNary	Hydro	USCE-North Pacific Division	1,127
5. Boardman	Coal	Portland General Electric Co	508

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. USCE-North Pacific Division	7,302	--	--	--	--	7,302
B. Portland General Electric Co	2,127	508	103	849	--	667
C. Idaho Power Co	581	--	--	--	--	581
D. PacifiCorp	339	--	--	--	--	339
E. City of Eugene	151	--	--	--	--	151
Total	10,500	508	103	849	--	9,040
Percentage of Industry Capability	91.9	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

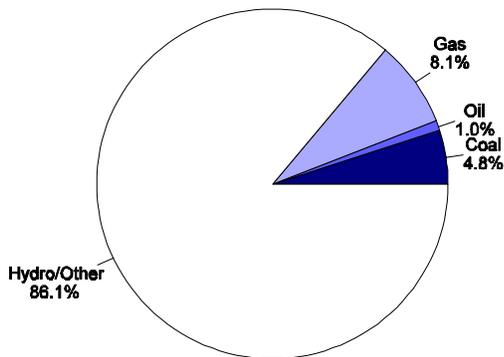


Figure 2. Utility Generation by Primary Energy Source, 1996

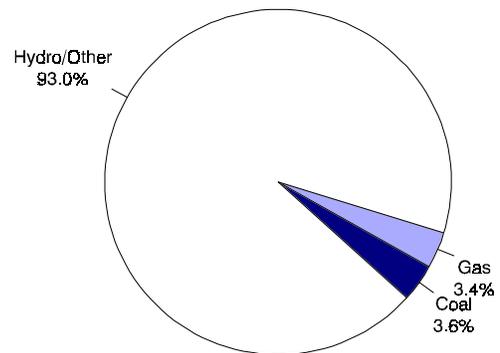


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

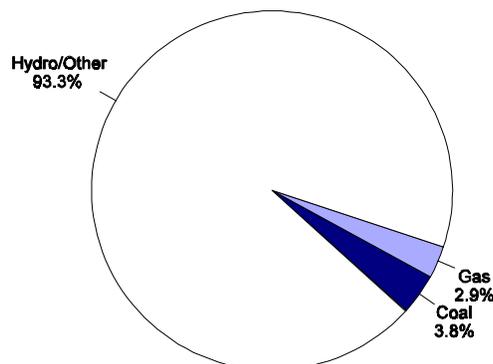


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	530	530	508	4.6	4.6	4.4
Oil	109	109	103	1.0	0.9	0.9
Gas	493	493	852	4.3	4.3	7.5
Nuclear	1,080	1,104	--	9.4	9.6	--
Hydro/Other	8,979	9,000	9,063	78.5	78.3	79.3
Total Utility	11,191	11,236	10,526	97.8	97.7	92.1
Total Nonutility	246	262	903	2.2	2.3	7.9
Industry	11,437	11,498	11,429	100.0	100.0	100.0

-- = Not applicable.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	-38,799	2,814,199	1,727,583	-0.1	5.9	3.4
Oil	-5,478	9,648	6,631	(s)	(s)	(s)
Gas	10	1,164,413	1,636,828	(s)	2.5	3.2
Nuclear	7,081,231	1,465,368	--	14.5	3.1	--
Hydro/Other	40,743,146	40,844,393	44,512,871	83.5	86.3	87.2
Total Utility	47,780,110	46,298,021	47,883,913	97.9	97.8	93.8
Total Nonutility	1,016,997	1,043,616	3,160,732	2.1	2.2	6.2
Industry	48,797,107	47,341,637	51,044,645	100.0	100.0	100.0

-- = Not applicable. (s) = Nonzero percentage less than 0.05 if value is positive and greater than -0.05 if value is negative.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	(s)	0.031	0.019	--	6.0	3.5
Oil	(s)	(s)	(s)	--	--	--
Gas	(s)	0.011	0.014	--	2.1	2.7
Nuclear	0.076	0.016	--	15.1	3.1	--
Hydro/Other	0.426	0.423	0.459	84.0	81.9	86.2
Total Utility	0.502	0.481	0.491	99.1	93.1	92.4
Total Nonutility	0.004	0.035	0.040	0.9	6.9	7.6
Industry	0.507	0.516	0.532	100.0	100.0	100.0

-- = Not applicable. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

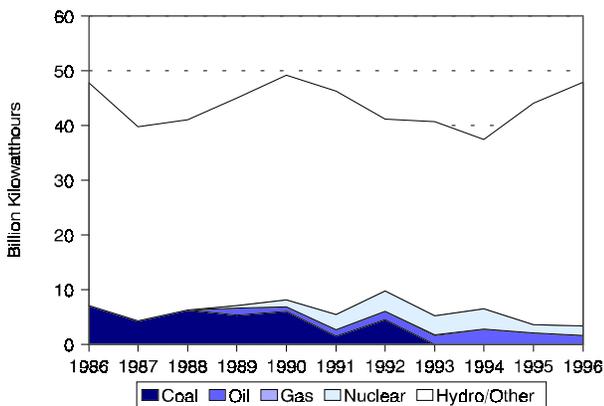


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

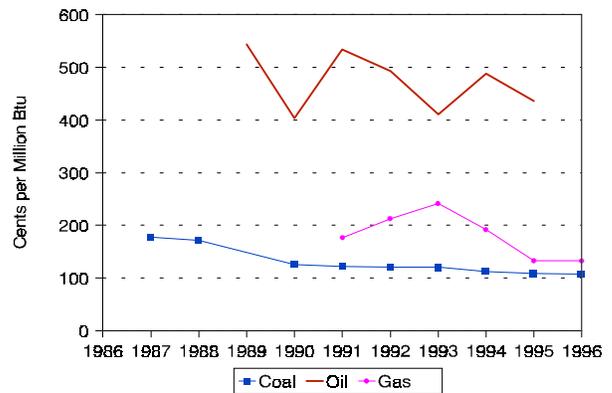


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	--	121.9	107.1	--
Oil	418.5	534.3	--	--
Gas	--	176.5	132.2	--

-- = Not applicable.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	(s)	14	9	90.7
Nitrogen Oxides ^d . .	(s)	22	21	121.7
Carbon Dioxide ^d . . .	4	7,259	6,716	110.1

(s) = Nonzero value less than 0.05.

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

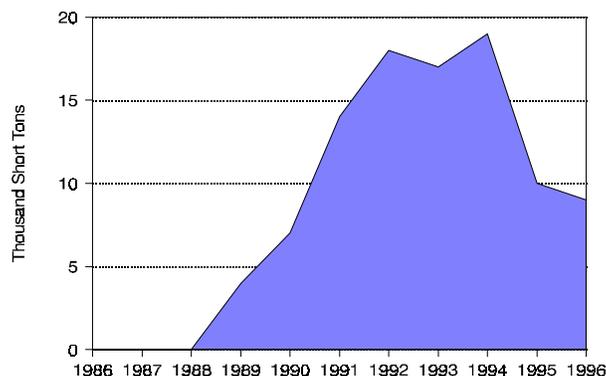


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

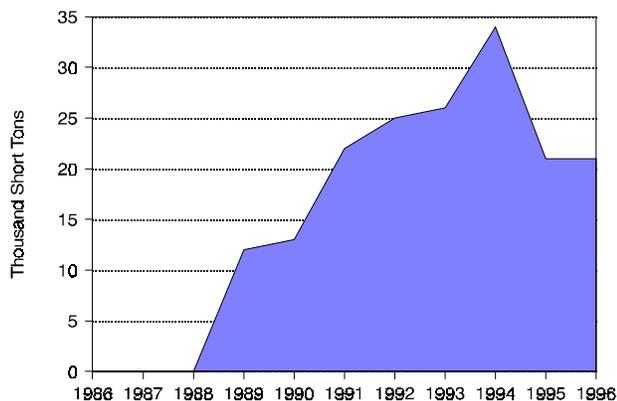


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

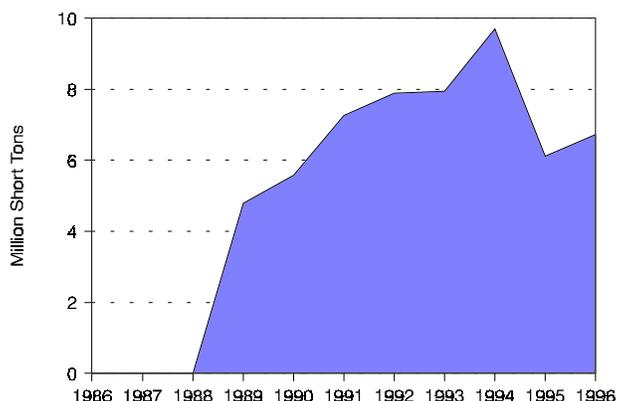


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	13,722,045	15,949,119	17,284,645	2.3	39.1	36.5	36.6
Commercial	9,959,862	11,614,083	13,387,964	3.0	28.4	26.6	28.4
Industrial . . .	10,993,905	15,296,762	15,804,189	3.7	31.4	35.0	33.5
Other	390,479	790,787	708,114	6.1	1.1	1.8	1.5
Total	35,066,288	43,650,751	47,184,912	3.0	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

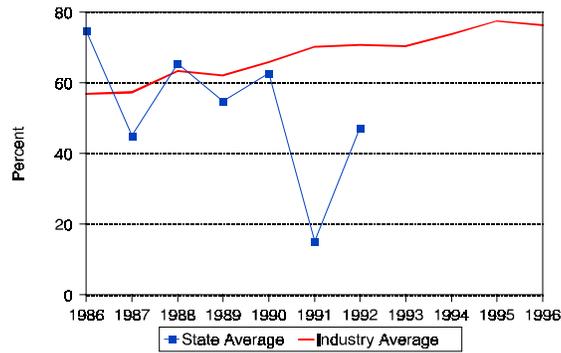


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	4	17	1	18	40
Number of Retail Customers	965,790	194,949	8	109,405	1,270,152
Retail Sales (MWh)	24,927,135	6,730,593	832,777	2,575,783	35,066,288
Percentage of Retail Sales	71.1	19.2	2.4	7.4	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,588,998	263,617	16,796	148,735	2,023,033
Percentage of Revenue	78.6	13.0	1.1	7.4	100.0
	1991				
Number of Utilities	3	17	1	19	40
Number of Retail Customers	1,033,092	208,126	8	146,522	1,387,748
Retail Sales (MWh)	28,549,384	7,619,357	3,908,728	3,573,282	43,650,751
Percentage of Retail Sales	65.4	17.5	9.0	8.2	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,497,300	300,917	83,588	192,160	2,084,330
Percentage of Revenue	71.8	14.4	4.5	9.2	100.0
	1996				
Number of Utilities	3	17	2	19	41
Number of Retail Customers	1,140,092	229,517	9	164,540	1,534,158
Retail Sales (MWh)	31,512,250	8,260,073	3,451,035	3,961,554	47,184,912
Percentage of Retail Sales	66.8	17.5	7.3	8.4	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,627,386	332,503	80,999	211,971	2,252,859
Percentage of Revenue	72.2	14.8	3.6	9.4	100.0

Pennsylvania

Pennsylvania ranks fifth nationally in population and, in 1996, fourth in generating capability. Over half of generating capability is coal-fired, as is the largest plant in the State, Bruce Mansfield. Until the 1950s, Pennsylvania was the leading producer of coal in the United States and has ranked among the leading coal producers since then.¹ Proximity to coal, the resultant low transportation costs, and a lack of environmental restrictions made coal an attractive fuel for electricity generation. Nuclear plants represent about a quarter of Pennsylvania's generating capability. The first nuclear plant in the Nation, Shippingport (no longer operating), was in Pennsylvania. Pennsylvania ranks second highest in the Nation in nuclear capability. Three of the four largest plants are nuclear.

Together, coal and nuclear plants produce over 96 percent of all electricity produced by the industry in Pennsylvania; the remainder is from small hydroelectric, gas, and oil-fired plants. Nuclear generation has displaced some of the coal generation since 1986 as Beaver Valley 2 and Limerick 2 began operation. In 1996, net generation from coal units at utilities represented 52.5 percent, down from 64.7 percent in 1986. Nuclear generation went from 26.3 percent to 35.8 percent. Nuclear plants in Pennsylvania increased their capacity factor to 87.5 percent, well above the national average capacity factor of 76.4 percent. Generation from nonutilities has more than quadrupled since 1986 and currently represents about 9 percent of total generation.

The Clean Air Act Amendments of 1990 specified some plants in Pennsylvania to begin compliance with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x). These units include 7,674 megawatts of nameplate capacity at nine plants. Emissions of SO₂ were second only to Ohio, accounting for 8 percent of all SO₂ emissions in the Nation. Carbon dioxide and NO_x emissions both ranked fifth in the Nation. After 1990, SO₂ and NO_x emissions have declined and are currently less than in 1986.

Most of Pennsylvania is included in the Pennsylvania-New Jersey-Maryland Interconnection (PJM). In 1998,

PJM began operating as an independent system operator and power exchange. PJM has assumed control of the transmission systems within its borders and the generators are selling wholesale power through the power exchange. The price of retail electricity in Pennsylvania exceeded the national average in 1996. At 7.96 cents per kilowatt-hour, it was the 12th most costly in the United States. Higher prices for electric power have been a catalyst for moving toward competitive markets for electricity. Pennsylvania is a leading State for the deregulation of electricity generation and allowing competition at the retail level.

The Commonwealth of Pennsylvania enacted a comprehensive law in December 1996 to restructure its electric power industry. Competition among electric generation suppliers began in November 1997 with a pilot program for 5 percent of each utility's load. By January 1999, two-thirds of consumers, and by January 2000 all consumers, will be allowed retail access. High interest and participation in the program is making Pennsylvania the national leader for a retail competitive electricity market. As required by the restructuring legislation, investor-owned utilities in Pennsylvania filed restructuring plans with the Pennsylvania Public Utility Commission (PPUC). The plans detail how retail competition will be implemented throughout the utilities' service territories and the amount of and time period for recoverable stranded costs.

The seven major investor-owned utilities in the State will be allowed to collect a total of approximately \$12.5 billion in stranded costs, although less than they requested. Stranded costs will be recovered via competitive transition charges that will be billed to customers in the service territories of the respective distribution companies. Duquesne Light has filed a plan with the PPUC to divest its generation assets, including its nuclear plants. GPU Energy has sold its fossil-fueled and hydro-generating capability and announced the sale of its nuclear capability at Three Mile Island, pending approval by State and Federal regulators. Three Mile Island will be among the first nuclear plants sold in the Nation.²

¹ Energy Information Administration, *State Coal Profiles*, DOE/EIA0576 (Washington, DC, January 1994), p. 79.

² Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

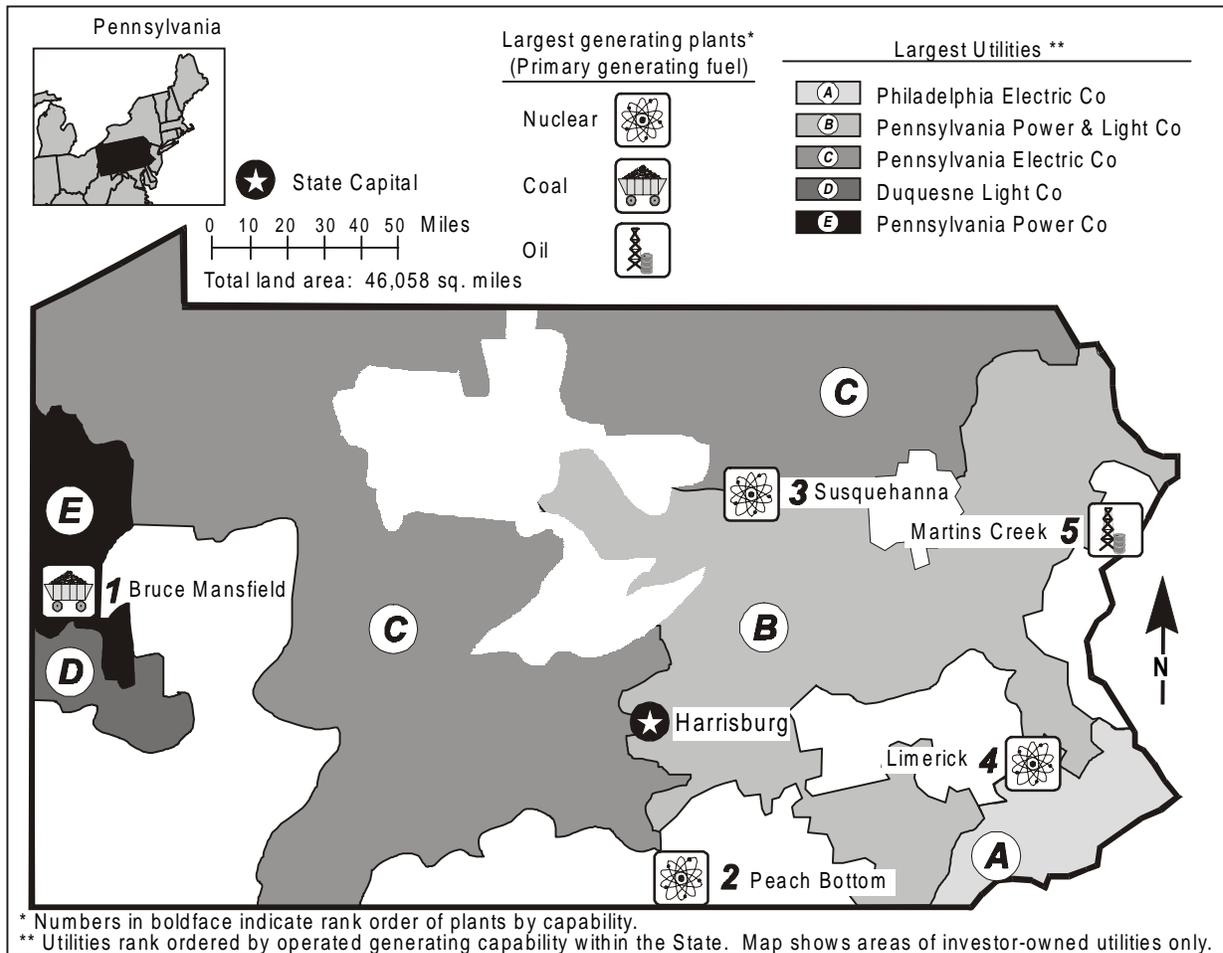


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		ECAR/MACC	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	33,723	4
State Primary Generating Fuel		Coal	Generation (MWh)	175,022,081	2
Population (as of 7/96)	12,040,084	5	Average Age of Coal Plants	29 years	
Average Revenue (cents/kWh)	7.96	^a 40	Average Age of Oil-fired Plants	25 years	
Industry			Average Age of Gas-fired Plants	35 years	
Capability (MWe)	36,439	^b 4	Average Age of Nuclear Plants	15 years	
Generation (MWh)	192,030,229	^b 2	Average Age of Hydroelectric Plants	33 years	
Capability/person (KWe/person)	3.03	^b 21	Average Age of Other Plants	--	
Generation/person (MWh/person)	15.95	^b 15	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	1,098	2	Capability (MWe)	2,716	9
Nitrogen Oxide Emissions (Thousand Short Tons)	392	5	Percentage Share of Capability	7.5	22
Carbon Dioxide Emissions (Thousand Short Tons)	128,999	5	Generation (MWh)	17,008,148	8
Sulfur Dioxide/sq. mile (Tons)	23.84	6	Percentage Share of Generation	8.9	18
Nitrogen Oxides/sq. mile (Tons)	8.51	8			
Carbon Dioxide/sq. mile (Tons)	2,800.79	9			

-- = Not applicable.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Bruce Mansfield	Coal	Pennsylvania Power Co	2,371
2. Peach Bottom	Nuclear	Philadelphia Electric Co	2,186
3. Susquehanna	Nuclear	Pennsylvania Power & Light Co	2,184
4. Limerick	Nuclear	Philadelphia Electric Co	2,170
5. Martins Creek	Oil/Coal	Pennsylvania Power & Light Co	1,949

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996 (Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Philadelphia Electric Co	8,215	725	2,047	207	4,356	880
B. Pennsylvania Power & Light Co ..	7,968	3,638	2,000	--	2,184	146
C. Pennsylvania Electric Co	6,737	6,159	84	76	--	418
D. Duquesne Light Co	3,336	1,346	360	--	1,630	--
E. Pennsylvania Power Co	2,793	2,787	6	--	--	--
Total	29,049	14,655	4,497	283	8,170	1,444
Percentage of Industry Capability	79.7	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

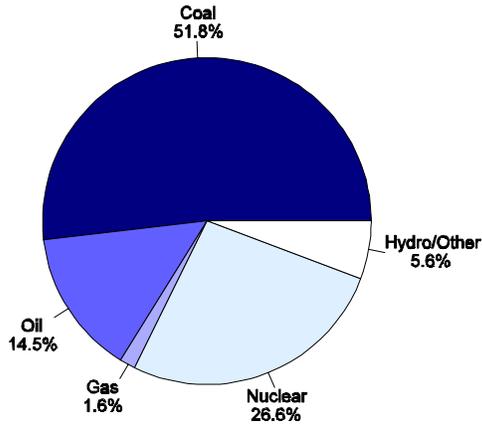


Figure 2. Utility Generation by Primary Energy Source, 1996

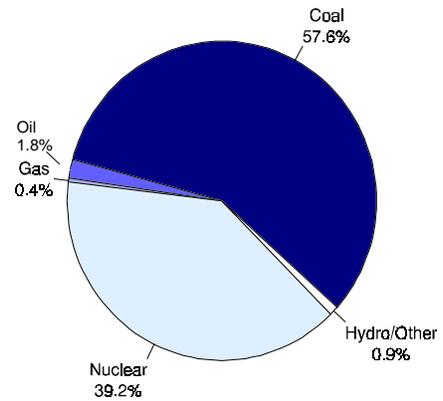


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

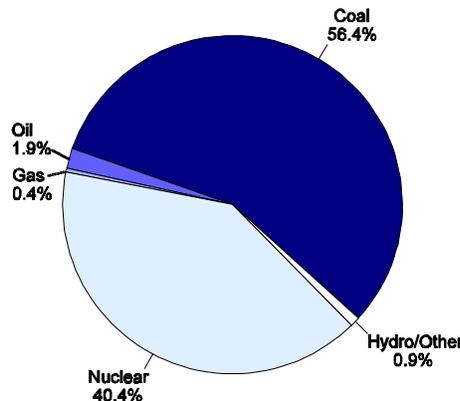


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	17,636	16,894	17,463	54.5	48.0	47.9
Oil	4,990	4,962	4,881	15.4	14.1	13.4
Gas	311	873	534	1.0	2.5	1.5
Nuclear	6,833	8,731	8,956	21.1	24.8	24.6
Hydro/Other	1,870	1,877	1,888	5.8	5.3	5.2
Total Utility	31,640	33,337	33,723	97.7	94.8	92.5
Total Nonutility	739	1,837	2,716	2.3	5.2	7.5
Industry	32,379	35,174	36,439	100.0	100.0	100.0

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	97,729,919	100,359,157	100,857,561	64.7	58.2	52.5
Oil	8,522,432	3,713,606	3,212,502	5.6	2.2	1.7
Gas	61,190	162,793	641,242	(s)	0.1	0.3
Nuclear	39,820,377	57,475,671	68,672,038	26.3	33.3	35.8
Hydro/Other	1,451,810	655,648	1,638,738	1.0	0.4	0.9
Total Utility	147,585,729	162,366,875	175,022,081	97.7	94.1	91.1
Total Nonutility	3,538,916	10,219,723	17,008,148	2.3	5.9	8.9
Industry	151,124,645	172,586,598	192,030,229	100.0	100.0	100.0

(s) = Nonzero percentage less than 0.05.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.998	1.005	1.018	58.3	54.0	48.3
Oil	0.090	0.038	0.034	5.3	2.0	1.6
Gas	0.001	0.002	0.007	(s)	0.1	0.4
Nuclear	0.430	0.617	0.730	25.1	33.2	34.6
Hydro/Other	0.015	0.007	0.017	0.9	0.4	0.8
Total Utility	1.534	1.669	1.806	89.6	89.7	85.7
Total Nonutility	0.177	0.192	0.302	10.4	10.3	14.3
Industry	1.712	1.861	2.107	100.0	100.0	100.0

(s) = Nonzero percentage less than 0.005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

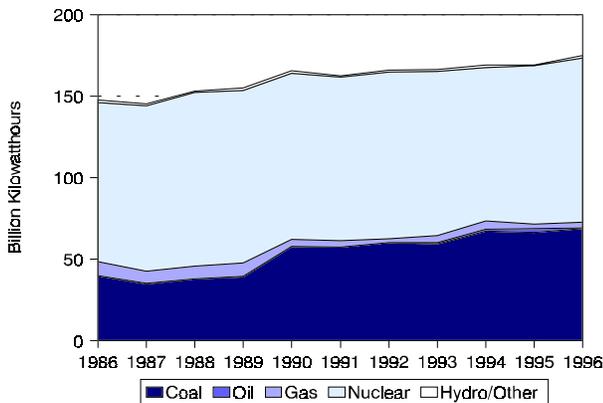


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

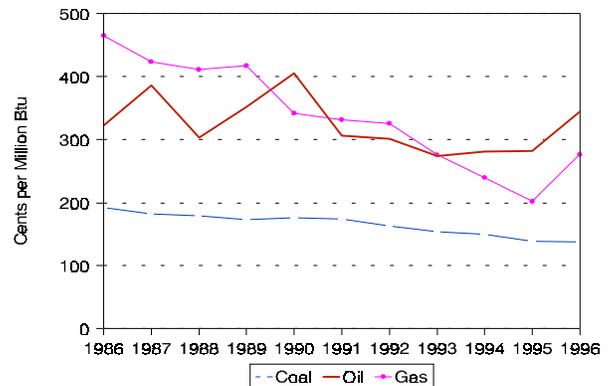


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	192.7	173.8	138.2	-3.3
Oil	322.7	306.6	345.2	0.7
Gas	465.5	332.0	276.9	-5.1

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	1,221	1,282	1,098	-1.1
Nitrogen Oxides ^d . .	392	443	392	0.0
Carbon Dioxide ^d . . .	110,842	125,179	128,999	1.5

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

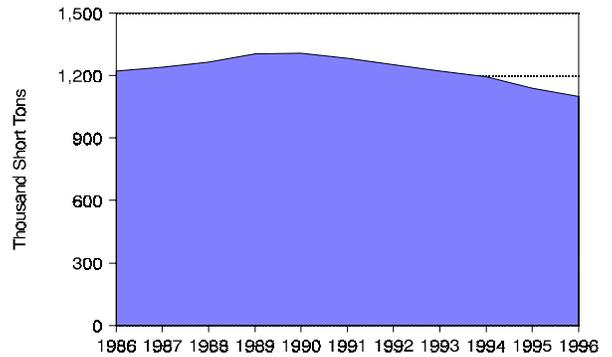


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

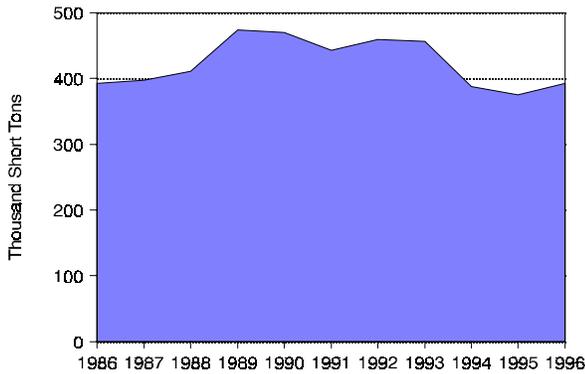


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

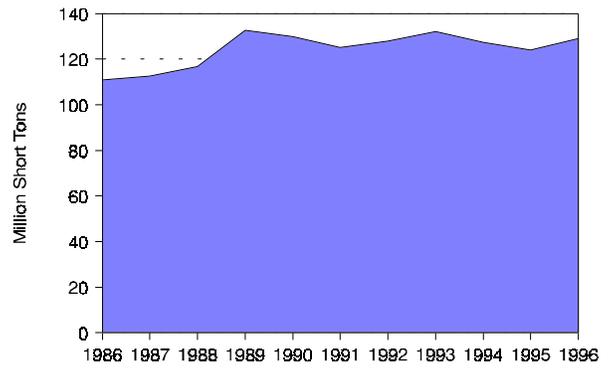


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	34,240,753	39,597,640	43,644,620	2.5	33.4	34.0	34.2
Commercial	24,796,178	30,552,517	35,396,258	3.6	24.2	26.3	27.7
Industrial . . .	42,019,961	44,728,178	47,207,540	1.2	41.0	38.4	37.0
Other	1,470,415	1,458,663	1,374,608	-0.7	1.4	1.3	1.1
Total	102,527,301	116,336,998	127,623,026	2.2	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

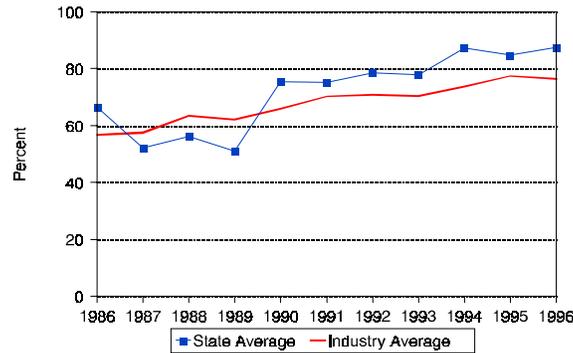


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	12	34	--	13	59
Number of Retail Customers	4,697,887	72,083	--	166,678	4,936,648
Retail Sales (MWh)	99,943,402	1,030,678	--	1,553,221	102,527,301
Percentage of Retail Sales	97.5	1.0	--	1.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	9,600,989	88,772	--	182,438	9,872,198
Percentage of Revenue	97.3	0.9	--	1.9	100.0
1991					
Number of Utilities	11	34	--	12	57
Number of Retail Customers	4,997,209	74,427	--	175,458	5,247,094
Retail Sales (MWh)	113,434,288	1,176,038	--	1,726,672	116,336,998
Percentage of Retail Sales	97.5	1.0	--	1.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	10,173,789	98,271	--	192,992	10,465,053
Percentage of Revenue	97.2	0.9	--	1.8	100.0
1996					
Number of Utilities	11	34	--	13	58
Number of Retail Customers	5,191,427	78,201	--	189,389	5,459,017
Retail Sales (MWh)	124,303,036	1,303,279	--	2,016,711	127,623,026
Percentage of Retail Sales	97.4	1.0	--	1.6	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	9,851,596	96,525	--	206,879	10,155,000
Percentage of Revenue	97.0	1.0	--	2.0	100.0

-- = Not applicable.

Rhode Island

In 1996, Rhode Island had the smallest amount of utility generating capability in the Nation; however, 55 percent of total capability in the State, the largest percentage nationally, is nonutility capability. Most of Rhode Island's utility electricity is produced by gas-fired plants. Of the five utility plants located in Rhode Island, the largest is the gas-fired Manchester Street plant, which is the only plant in the State with a capability of over 10 megawatts. Generation from gas units went from none in 1986, when Manchester Street primarily used oil for generation, to 98 percent in 1996. Due to the restructuring of the electric power industry in Rhode Island, utility-owned generation is being sold. In 1998, the New England Electric System (NEES) sold Manchester Street to the U.S. Generating Co., a nonutility. Additionally, about 500 megawatts of new nonutility gas-fired generation is being planned in Rhode Island.

With primarily gas-fired plants and no coal plants in the State, no generating units were cited by Title IV of the Clean Air Act Amendments of 1990 to begin compliance with stricter emissions reductions requirements for sulfur dioxide (SO₂) and nitrogen oxides (NO_x) in 1995. Among all States, Rhode Island's emissions of SO₂, NO_x, and carbon dioxide (CO₂) ranked forty-ninth, forty-fourth, and forty seventh, respectively. However, because of Rhode Island's small area, it was first in the United States in emissions of NO_x from electricity generators per square mile and first in CO₂ per square mile. The high concentration of NO_x has made it likely that Rhode Island will need to design a State implementation plan for reducing ground-level ozone in response to a proposal released by the Environmental Protection Agency (EPA) in October 1998. The EPA proposal does not mandate which sources must reduce pollution. However, EPA states that utilities would be one of the most likely sources of NO_x emissions reductions. Rhode Island is also part of the Ozone Transport Commission (OTC).¹ Each of the 13 States of the OTC is responsible for enacting regulations in order to achieve region-wide NO_x reductions in a consistent, enforceable manner,

and for allocating its NO_x Budget Program allowances among NO_x sources in the State. The targets in this program are all electricity generating facilities with a rated output of 15 megawatts or more and large industrial boilers. Rhode Island has issued its draft rule for its NO_x Budget Program.

In 1996, Rhode Island had the sixth most expensive electricity in the Nation at 10.48 cents per kilowatthour. The largest utility in terms of retail sales is Narragansett Electric Company, an investor-owned company and subsidiary of NEES. There are two other investor-owned distribution utilities in the State: Blackstone Valley and Newport Electric, both subsidiaries of Eastern Utilities. Rhode Island has only one small publicly owned utility and no cooperatives.

In August 1996, the Rhode Island Utility Restructuring Act was enacted. In July 1997, Rhode Island became the first State to implement retail competition, beginning by phasing-in large industrial customers. By January 1998, all consumers in Rhode Island had the option to choose their generation supplier. As required by the law, rates have been reduced by approximately 7 percent. The sale of NEES generating plants has reduced rates in Narragansett's service territory by another 12 percent. With the rate reductions, the standard offer rates set by the Rhode Island Public Utility Commission (PUC) for the investor-owned distribution utilities are approximately 3.2 cents per kilowatthour, and consumers have had little incentive to switch to competitors that are not able to offer lower prices than the standard offer. In a recent rate case hearing, the PUC approved increases in the standard offer rates for all three investor-owned utilities. As the standard offer rates increase, more competition is expected. The restructuring law also allows recovery of stranded costs via transition charges on consumers' bills for 12 ½ years, funds energy conservation and renewable research and development,² and requires divestiture of 15 percent of generation. (In 1998, NEES sold of all its generating capability in Rhode Island.)

¹The Ozone Transport Region comprises the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Delaware, the northern counties of Virginia, and the District of Columbia.

²Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

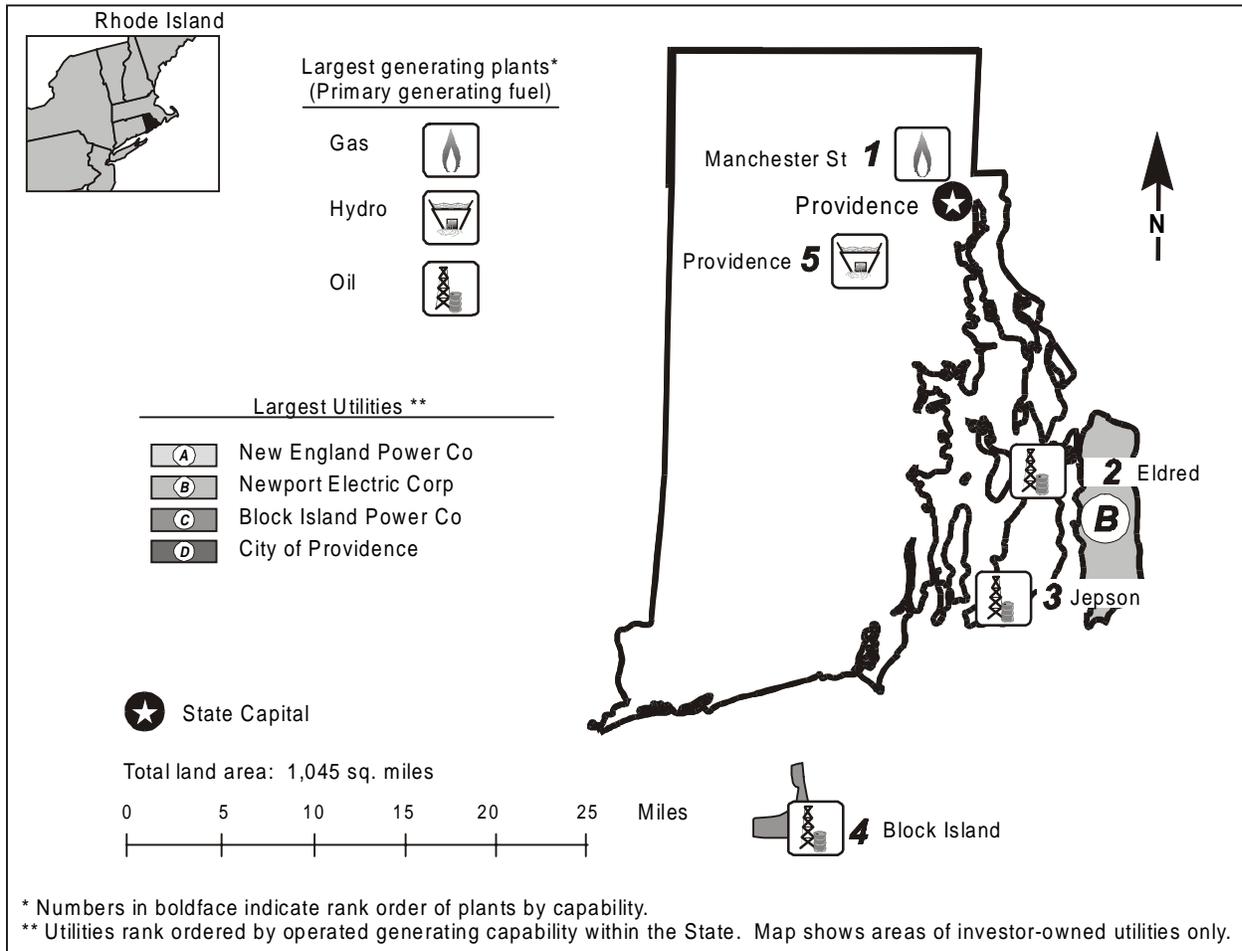


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		WPC	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	441	51
State Primary Generating Fuel		Gas	Generation (MWh)	3,301,111	50
Population (as of 7/96)	988,283	43	Average Age of Coal Plants	--	
Average Revenue (cents/kWh)	10.48	^a 46	Average Age of Oil-fired Plants	26 years	
Industry			Average Age of Gas-fired Plants	50 years	
Capability (MWe)	979	^b 44	Average Age of Nuclear Plants	--	
Generation (MWh)	7,967,377	^b 42	Average Age of Hydroelectric Plants	66 years	
Capability/person (KWe/person)	0.99	^b 45	Average Age of Other Plants	--	
Generation/person (MWh/person)	8.06	^b 39	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	2	49	Capability (MWe)	538	29
Nitrogen Oxide Emissions (Thousand Short Tons)	22	44	Percentage Share of Capability	55.0	1
Carbon Dioxide Emissions (Thousand Short Tons)	5,715	47	Generation (MWh)	4,666,266	16
Sulfur Dioxide/sq. mile (Tons)	1.91	36	Percentage Share of Generation	58.6	1
Nitrogen Oxides/sq. mile (Tons)	21.05	1			
Carbon Dioxide/sq. mile (Tons)	5,468.90	1			

-- = Not applicable.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capacity (MWe)
1. Manchester Street	Gas	New England Power Co	420
2. Eldred	Oil	Newport Electric Corp	8
3. Jepson	Oil	Newport Electric Corp	8
4. Block Island	Oil	Block Island Power Co	4
5. Providence	Hydro	City of Providence	1

Table 3. Top Four Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. New England Power Co	420	--	--	420	--	--
B. Newport Electric Corp	16	--	16	--	--	--
C. Block Island Power Co	4	--	4	--	--	--
D. City of Providence	1	--	--	--	--	1
Total	441	--	20	420	--	1
Percentage of Industry Capability ..	45.0	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

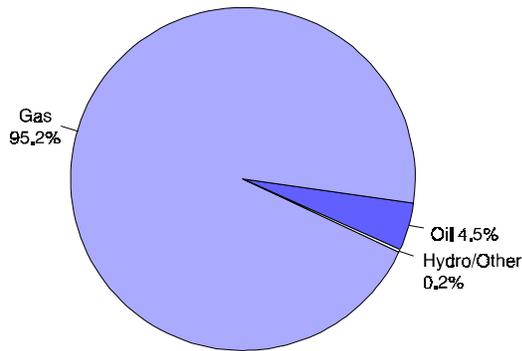


Figure 2. Utility Generation by Primary Energy Source, 1996

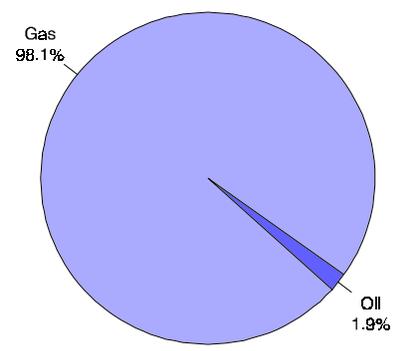


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

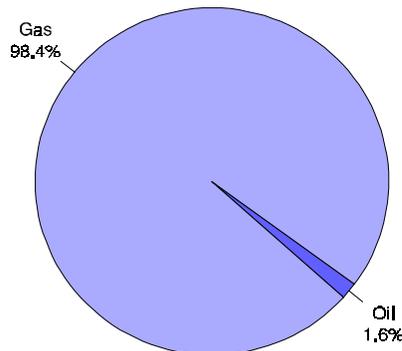


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	125	161	20	45.8	61.7	4.5
Gas	146	99	420	53.5	37.9	95.2
Nuclear	--	--	--	--	--	--
Hydro/Other	1	1	1	0.4	0.4	0.2
Total Utility	273	261	441	100.0	100.0	100.0
Total Nonutility	16	W	538	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	724,027	54,218	61,675	100.0	31.6	1.9
Gas	--	117,239	3,239,436	--	68.4	98.1
Nuclear	--	--	--	--	--	--
Hydro/Other	--	--	--	--	--	--
Total Utility	724,027	171,457	3,301,111	100.0	100.0	100.0
Total Nonutility	58,106	W	4,666,266	--	--	--

-- = Not applicable. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	0.009	0.001	(s)	100.0	34.5	1.6
Gas	--	0.002	0.026	--	65.5	98.4
Nuclear	--	--	--	--	--	--
Hydro/Other	--	--	--	--	--	--
Total Utility	0.009	0.003	0.026	100.0	100.0	100.0
Total Nonutility	0.027	W	0.043	--	--	--

-- = Not applicable. W = Withheld. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

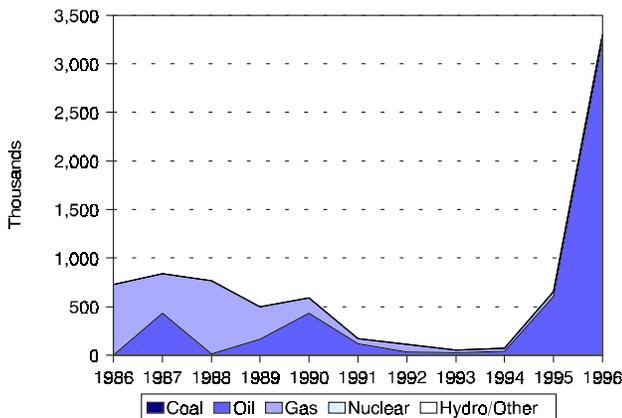


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

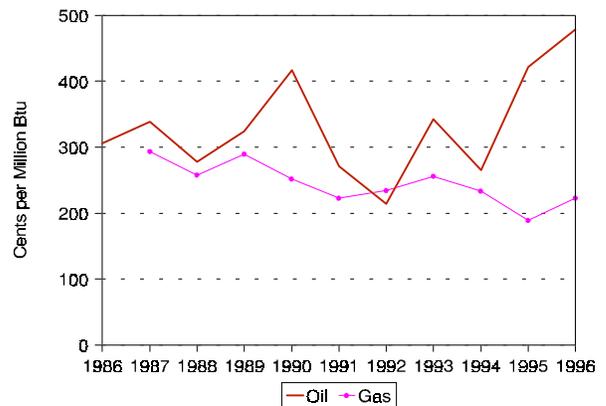


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	--	--	--	--
Oil	306.0	271.0	478.7	4.6
Gas	--	222.5	222.6	--

-- = Not applicable.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	5	1	2	-8.8
Nitrogen Oxides ^d . .	1	2	22	36.2
Carbon Dioxide ^d . . .	758	1,648	5,715	22.4

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

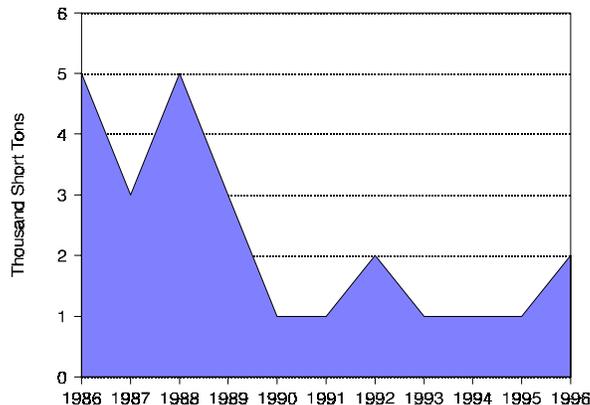


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

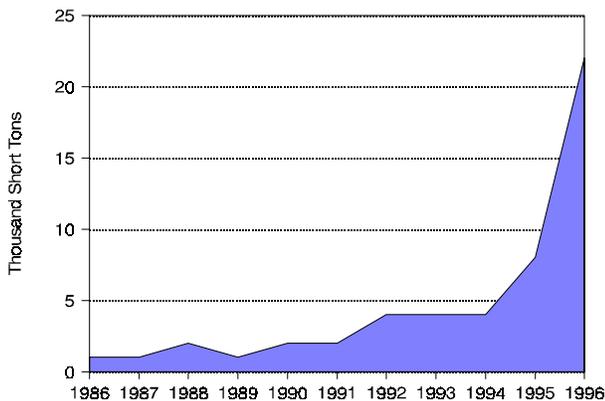


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

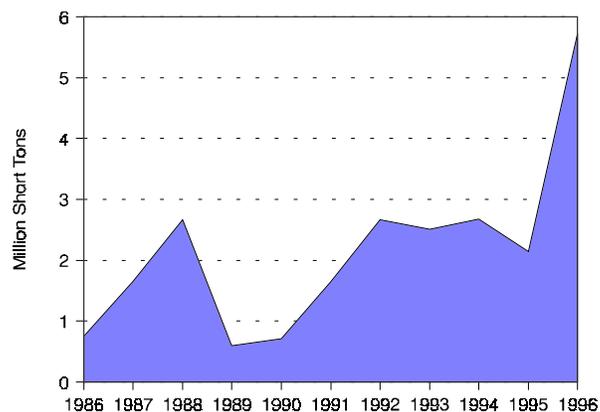


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	2,063,594	2,368,833	2,480,612	1.9	36.5	37.0	37.6
Commercial	2,075,803	2,474,170	2,607,368	2.3	36.7	38.6	39.5
Industrial . . .	1,326,265	1,363,158	1,350,838	0.2	23.4	21.3	20.5
Other	191,760	196,885	165,380	-1.5	3.4	3.1	2.5
Total	5,657,421	6,403,046	6,604,198	1.6	100.0	100.0	100.0

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	4	1	--	--	5
Number of Retail Customers	399,747	3,409	--	--	403,156
Retail Sales (MWh)	5,631,466	25,955	--	--	5,657,421
Percentage of Retail Sales	99.5	0.5	--	--	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	580,076	3,176	--	--	583,252
Percentage of Revenue	99.5	0.5	--	--	100.0
	1991				
Number of Utilities	4	1	--	--	5
Number of Retail Customers	433,245	3,903	--	--	437,148
Retail Sales (MWh)	6,371,130	31,916	--	--	6,403,046
Percentage of Retail Sales	99.5	0.5	--	--	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	727,315	4,507	--	--	731,822
Percentage of Revenue	99.4	0.6	--	--	100.0
	1996				
Number of Utilities	4	1	--	--	5
Number of Retail Customers	446,996	4,025	--	--	451,021
Retail Sales (MWh)	6,568,007	36,191	--	--	6,604,198
Percentage of Retail Sales	99.5	0.6	--	--	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	687,949	3,950	--	--	691,899
Percentage of Revenue	99.4	0.6	--	--	100.0

-- = Not applicable.

South Carolina

The largest utility in terms of generating capability in South Carolina, and the fourth largest in the Nation, is Duke Power. Duke Power operates the two largest plants in the State: Oconee and Catawba, both nuclear plants. It is also the largest utility presence in North Carolina. Nuclear power provides over half of the electricity in South Carolina and represents 37 percent of capability. Coal provides nearly 40 percent of generation, and makes up 32 percent of capability. The third and fourth largest plants in the State are both coal-fired plants operated by the South Carolina Public Service Authority. Over 85 percent of the coal purchased for South Carolina plants in 1997 came from Kentucky's Appalachian coal basin.¹ South Carolina ranks twenty-sixth in population and fifteenth in generating capability in the Nation. With such a large discrepancy in these rankings, it is not surprising that South Carolina is an exporter of electricity.

In July 1998, Duke Power became the Nation's second utility to request a nuclear license extension when it submitted an application for the three-unit Oconee plant. Even though Oconee's current license expires in 2013, the process of approving the license extension request could take three years.² Throughout the process, the company must provide the Nuclear Regulatory Commission with additional information about the plant's operations and history. From 1986 through 1996, the average capacity factor for South Carolina nuclear plants was above the industry average.

No South Carolina generators were cited in the Clean Air Act Amendments of 1990 to begin compliance in 1995 with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x). However, it is likely that South Carolina will need to design a State imple-

mentation plan (SIP) for reducing ground-level ozone in response to a proposal released by the Environmental Protection Agency (EPA) in October 1998. The EPA SIP call proposal does not mandate which sources must reduce pollution. However, EPA states that utilities would be one of the most likely sources of NO_x emissions reductions. Emissions of SO₂, NO_x, and carbon dioxide ranked eighteenth, thirty-first and twenty-fourth among the States, respectively, in 1996. All emissions have increased from 1986 through 1996.

South Carolina has four investor-owned utilities that sell about 70 percent of retail electricity in the State. Almost 30 percent of the electricity in the State is sold by publicly owned utilities and cooperatives. South Carolina's average electricity price in 1996 was 5.67 cents, the seventeenth least expensive in the United States.

With lower than average retail rates, South Carolina is moving relatively slowly toward retail competition. In February 1998, the Public Service Commission of South Carolina (PSC) issued a report, "Proposed Electric Restructuring Implementation Process." The proposal recommends a 5-year transition to retail competition following enactment of legislation. However, legislation to restructure the electric power industry was not acted on in the 1998 legislative session. In April 1998, the PSC requested the major investor-owned utilities to file proposals for restructuring, including stranded cost estimates. Stranded costs were estimated for South Carolina Electric & Gas at \$882 million; for Carolina Light & Power at \$410 million; and for Duke Power at \$81 million. The PSC estimates the cost to deregulate the electric power industry in South Carolina to be \$14 billion.³

¹ Energy Information Administration, *Cost and Quality of Fuels for Electric Utility Plants 1997 Tables*, DOE/EIA-0191(97) (Washington, DC, May 1998), p. 33.

² Nuclear News, *Utility Seeks License Renewal for Oconee Station* (August 1998), p. 20.

³ Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

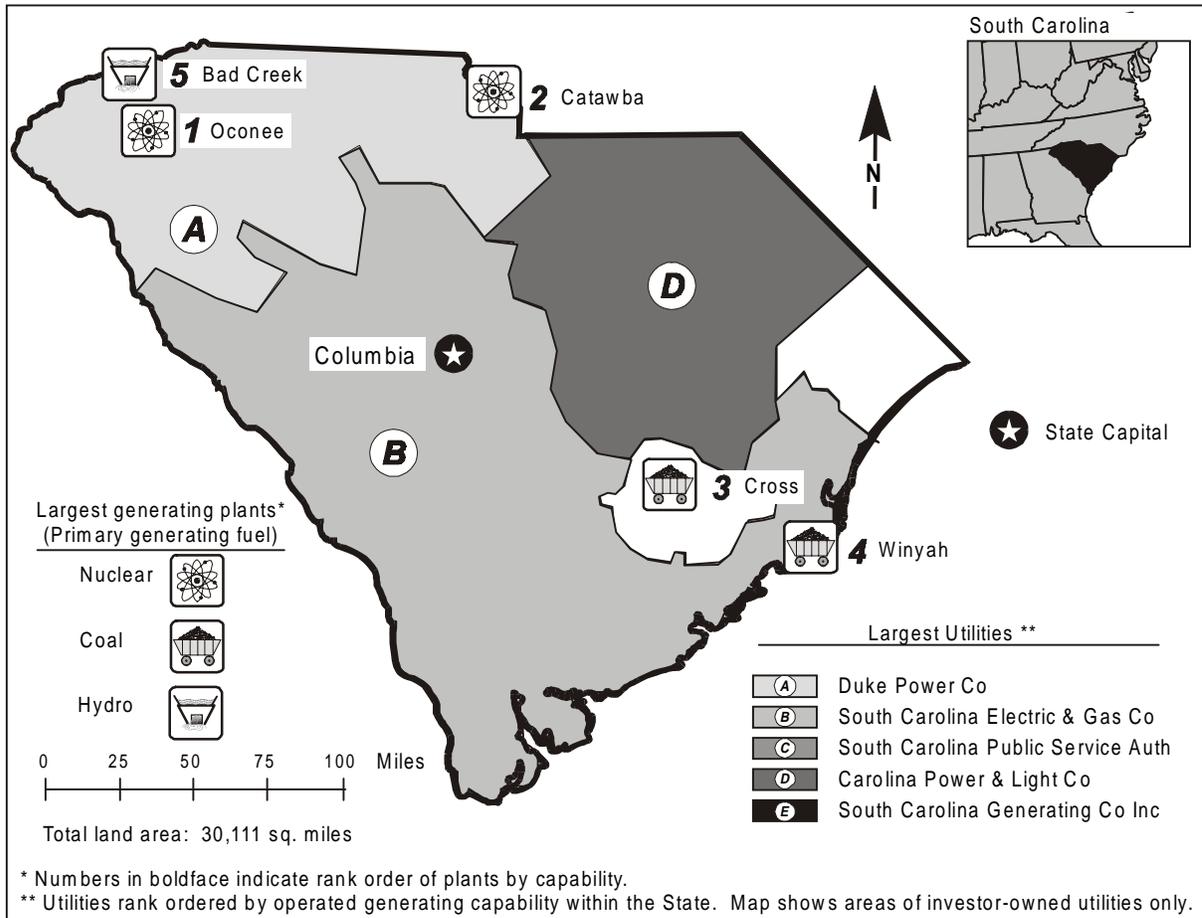


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		SERC	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	17,173	15
State Primary Generating Fuel		Nuclear	Generation (MWh)	76,325,556	17
Population (as of 7/96)	3,716,645	26	Average Age of Coal Plants	21 years	
Average Revenue (cents/kWh)	5.67	^a 17	Average Age of Oil-fired Plants	25 years	
Industry			Average Age of Gas-fired Plants	17 years	
Capability (MWe)	17,550	^b 17	Average Age of Nuclear Plants	17 years	
Generation (MWh)	78,645,821	^b 16	Average Age of		
Capability/person			Hydroelectric Plants	27 years	
(KWe/person)	4.72	^b 4	Average Age of Other Plants . . .	--	
Generation/person			Nonutility^c		
(MWh/person)	21.16	^b 5	Capability (MWe)	377	32
Sulfur Dioxide Emissions			Percentage Share of Capability	2.1	40
(Thousand Short Tons)	258	18	Generation (MWh)	2,320,265	30
Nitrogen Oxide Emissions			Percentage Share of		
(Thousand Short Tons)	111	31	Generation	3.0	37
Carbon Dioxide Emissions			-- = Not applicable.		
(Thousand Short Tons)	41,728	24			
Sulfur Dioxide/sq. mile (Tons)	8.57	17			
Nitrogen Oxides/sq. mile (Tons)	3.69	21			
Carbon Dioxide/sq. mile (Tons)	1,385.81	23			

Table 2. Five Largest Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Oconee	Nuclear	Duke Power Co	2,538
2. Catawba	Nuclear	Duke Power Co	2,258
3. Cross	Coal	South Carolina Pub Serv Auth	1,100
4. Winyah	Coal	South Carolina Pub Serv Auth	1,080
5. Bad Creek	Hydro	Duke Power Co	1,065

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Duke Power Co	7,647	370	301	--	4,796	2,180
B. South Carolina Electric&Gas Co	4,004	2,017	185	105	942	756
C. South Carolina Pub Serv Auth ...	3,139	2,350	575	--	--	214
D. Carolina Power & Light Co	1,444	174	364	223	683	--
E. South Carolina Genertg Co Inc ..	609	560	49	--	--	--
Total	16,843	5,471	1,474	328	6,421	3,150
Percentage of Industry Capability	96.0	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

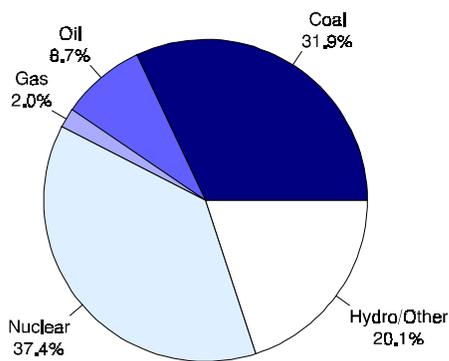


Figure 2. Utility Generation by Primary Energy Source, 1996

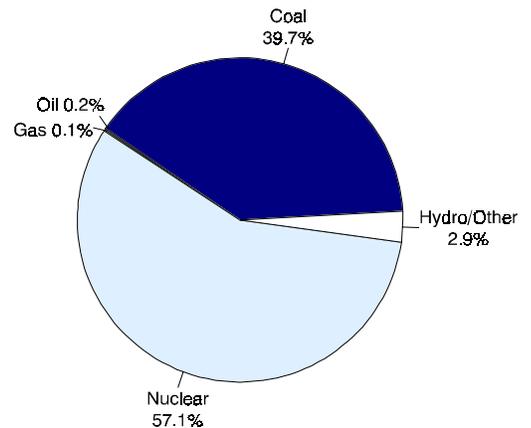


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

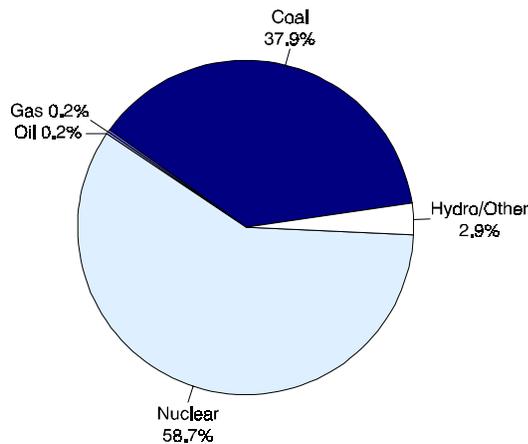


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	4,812	4,812	5,471	32.2	29.8	31.9
Oil	908	894	1,488	6.1	5.5	8.7
Gas	665	760	345	4.5	4.7	2.0
Nuclear	6,420	6,364	6,421	43.0	39.4	37.4
Hydro/Other	2,136	3,332	3,449	14.3	20.6	20.1
Total Utility	14,941	16,162	17,173	100.0	100.0	100.0
Total Nonutility	332	W	377	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	19,503,758	23,165,807	30,307,236	34.5	33.2	39.7
Oil	67,346	83,385	125,657	0.1	0.1	0.2
Gas	132,821	983,695	90,464	0.2	1.4	0.1
Nuclear	35,625,497	43,108,073	43,571,032	63.0	61.7	57.1
Hydro/Other	1,216,957	2,497,024	2,231,167	2.2	3.6	2.9
Total Utility	56,546,380	69,837,984	76,325,556	100.0	100.0	100.0
Total Nonutility	1,449,333	W	2,320,265	--	--	--

-- = Not applicable. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.197	0.235	0.299	33.0	31.9	37.9
Oil	0.001	0.001	0.002	0.1	0.1	0.2
Gas	0.001	0.010	0.001	0.2	1.4	0.2
Nuclear	0.385	0.463	0.463	64.5	63.1	58.8
Hydro/Other	0.013	0.026	0.023	2.1	3.5	2.9
Total Utility	0.596	0.734	0.788	100.0	100.0	100.0
Total Nonutility	0.069	W	0.089	--	--	--

-- = Not applicable. W = Withheld.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

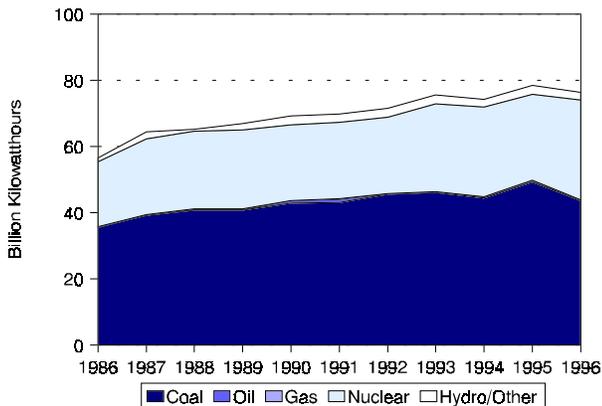


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

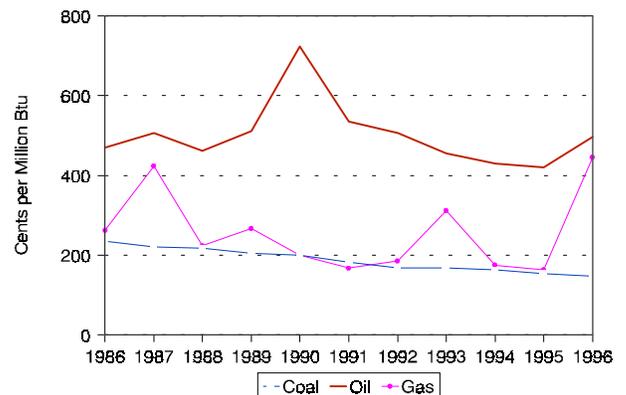


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	235.6	182.7	147.1	-4.6
Oil	469.5	534.1	496.5	0.6
Gas	262.2	167.4	445.4	5.4

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	148	194	258	5.7
Nitrogen Oxides ^d . .	64	91	111	5.7
Carbon Dioxide ^d . .	19,817	33,878	41,728	7.7

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

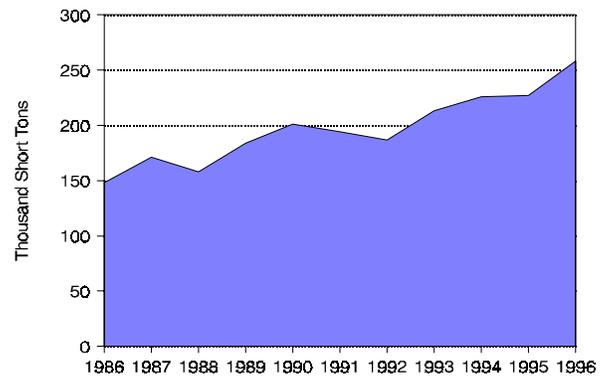


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

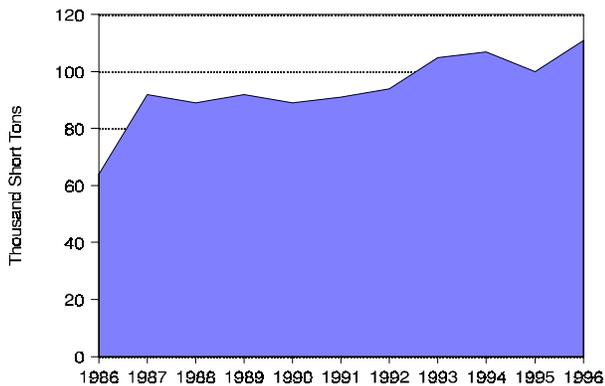


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

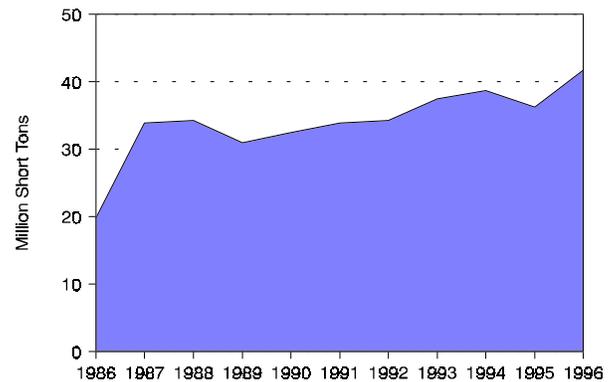


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	16,122,155	18,706,762	22,513,555	3.4	32.6	32.8	33.6
Commercial	9,802,864	12,208,945	14,544,887	4.0	19.8	21.4	21.7
Industrial . . .	22,805,417	25,360,811	29,184,592	2.5	46.1	44.4	43.5
Other	703,001	792,813	843,181	1.8	1.4	1.4	1.3
Total	49,433,441	57,069,331	67,086,215	3.1	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

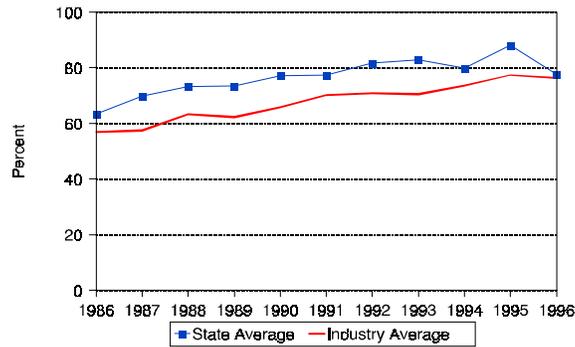


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	5	22	--	21	48
Number of Retail Customers	908,815	209,985	--	376,001	1,494,801
Retail Sales (MWh)	34,661,343	9,288,547	--	5,483,551	49,433,441
Percentage of Retail Sales	70.1	18.8	--	11.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,525,121	528,983	--	520,708	3,574,813
Percentage of Revenue	70.6	14.8	--	14.6	100.0
1991					
Number of Utilities	4	22	--	21	47
Number of Retail Customers	1,007,384	231,836	--	440,671	1,679,891
Retail Sales (MWh)	39,255,319	10,427,172	--	7,386,840	57,069,331
Percentage of Retail Sales	68.8	18.3	--	12.9	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,477,731	552,114	--	579,706	3,609,552
Percentage of Revenue	68.6	15.3	--	16.1	100.0
1996					
Number of Utilities	4	22	--	21	47
Number of Retail Customers	1,096,017	257,674	--	513,455	1,867,146
Retail Sales (MWh)	45,290,922	11,595,877	--	10,199,416	67,086,215
Percentage of Retail Sales	67.5	17.3	--	15.2	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,536,740	567,337	--	697,519	3,801,596
Percentage of Revenue	66.7	14.9	--	18.4	100.0

-- = Not applicable.

South Dakota

South Dakota had the forty-fifth largest population and the forty-second largest utility generating capability in 1996. Most of the electricity in the State is generated at hydroelectric plants. The five largest utilities in South Dakota operated 95 percent of the generating capability in the State in 1996. Three of the four largest plants, including Oahe, the largest, are hydroelectric projects on the Missouri River. All three of these plants are operated by the United States Army Corps of Engineers—Missouri River District, the largest utility in terms of generating capability in the State. Coal, oil, and gas units all contribute to the generating capability mix in the State. The third and fifth largest plants in the State, coal-fired Big Stone and gas-fired Angus Anson, are in the easternmost part of the State. There are no nuclear generating units or nonutility generation. South Dakota is a net exporter of electricity.

In 1986, utility hydroelectric units accounted for 68.6 percent of South Dakota's generating capability and 73.1 percent of its net generation. In 1996, the hydroelectric share of capability had fallen to 61.6 percent, while the net generation share rose to 79.3 percent. Utility coal capability and net generation, on the other hand, were 18.6 percent and 26.8 percent, respectively, in 1986. By 1996, these coal shares had fallen to 16.0 percent and 20.2 percent, respectively. Although gas-fired generation increased substantially between 1986 and 1996, it still represents less than 1 percent of total generation.

There were no South Dakota generating units cited by Title IV of the Clean Air Act Amendments of 1990 to begin compliance with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x). Emissions of SO₂, NO_x, and carbon dioxide (CO₂) from South Dakota generators and the concentrations of these

pollutants per square mile were all among the lowest in the United States. Emissions of SO₂ from South Dakota generators increased from 1986 to 1991, but in 1996, they decreased to just a little more than half of what they had been in 1986. NO_x were almost double in 1996 what they had been in 1986 after also rising to the 1991 levels. CO₂ emissions were up from 1986 levels in 1991, but then decreased substantially in 1996, although they were not as low as they had been in 1986.

The average price of electricity, 6.18 cents per kilowatt-hour, ranked it as the twenty-fifth most expensive in the Nation. There were 6 investor-owned utilities, 34 public utilities, 1 federally owned utility, and 34 cooperatives in South Dakota in 1996. The largest utilities in terms of retail sales were three investor-owned utilities: Northern States Power, Northwestern Public Service, and Black Hills Corporation. Together these utilities provided slightly less than half of the retail sales in South Dakota. The federally owned utility, Western Area Power Administration, markets the power produced at the federally owned dams operated by the U.S. Army Corps of Engineers. Most of the power produced and sold by these Federal entities is provided as wholesale power to nonprofit publicly owned and cooperative utilities.

South Dakota has not initiated any formal investigation or study of restructuring the electric power industry in the State. In January 1998, the South Dakota Legislative Research Council hosted an informational forum on developments in utility competition. This was the first time that the South Dakota legislature addressed the restructuring of the State's electricity industry. No significant action, however, was expected. Current South Dakota law allows retail wheeling for new, large customers.¹

¹Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

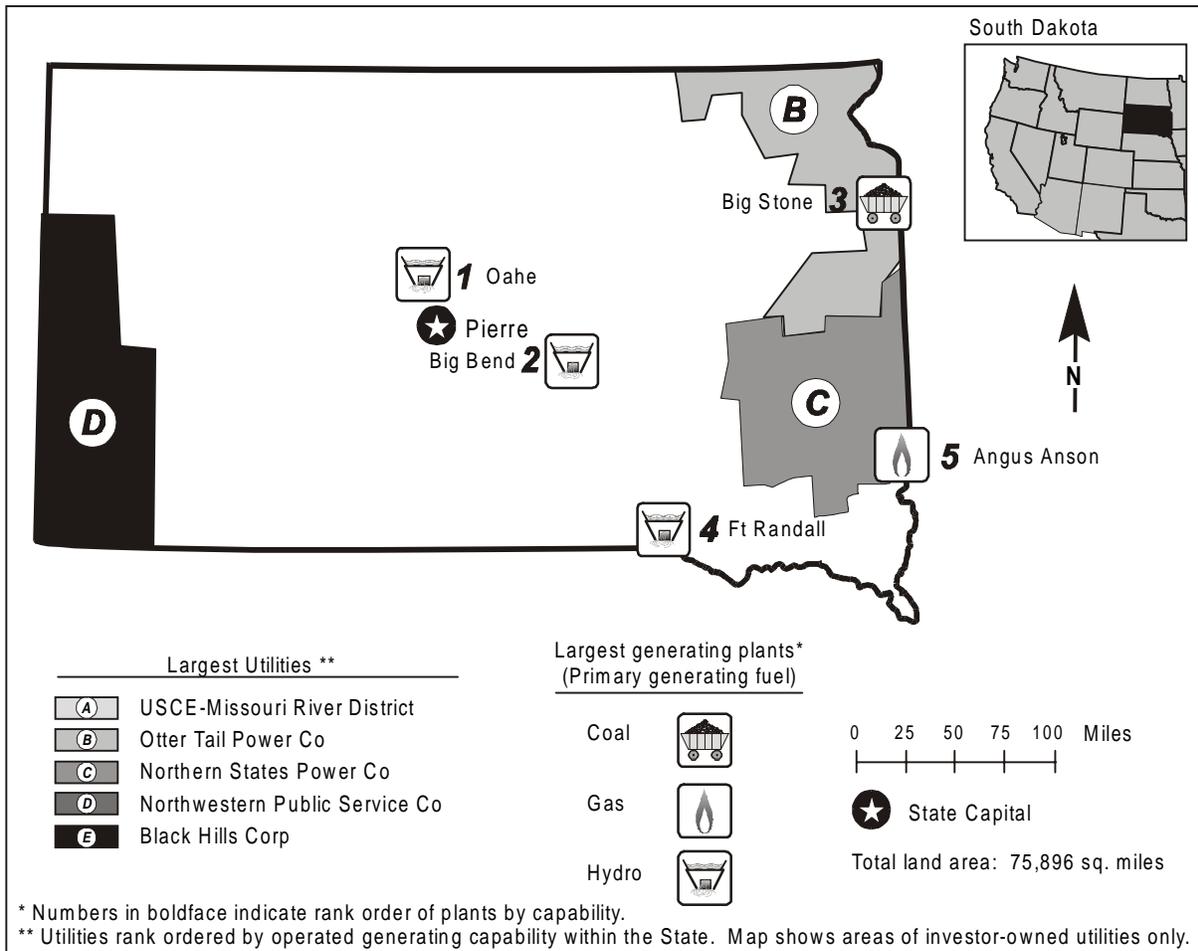


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		WSCC/MAPP	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	2,954	42
State Primary Generating Fuel		Hydro	Generation (MWh)	10,066,274	44
Population (as of 7/96)	737,561	45	Average Age of Coal Plants	22 years	
Average Revenue (cents/kWh)	6.18	^a 27	Average Age of Oil-fired Plants	19 years	
Industry			Average Age of Gas-fired Plants	11 years	
Capability (MWe)	2,954	^b 38	Average Age of Nuclear Plants	--	
Generation (MWh)	10,066,274	^b 40	Average Age of Hydroelectric Plants	35 years	
Capability/person (KWe/person)	4.01	^b 8	Average Age of Other Plants	--	
Generation/person (MWh/person)	13.65	^b 21	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	14	46	Capability (MWe)	--	44
Nitrogen Oxide Emissions (Thousand Short Tons)	13	48	Percentage Share of Capability	--	44
Carbon Dioxide Emissions (Thousand Short Tons)	2,864	48	Generation (MWh)	--	44
Sulfur Dioxide/sq. mile (Tons)	0.18	46	Percentage Share of Generation	--	44
Nitrogen Oxides/sq. mile (Tons)	0.17	48			
Carbon Dioxide/sq. mile (Tons)	37.74	49			

-- = Not applicable.

Table 2. Five Largest Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Oahe	Hydro	USCE-Missouri River District	784
2. Big Bend	Hydro	USCE-Missouri River District	536
3. Big Stone	Coal	Otter Tail Power Co	453
4. Ft Randall	Hydro	USCE-Missouri River District	368
5. Angus Anson	Gas	Northern States Power Co	232

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. USCE-Missouri River District	1,820	--	--	--	--	1,820
B. Otter Tail Power Co	496	452	43	--	--	--
C. Northern States Power Co	293	--	--	293	--	--
D. Northwestern Public Service Co	107	--	37	70	--	--
E. Black Hills Corp	100	22	78	--	--	--
Total	2,816	474	158	363	--	1,820
Percentage of Industry Capability	95.3	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

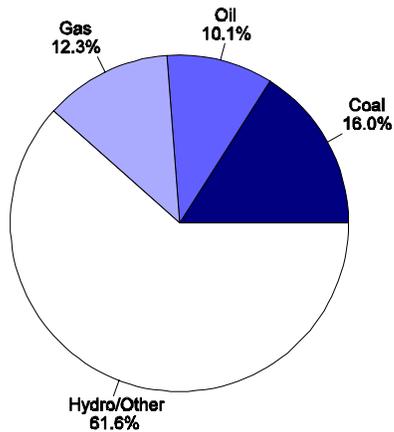


Figure 2. Utility Generation by Primary Energy Source, 1996

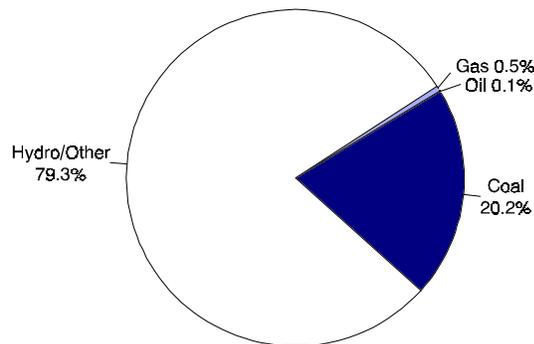


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

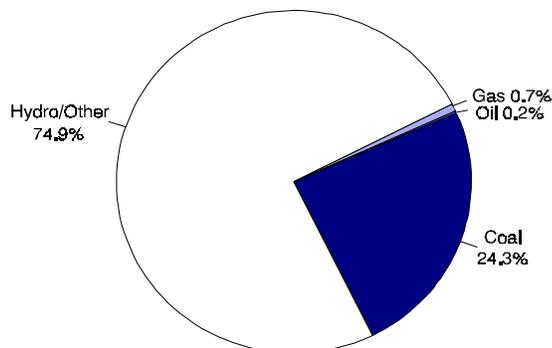


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	490	484	474	18.6	17.9	16.0
Oil	246	296	297	9.4	10.9	10.1
Gas	89	110	363	3.4	4.1	12.3
Nuclear	--	--	--	--	--	--
Hydro/Other	1,805	1,821	1,820	68.6	67.2	61.6
Total Utility	2,631	2,711	2,954	100.0	100.0	100.0
Total Nonutility	--	--	--	--	--	--
Industry	2,631	2,710	2,954	100.0	100.0	100.0

-- = Not applicable.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	2,095,449	2,727,087	2,029,901	26.8	41.5	20.2
Oil	7,096	8,427	8,975	0.1	0.1	0.1
Gas	1,091	9,036	49,728	(s)	0.1	0.5
Nuclear	--	--	--	--	--	--
Hydro/Other	5,704,151	3,828,116	7,977,670	73.1	58.2	79.3
Total Utility	7,807,787	6,572,666	10,066,274	100.0	100.0	100.0
Total Nonutility	--	--	--	--	--	--
Industry	7,807,787	6,572,666	10,066,274	100.0	100.0	100.0

-- = Not applicable. (s) = Nonzero percentage value less than 0.05.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.026	0.034	0.027	30.4	45.6	24.3
Oil	(s)	(s)	(s)	0.3	0.3	0.2
Gas	(s)	(s)	0.001	--	0.2	0.7
Nuclear	--	--	--	--	--	--
Hydro/Other	0.060	0.040	0.082	69.2	53.9	74.9
Total Utility	0.086	0.074	0.110	100.0	100.0	100.0
Total Nonutility	--	--	--	--	--	--
Industry	0.086	0.074	0.110	100.0	100.0	100.0

-- = Not applicable. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

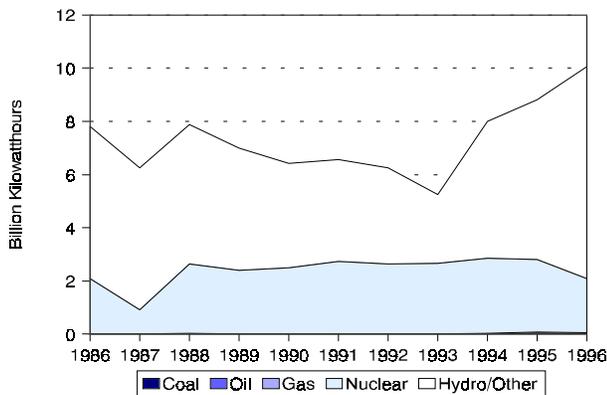


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

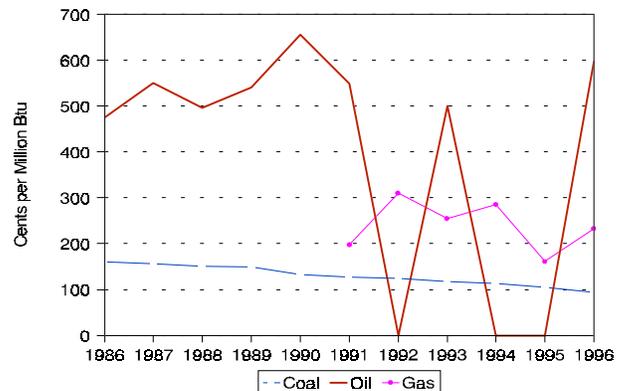


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	160.1	127.3	93.7	-5.2
Oil	475.0	548.4	597.9	2.3
Gas	--	197.6	233.0	--

-- = Not applicable.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	27	33	14	-6.4
Nitrogen Oxides ^d . .	16	20	13	-2.1
Carbon Dioxide ^d . .	2,753	3,518	2,864	0.4

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

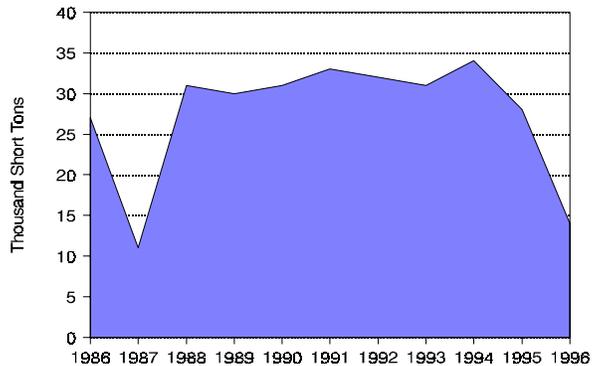


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

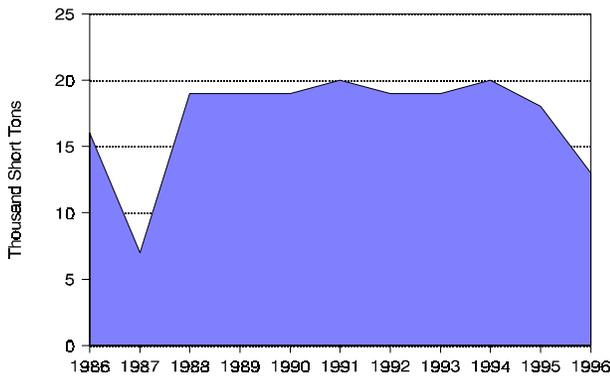


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

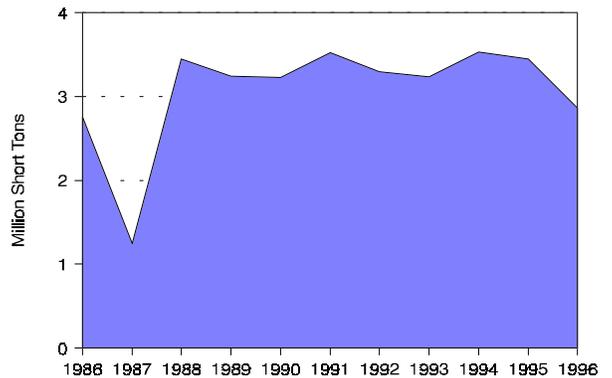


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	2,754,236	3,039,891	3,426,185	2.2	48.5	45.5	44.3
Commercial	1,223,032	1,521,975	2,179,182	5.9	21.6	22.8	28.2
Industrial . . .	1,316,395	1,726,158	1,784,753	3.1	23.2	25.8	23.1
Other	379,963	397,116	346,042	-0.9	6.7	5.9	4.5
Total	5,673,627	6,685,140	7,736,162	3.1	100.0	100.0	100.0

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	6	34	1	36	77
Number of Retail Customers	169,746	44,908	15	104,979	319,648
Retail Sales (MWh)	2,997,674	814,627	164,492	1,696,834	5,673,627
Percentage of Retail Sales	52.8	14.4	2.9	29.9	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	248,932	41,058	1,319	147,839	439,531
Percentage of Revenue	56.6	9.3	0.4	33.6	100.0
	1991				
Number of Utilities	6	34	1	36	77
Number of Retail Customers	180,904	50,020	15	109,323	340,262
Retail Sales (MWh)	3,670,477	961,188	150,703	1,902,772	6,685,140
Percentage of Retail Sales	54.9	14.4	2.3	28.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	261,632	46,027	1,461	151,145	460,447
Percentage of Revenue	56.8	10.0	0.4	32.8	100.0
	1996				
Number of Utilities	6	34	1	34	75
Number of Retail Customers	194,987	52,622	11	117,687	365,307
Retail Sales (MWh)	4,237,504	1,114,605	144,113	2,239,940	7,736,162
Percentage of Retail Sales	54.8	14.4	1.9	29.0	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	272,025	51,503	2,133	152,710	478,371
Percentage of Revenue	56.9	10.8	0.5	31.9	100.0

Tennessee

Tennessee had the seventeenth largest population and the fourteenth largest utility generating capability in 1996. Most of the electricity in Tennessee is generated at coal-fired plants. Four of the five largest plants in the State, including Cumberland, the largest, are coal-fired. Tennessee is also reliant on nuclear power and hydroelectric power. The second largest plant in the State, Sequoyah, is one of the two nuclear plants in Tennessee. Watts Bar, the other Tennessee nuclear plant, is the last nuclear power plant to come on-line in the United States. The federally owned Tennessee Valley Authority (TVA), a creation of Franklin D. Roosevelt's New Deal and the largest utility in the United States, is by far the largest utility presence in Tennessee. With the exception of some small hydroelectric plants operated by the United States Army Corps of Engineers, TVA produces and sells all electric power in the State. TVA provides wholesale power under 10-year contracts to 159 municipal utilities and cooperatives in 7 southern States.¹

In 1996, coal-fired plants produced 60.2 percent of Tennessee's net generation; the two nuclear units produced 24.9 percent. Nuclear generation has increased and coal generation has decreased since 1986. This increase in the nuclear share of generation is largely a result of the fact that Sequoyah did not produce any electricity (but did consume some, resulting in negative net generation) in 1986, and in 1996 Watts Bar 1 began producing electricity.

The Clean Air Act Amendments of 1990 specified 6,332 megawatts of Tennessee nameplate capacity at four plants to begin compliance with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides

(NO_x) in 1995. In 1996, Tennessee's emissions of SO₂, NO_x, and carbon dioxide ranked tenth, fifteenth, and fifteenth, respectively, in the United States.

Tennessee's SO₂ emissions from electricity generators declined slightly from 1986 to 1991, but then were reduced much more in 1996. It is likely that Tennessee will need to design a State implementation plan (SIP) for reducing ground-level ozone in response to a proposal released by the Environmental Protection Agency (EPA) in October 1998. The EPA SIP call proposal does not mandate which sources must reduce pollution. However, EPA states that utilities would be one of the most likely sources of NO_x emissions reductions.

Interest in restructuring the electric power industry in Tennessee is very low due to the gargantuan presence of TVA, a Federal utility that is not subject to Tennessee's Public Utility Commission control, and the relatively low price of electricity in the State. In 1996, the average price, 5.24 cents per kilowatt-hour, was the ninth least expensive in the United States. Some of TVA's wholesale customers have discussed allowing 5-year power purchase contracts rather than the current 10-year rolling contracts with TVA. At least one municipal (in Virginia) has left the TVA system. Just recently, the TVA and the Tennessee Public Power Association reached an agreement whereby TVA could sell retail power outside its service territory, but must permit marketers to sell in TVA's territory. The 10-year power purchase contracts will remain in place, but the agreement will allow reduced purchases in exchange for recovery of stranded investment for lost load.²

¹The seven States are Tennessee, Kentucky, Virginia, North Carolina, Georgia, Alabama, and Mississippi.

²Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

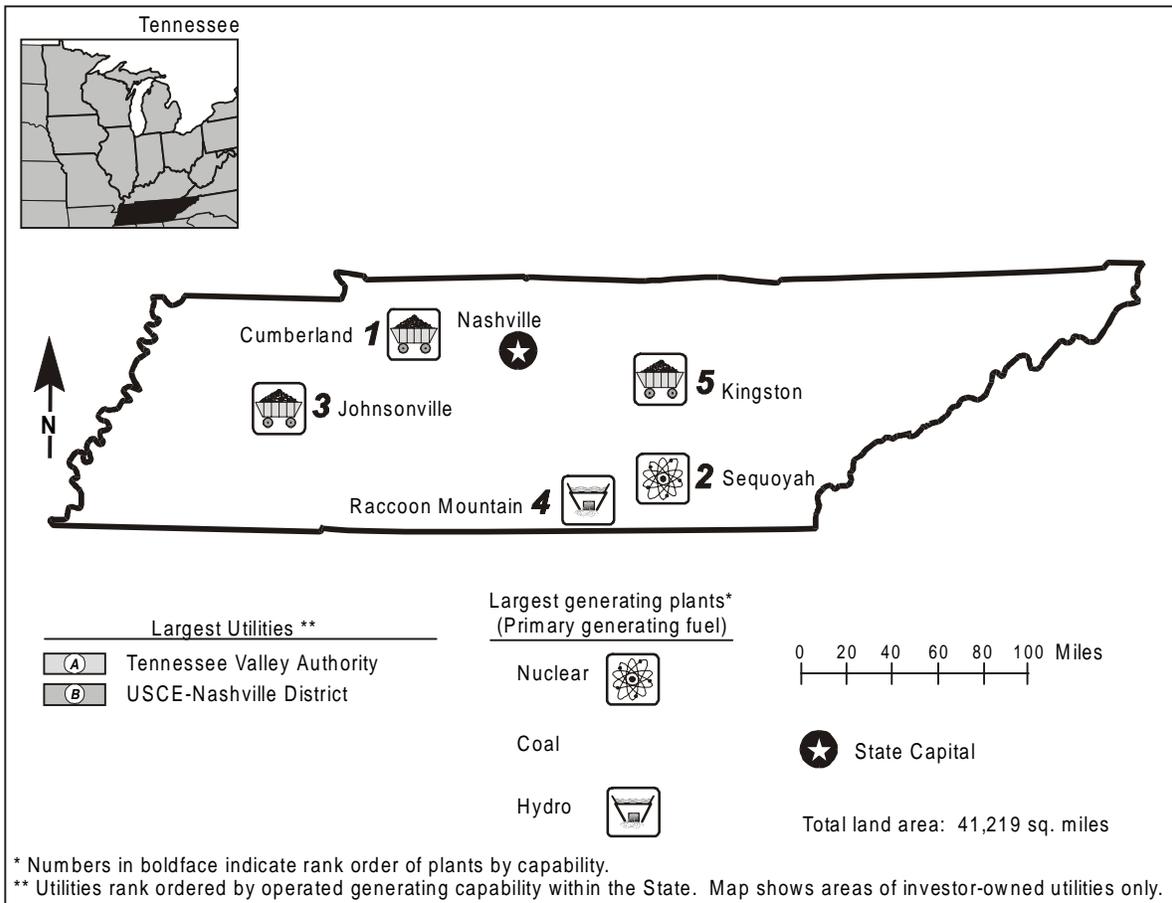


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		ECAR/SERC	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	17,253	14
State Primary Generating Fuel		Coal	Generation (MWh)	88,647,111	14
Population (as of 7/96)	5,307,381	17	Average Age of Coal Plants	35 years	
Average Revenue (cents/kWh)	5.24	^a 9	Average Age of Oil-fired Plants	21 years	
Industry			Average Age of Gas-fired Plants	25 years	
Capability (MWe)	17,871	^b 16	Average Age of Nuclear Plants	10 years	
Generation (MWh)	92,142,427	^b 14	Average Age of		
Capability/person			Hydroelectric Plants	34 years	
(KWe/person)	3.37	^b 15	Average Age of Other Plants . . .	--	
Generation/person			Nonutility^c		
(MWh/person)	17.36	^b 10	Capability (MWe)	618	25
Sulfur Dioxide Emissions			Percentage Share of Capability	3.5	36
(Thousand Short Tons)	537	10	Generation (MWh)	3,495,316	23
Nitrogen Oxide Emissions			Percentage Share of		
(Thousand Short Tons)	218	14	Generation	3.8	33
Carbon Dioxide Emissions			-- = Not applicable.		
(Thousand Short Tons)	64,964	15			
Sulfur Dioxide/sq. mile (Tons)	13.03	11			
Nitrogen Oxides/sq. mile (Tons)	5.29	15			
Carbon Dioxide/sq. mile (Tons)	1,576.07	21			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Cumberland	Coal	Tennessee Valley Authority	2,448
2. Sequoyah	Nuclear	Tennessee Valley Authority	2,223
3. Johnsonville	Coal/Oil	Tennessee Valley Authority	2,006
4. Raccoon Mountain	Hydro	Tennessee Valley Authority	1,532
5. Kingston	Coal	Tennessee Valley Authority	1,434

Table 3. Top Two Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Tennessee Valley Authority	16,734	8,615	1,096	472	3,345	3,206
B. USCE-Nashville District	519	0	0	0	0	519
Total	17,253	8,615	1,096	472	3,345	3,725
Percentage of Industry Capability	96.5	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

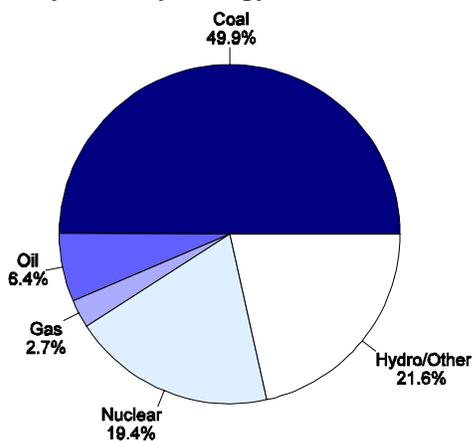


Figure 2. Utility Generation by Primary Energy Source, 1996

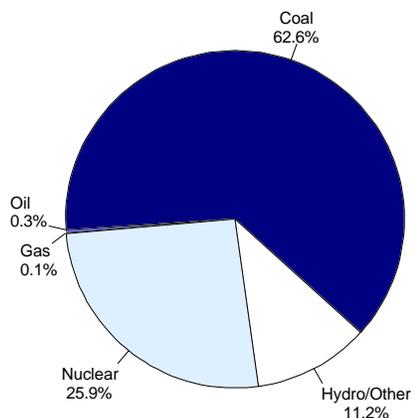


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

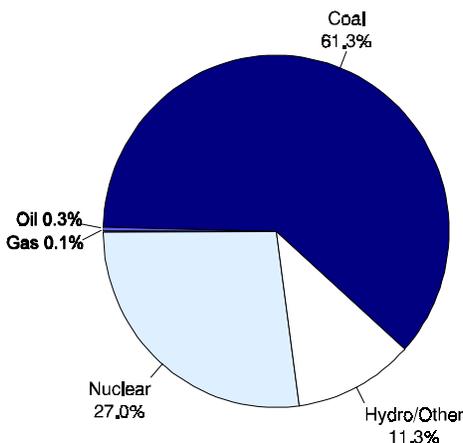


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	9,289	8,702	8,615	53.4	52.2	48.2
Oil	1,152	1,100	1,096	6.6	6.6	6.1
Gas	516	480	472	3.0	2.9	2.6
Nuclear	2,296	2,244	3,345	13.2	13.5	18.7
Hydro/Other	3,750	3,743	3,725	21.5	22.5	20.8
Total Utility	17,003	16,269	17,253	97.7	97.6	96.5
Total Nonutility	401	403	618	2.3	2.4	3.5
Industry	17,404	16,672	17,871	100.0	100.0	100.0

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	51,107,785	46,671,234	55,504,189	86.9	61.3	60.2
Oil	126,248	160,072	257,586	0.2	0.2	0.3
Gas	--	17,014	60,783	--	(s)	0.1
Nuclear	(104,602)	16,586,744	22,924,239	-0.2	21.8	24.9
Hydro/Other	5,325,503	10,496,606	9,900,314	9.1	13.8	10.7
Total Utility	56,454,934	73,931,670	88,647,111	96.0	97.1	96.2
Total Nonutility	2,365,861	2,242,435	3,495,316	4.0	2.9	3.8
Industry	58,820,795	76,174,105	92,142,427	100.0	100.0	100.0

-- = Not applicable. (s) = Nonzero percentage less than 0.05.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.501	0.468	0.552	77.8	54.7	55.5
Oil	0.001	0.002	0.003	0.2	0.2	0.3
Gas	--	(s)	0.001	--	--	0.1
Nuclear	--	0.178	0.244	--	20.9	24.5
Hydro/Other	0.056	0.109	0.102	8.6	12.7	10.3
Total Utility	0.557	0.756	0.901	86.6	88.5	90.6
Total Nonutility	0.086	0.098	0.093	13.4	11.5	9.4
Industry	0.644	0.854	0.994	100.0	100.0	100.0

-- = Not applicable. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

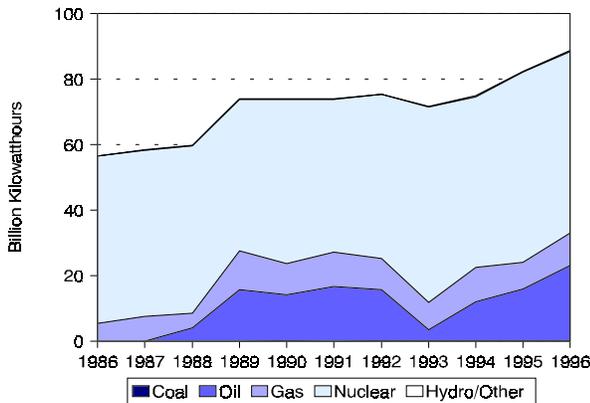


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

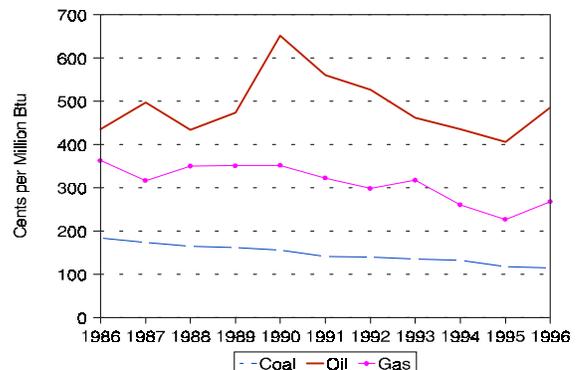


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	183.2	140.7	114.6	-4.6
Oil	434.8	560.1	484.6	1.1
Gas	--	--	--	--

-- = Not applicable.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	798	797	537	-3.9
Nitrogen Oxides ^d . .	198	206	218	1.0
Carbon Dioxide ^d . . .	50,694	57,270	64,964	2.5

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

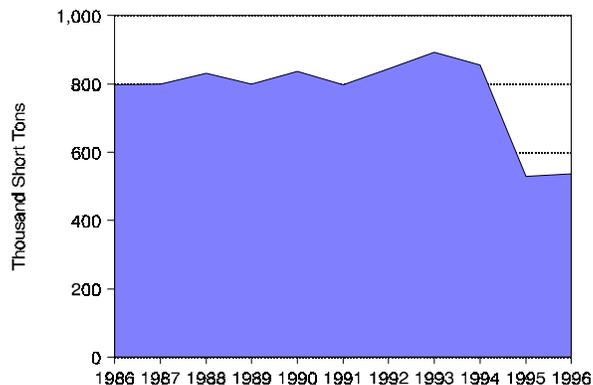


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

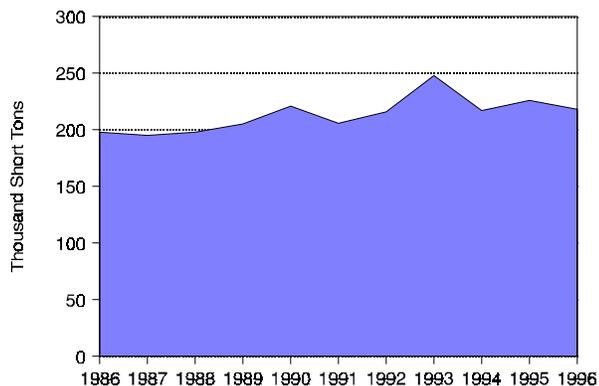


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

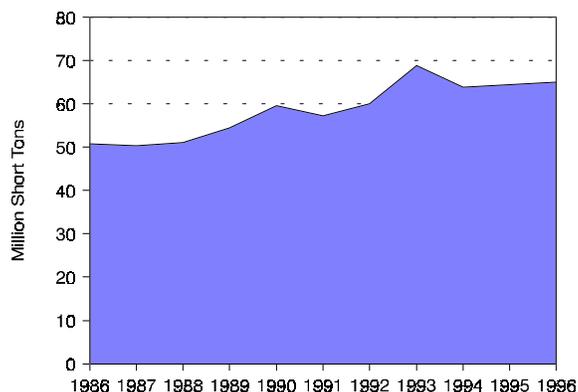


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential .	25,884,198	29,605,275	35,333,276	3.2	38.2	37.8	40.3
Commercial	8,733,881	12,096,992	5,548,085	-4.4	12.9	15.4	6.3
Industrial . .	32,196,025	35,667,296	45,781,283	3.6	47.5	45.5	52.2
Other	993,600	1,020,578	996,370	0.0	1.5	1.3	1.1
Total	67,807,702	78,390,141	87,659,014	2.6	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

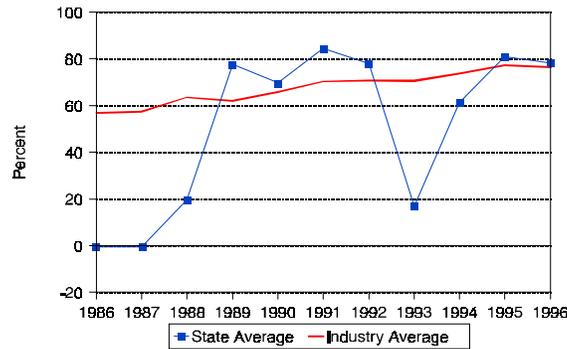


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	4	63	1	25	93
Number of Retail Customers	36,312	1,537,859	43	539,670	2,113,884
Retail Sales (MWh)	2,727,372	44,850,490	9,875,892	10,353,948	67,807,702
Percentage of Retail Sales	4.0	66.1	14.6	15.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	86,403	2,928,686	573,863	714,847	4,470,794
Percentage of Revenue	1.9	65.5	16.6	16.0	100.0
1991					
Number of Utilities	4	63	1	26	94
Number of Retail Customers	39,111	1,684,485	57	616,307	2,339,960
Retail Sales (MWh)	3,328,252	52,291,676	10,029,295	12,740,918	78,390,141
Percentage of Retail Sales	4.3	66.7	12.8	16.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	90,271	3,209,089	399,850	840,605	4,589,395
Percentage of Revenue	2.0	69.9	9.8	18.3	100.0
1996					
Number of Utilities	3	63	1	25	92
Number of Retail Customers	42,304	1,806,324	43	692,736	2,541,407
Retail Sales (MWh)	1,894,673	61,363,703	8,367,390	16,033,248	87,659,014
Percentage of Retail Sales	2.2	70.0	9.6	18.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	82,190	3,336,437	238,198	936,883	4,593,708
Percentage of Revenue	1.8	72.6	5.2	20.4	100.0

Texas

The first power plant in Texas began operation in Galveston in 1882, about the same time one was completed in Houston. The first plant in North Texas began operation in Dallas in 1883.¹ One hundred thirteen years later, Texas had the second largest population and the largest utility generating capability in the United States. The largest part of the utility electricity generated in Texas is from coal-fired plants, although the largest part of capability is gas-fired. Two of the five largest plants in Texas, including Houston Lighting and Power's W.A. Parish, the largest, are coal-fired. W. A. Parish is the third largest plant and the largest coal-fired plant in the Nation. Texas also relies on gas-fired plants, especially since Texas produces more natural gas than any other State. In terms of generating capability, the Texas Electric Utilities Company is the largest in the State and the third largest in the Nation. Nonutilities provide about 12 percent of capability and almost 17 percent of generation in the State.

The United States has three separate power grids connected by a few direct current tie lines: the Eastern Interconnected System, the Western Interconnected System, and the Texas Interconnected System. Utilities in each interconnection coordinate operations and planning and buy and sell power among themselves. Since utilities in the Texas Interconnected System are not connected with other utilities outside the State of Texas, and electric trade does not cross State boundaries for these utilities, the Federal Energy Regulatory Commission (FERC) does not have regulatory jurisdiction over them. In 1995, legislation was enacted to restructure the wholesale electricity industry in Texas consistent with FERC requirements for unbundled transmission service. The law also requires the establishment of an independent system operator (ISO). The ISO in the Electric Reliability Council of Texas (ERCOT)² differs somewhat from other ISOs like PJM and the one in California. The ERCOT ISO does not participate in generation dispatch, in power exchanges, in providing

ancillary services, or in establishing prices other than determining the cost of any redispatch needed to allow transactions to occur. In 1996, the Public Utility Commission (PUC) of Texas issued rules implementing the legislation that required transmission-owning utilities in the State to provide open access to the transmission system and ancillary services. The rule also required separation of transmission, distribution, and generation costs and rates, and the establishment of the ERCOT ISO.³

Texas did not have any generators that were named in the Clean Air Act Amendments of 1990 to begin compliance with stricter emissions reductions requirements for sulfur dioxide (SO₂) and nitrogen oxides (NO_x) in 1995. Emissions of SO₂ from Texas generators ranked eleventh in the Nation in 1996. Texas led the Nation in emissions of NO_x and carbon dioxide (CO₂) from generators of electric power. However, the concentrations of these pollutants per square mile ranked thirtieth, twenty-seventh and twenty-sixth, respectively. Emissions of SO₂ and NO_x from Texas generators increased from 1986 to 1991. The emissions totals of both pollutants then decreased from 1991 to 1996 but not back to the 1986 levels. CO₂ emissions increased over both time periods. The increase in the first time period was more substantial, however.

The average price of electricity, 6.16 cents per kilowatt-hour, was twenty-sixth most expensive in the Nation. Although the price in Texas was the national median price, it was more than half a cent per kilowatt-hour lower than the national average price. In 1996, 10 investor-owned utilities, 72 publicly owned utilities, and 79 cooperative utilities sold retail electricity in the State. The Texas Utilities Electric Company and Houston Power & Light, both investor-owned, are the largest utilities in the State in terms of retail sales. Investor-owned utilities in Texas sold almost 80 percent of retail electricity in the State in 1996.

¹Vance Gillmore, *And Work was Made Less, History of the Texas Electric Service Company*, Texas Electric Service Company (Fort Worth, TX, 1976) p.1.

²There are nine Regional Electric Reliability Councils in the United States. The Texas Interconnected System is also itself the Electric Reliability Council of Texas.

³Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

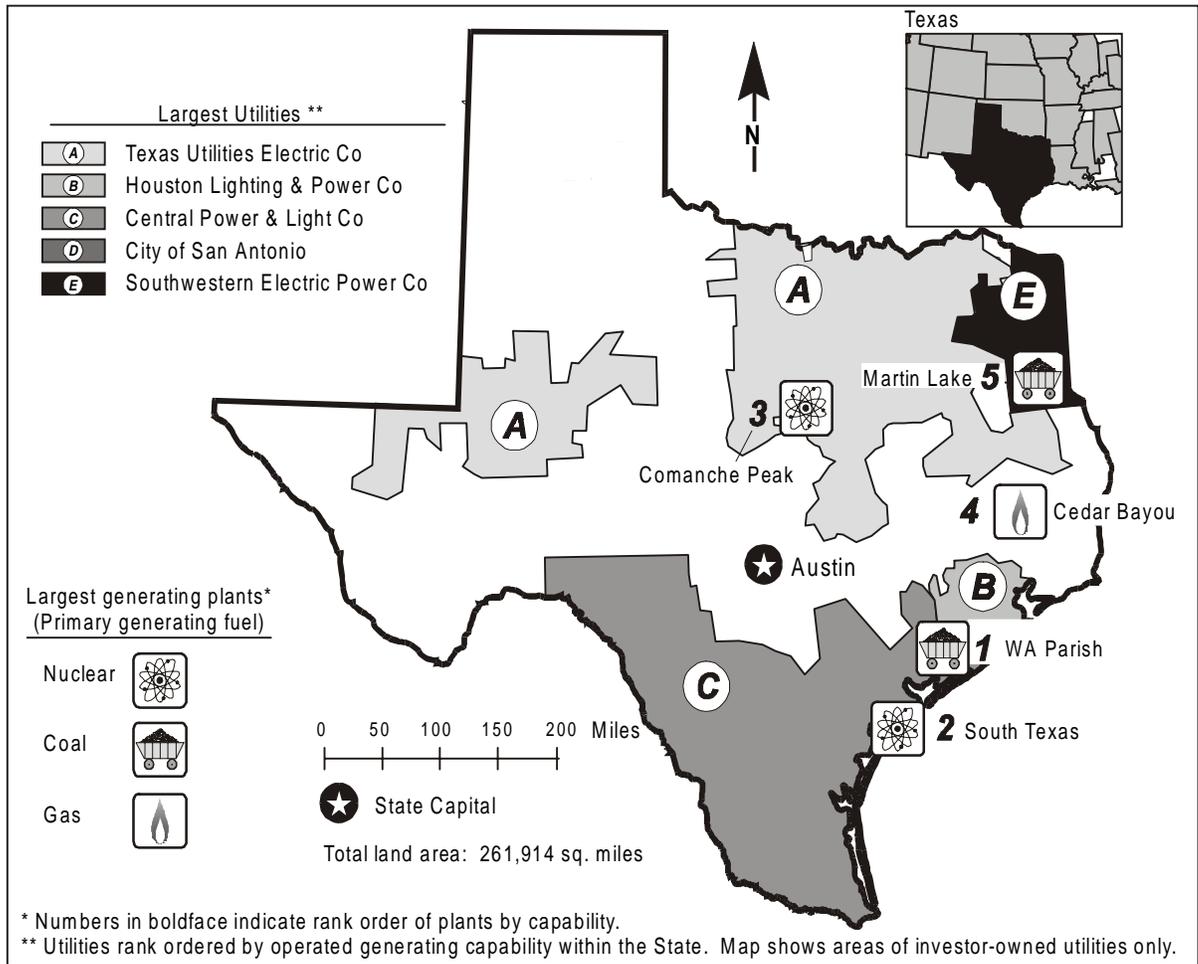


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)	ERCOT/SPP/WCSS/SERC		Utility		
Net Exporter or Importer		Importer	Capability (MWe)	64,767	1
State Primary Generating Fuel		Coal	Generation (MWh)	272,282,585	1
Population (as of 7/96)	19,091,207	2	Average Age of Coal Plants	16 years	
Average Revenue (cents/kWh)	6.16	^a 26	Average Age of Oil-fired Plants	35 years	
Industry			Average Age of Gas-fired Plants	28 years	
Capability (MWe)	73,360	^b 1	Average Age of Nuclear Plants	6 years	
Generation (MWh)	327,371,326	^b 1	Average Age of Hydroelectric Plants	41 years	
Capability/person (KWe/person)	3.84	^b 11	Average Age of Other Plants	9 years	
Generation/person (MWh/person)	17.15	^b 11	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	519	11	Capability (MWe)	8,593	2
Nitrogen Oxide Emissions (Thousand Short Tons)	754	1	Percentage Share of Capability	11.7	14
Carbon Dioxide Emissions (Thousand Short Tons)	268,921	1	Generation (MWh)	55,088,741	2
Sulfur Dioxide/sq. mile (Tons)	1.98	30	Percentage Share of Generation	16.8	11
Nitrogen Oxides/sq. mile (Tons)	2.88	27			
Carbon Dioxide/sq. mile (Tons)	1,026.75	26			

Table 2. Five Largest Plants, 1996

Plant	Type	Operating Utility	Net Capacity (MWe)
1. W A Parish	Coal/Gas	Houston Lighting & Power Co	3,614
2. South Texas	Nuclear	Houston Lighting & Power Co	2,502
3. Comanche Peak	Nuclear	Texas Utilities Electric Co	2,430
4. Cedar Bayou	Gas	Houston Lighting & Power Co	2,250
5. Martin Lake	Coal	Texas Utilities Electric Co	2,250

Table 3. Top Five Utilities with Largest Generating Capacities, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Texas Utilities Electric Co	21,355	5,825	20	13,080	2,430	--
B. Houston Lighting & Power Co ...	15,653	3,855	--	9,296	2,502	--
C. Central Power & Light Co	3,793	632	--	3,155	--	6
D. City of San Antonio	3,725	1,340	--	2,385	--	--
E. Southwestern Electric Power Co	3,637	2,234	--	1,403	--	--
Total	48,163	13,886	20	29,319	4,932	6
Percentage of Industry Capability	65.7	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

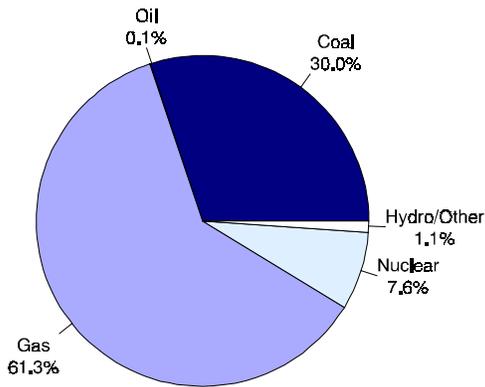


Figure 2. Utility Generation by Primary Energy Source, 1996

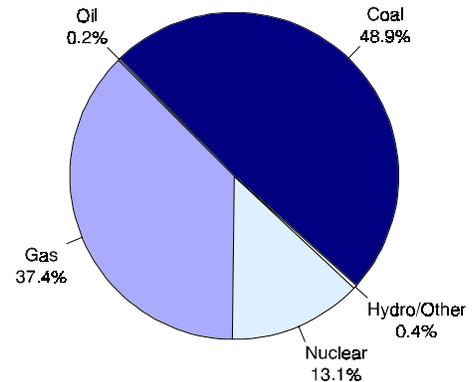


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

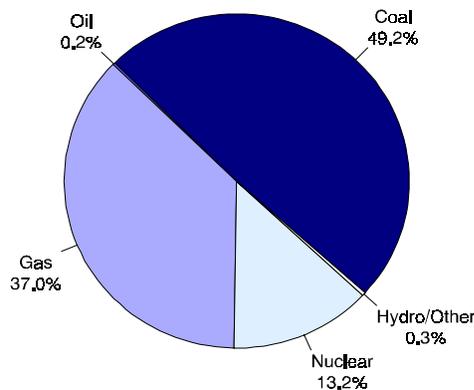


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	18,059	18,776	19,399	29.1	27.1	26.4
Oil	603	58	48	1.0	0.1	0.1
Gas	37,346	39,052	39,705	60.3	56.4	54.1
Nuclear	--	3,650	4,932	--	5.3	6.7
Hydro/Other	659	644	683	1.1	0.9	0.9
Total Utility	56,667	62,180	64,767	91.4	89.8	88.3
Total Nonutility	5,300	7,069	8,593	8.6	10.2	11.7
Industry	61,967	69,249	73,360	100.0	100.0	100.0

-- = Not applicable.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	100,855,392	118,085,107	133,255,364	40.5	41.3	40.7
Oil	410,162	218,714	558,659	0.2	0.1	0.2
Gas	109,305,066	97,738,623	101,748,031	43.9	34.2	31.1
Nuclear	--	19,799,867	35,766,550	--	6.9	10.9
Hydro/Other	2,279,837	2,501,057	953,981	0.9	0.9	0.3
Total Utility	212,850,456	238,343,368	272,282,585	85.5	83.3	83.2
Total Nonutility	36,072,372	47,696,383	55,088,741	14.5	16.7	16.8
Industry	248,922,828	286,039,751	327,371,326	100.0	100.0	100.0

-- = Not applicable.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	1.082	1.270	1.412	37.3	38.6	38.2
Oil	0.005	0.003	0.006	0.2	0.1	0.2
Gas	1.146	1.035	1.064	39.5	31.5	28.8
Nuclear	--	0.213	0.380	--	6.5	10.3
Hydro/Other	0.024	0.026	0.010	0.8	0.8	0.3
Total Utility	2.257	2.547	2.872	77.8	77.5	77.6
Total Nonutility	0.645	0.741	0.828	22.2	22.5	22.4
Industry	2.902	3.287	3.700	100.0	100.0	100.0

-- = Not applicable.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

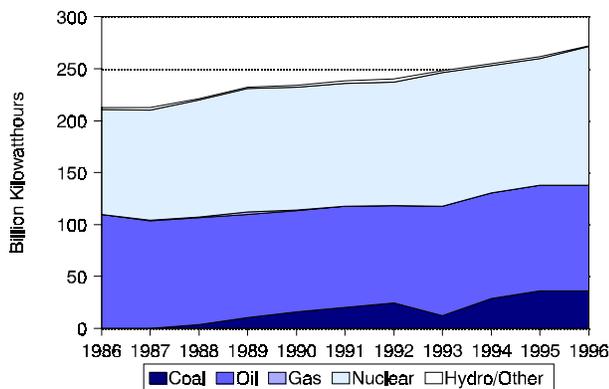


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

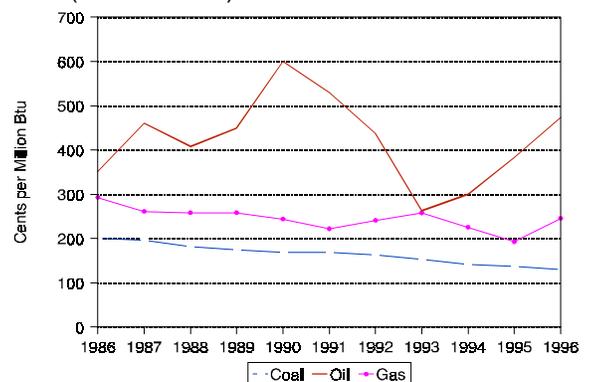


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	200.0	168.5	129.5	-4.3
Oil	351.8	529.3	473.2	3.0
Gas	293.0	221.9	245.6	-1.8

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	405	586	519	2.5
Nitrogen Oxides ^d	528	751	754	3.6
Carbon Dioxide ^d	178,356	247,317	268,921	4.2

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

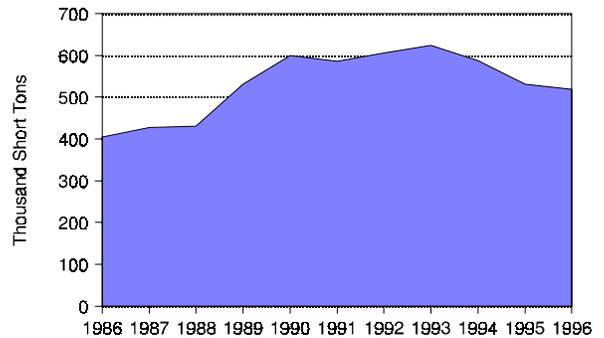


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

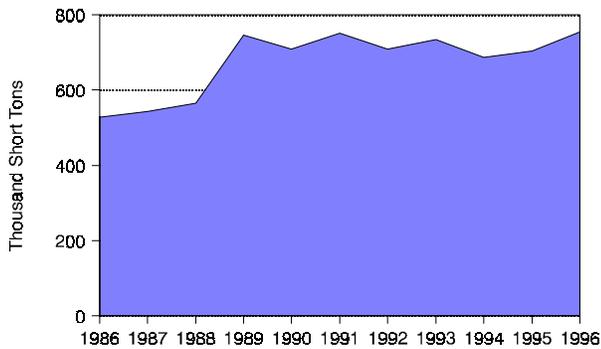


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

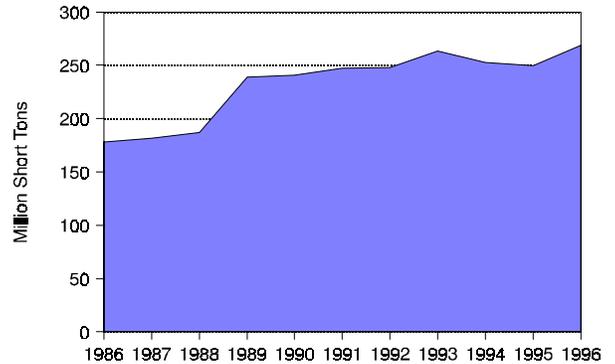


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential	72,392,320	84,088,111	99,656,148	3.2	33.9	35.0	35.8
Commercial	55,268,865	61,447,400	70,865,539	2.5	25.9	25.6	25.5
Industrial	79,527,235	84,122,423	95,308,450	1.8	37.3	35.0	34.2
Other	6,081,122	10,693,853	12,619,446	7.6	2.9	4.4	4.5
Total	213,269,549	240,351,787	278,449,583	2.7	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

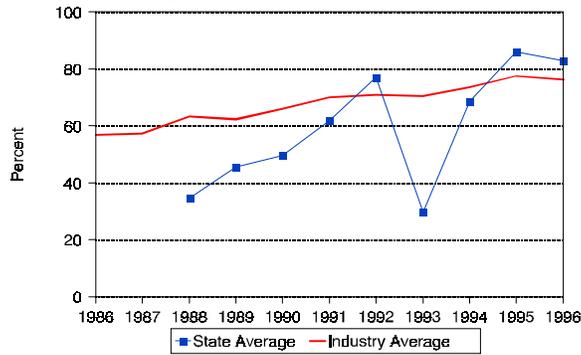


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	11	72	--	79	162
Number of Retail Customers	5,099,332	1,110,329	--	1,006,498	7,216,159
Retail Sales (MWh)	174,306,480	24,267,249	--	14,695,820	213,269,549
Percentage of Retail Sales	81.7	11.4	--	6.9	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	12,093,541	2,006,925	--	1,326,677	15,427,143
Percentage of Revenue	78.4	13.0	--	8.6	100.0
	1991				
Number of Utilities	10	73	--	79	162
Number of Retail Customers	5,380,460	1,143,727	--	1,074,170	7,598,357
Retail Sales (MWh)	194,343,526	28,040,029	--	17,968,232	240,351,787
Percentage of Retail Sales	80.9	11.7	--	7.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	13,068,332	1,903,722	--	1,387,143	16,359,197
Percentage of Revenue	79.9	11.6	--	8.5	100.0
	1996				
Number of Utilities	10	75	--	77	162
Number of Retail Customers	5,858,772	1,295,531	--	1,238,265	8,392,568
Retail Sales (MWh)	221,020,782	34,390,868	--	23,037,933	278,449,583
Percentage of Retail Sales	79.4	12.4	--	8.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	13,408,246	2,127,850	--	1,614,608	17,150,704
Percentage of Revenue	78.2	12.4	--	9.4	100.0

-- = Not applicable.

Utah

Utah had the thirty-fourth largest population and the fortieth largest utility generating capability in 1996. Most of the utility electricity generated in Utah is from coal-fired plants. In 1992, Utah coal mines supplied most of the coal burned in the State to generate electricity.¹ The four largest power plants in the State are coal-fired. None of the five largest plants is located in the southern third of the State. The largest plant in Utah, the Intermountain plant, is owned by the City of Los Angeles, California, which maintains a direct current linkage with the plant. Utah has no nuclear power and a small amount of hydropower generation provided by numerous small generators. The average price of electricity in Utah, 5.28 cents per kilowatt-hour, was eleventh least expensive in the Nation. Utah is a net exporter of electricity.

Like all States west of Kansas, Utah had no plants that were named in Title IV of the Clean Air Act Amendments of 1990 to begin compliance with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x). SO₂, NO_x and carbon dioxide (CO₂) emissions from Utah generators were in the lower half nationally both in absolute terms and in their concentrations. SO₂ emissions in 1991 declined from 1986 levels. They were almost the same in 1996 as they were in 1991. NO_x and CO₂ in 1991, on the other hand, both were almost double what they had been in 1986. They both had noticeable increases over the next five years as well.

In 1986, coal units represented 92.4 percent of Utah's utility generating capability and 90.1 percent of its utility net generation. In 1996, the coal share of capability had fallen to 88.8 percent while the net generation share had risen to 95.2 percent. Gas capability over the same time period rose from 3.2 percent of the utility total to 4.7 percent. In 1996, PacifiCorp, the largest utility in the State in terms of operated generating capability within Utah, was the only investor-owned utility in the State. Additionally, there were 41 publicly owned utilities, 1 federally owned utility (the Bureau of Reclamation), and 9 cooperatives. PacifiCorp accounted for over 81 percent of the retail electricity sales in Utah in 1996, while the publicly owned group sold almost 15 percent of the total in the State.

Utah is moving very cautiously toward restructuring its electric power industry because its average price of electricity is significantly below the national average price. In March 1997, the legislature passed a bill that created a legislative task force to study electric power restructuring and consumer choice issues in the State. Several issues have been addressed, including unbundling distribution, transmission, and generation costs and stranded costs. The task force has recommended a slow approach to restructuring and was expected to have begun working on draft legislation in the fall of 1998. In March of 1998, the legislature passed a House Joint Resolution which calls for proposals for draft legislation to be considered in the 1999 legislative session.²

¹Energy Information Administration, *State Coal Profiles*, DOE/EIA0576 (Washington, DC, January 1994), p. 91.

²Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

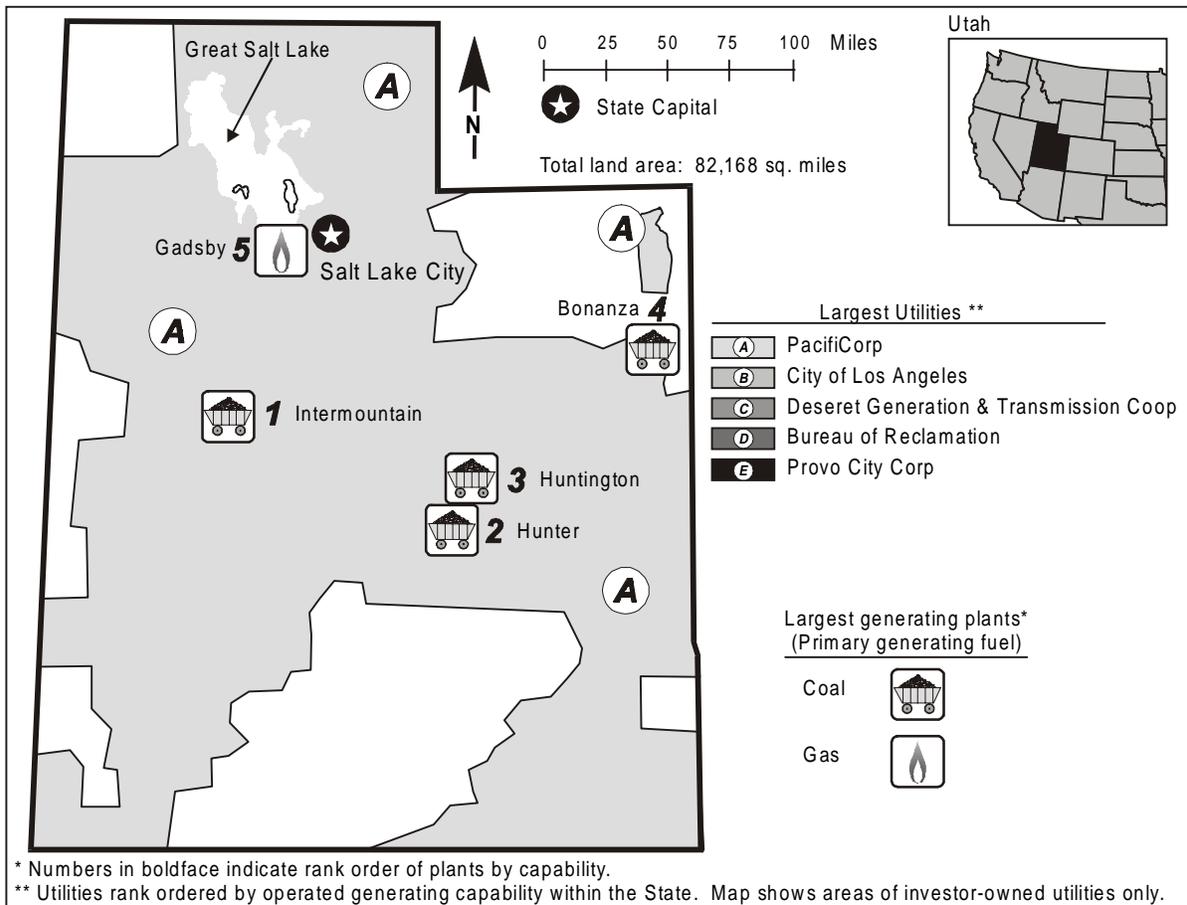


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		WSCC	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	4,926	40
State Primary Generating Fuel		Coal	Generation (MWh)	32,228,605	32
Population (as of 7/96)	2,107,573	34	Average Age of Coal Plants	15 years	
Average Revenue (cents/kWh)	5.28	^a 11	Average Age of Oil-fired Plants	18 years	
Industry			Average Age of Gas-fired Plants	36 years	
Capability (MWe)	5,062	^b 35	Average Age of Nuclear Plants	--	
Generation (MWh)	32,951,860	^b 31	Average Age of Hydroelectric Plants	40 years	
Capability/person (KWe/person)	2.51	^b 30	Average Age of Other Plants	11 years	
Generation/person (MWh/person)	16.33	^b 12	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	28	43	Capability (MWe)	136	39
Nitrogen Oxide Emissions (Thousand Short Tons)	124	27	Percentage Share of Capability	2.7	37
Carbon Dioxide Emissions (Thousand Short Tons)	37,653	27	Generation (MWh)	732,255	40
Sulfur Dioxide/sq. mile (Tons)	0.34	45	Percentage Share of Generation	2.2	40
Nitrogen Oxides/sq. mile (Tons)	1.51	37			
Carbon Dioxide/sq. mile (Tons)	458.24	37			

-- = Not applicable.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Intermountain	Coal	City of Los Angeles	1,620
2. Hunter	Coal	PacifiCorp	1,225
3. Huntington	Coal	PacifiCorp	845
4. Bonanza	Coal	Deseret Generation & Tran Coop	425
5. Gadsby	Gas/Coal	PacifiCorp	235

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. PacifiCorp	2,569	2,320	--	174	--	75
B. City of Los Angeles	1,620	1,620	--	--	--	--
C. Deseret Generation & Tran Coop	425	425	--	--	--	--
D. Bureau of Reclamation	157	--	--	--	--	157
E. Provo City Corp	31	9	--	10	--	12
Total	4,802	4,374	--	184	--	244
Percentage of Industry Capability	94.9	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

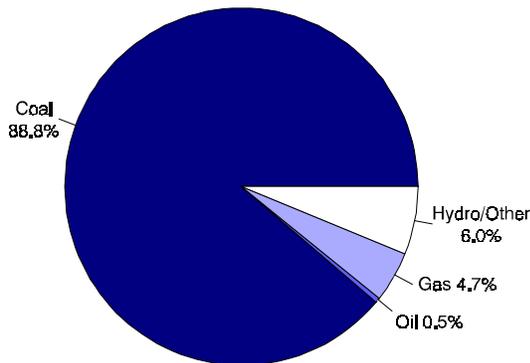


Figure 2. Utility Generation by Primary Energy Source, 1996

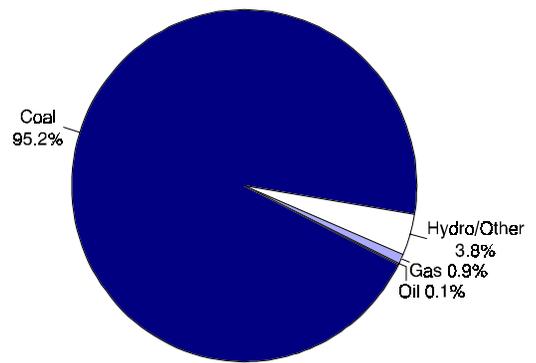


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

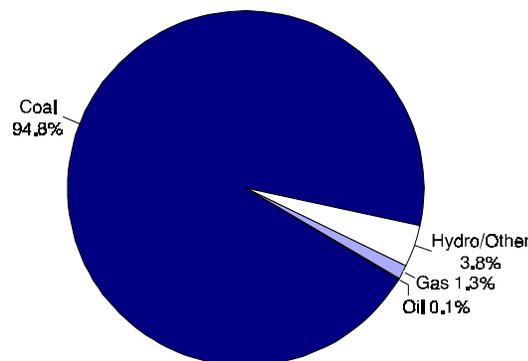


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	3,638	4,271	4,374	92.4	89.3	88.8
Oil	15	28	23	0.4	0.6	0.5
Gas	125	228	231	3.2	4.8	4.7
Nuclear	--	--	--	--	--	--
Hydro/Other	159	258	297	4.0	5.4	6.0
Total Utility	3,938	4,785	4,926	100.0	100.0	100.0
Total Nonutility	W	W	136	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	15,154,780	28,883,914	30,693,187	90.1	95.8	95.2
Oil	73,664	47,586	30,957	0.4	0.2	0.1
Gas	6,474	436,458	293,467	(s)	1.4	0.9
Nuclear	--	--	--	--	--	--
Hydro/Other	1,584,184	790,505	1,210,994	9.4	2.6	3.8
Total Utility	16,819,102	30,158,463	32,228,605	100.0	100.0	100.0
Total Nonutility	W	W	723,255	--	--	--

-- = Not applicable. (s) = Nonzero percentage less than 0.05. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.155	0.293	0.312	89.8	95.4	94.8
Oil	0.001	(s)	(s)	0.5	0.2	0.1
Gas	(s)	0.005	0.004	0.1	1.8	1.3
Nuclear	--	--	--	--	--	--
Hydro/Other	0.017	0.008	0.012	9.6	2.7	3.8
Total Utility	0.173	0.307	0.329	100.0	100.0	100.0
Total Nonutility	W	W	(s)	--	--	--

-- = Not applicable. (s) = Nonzero value less than 0.0005. W = Withheld.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

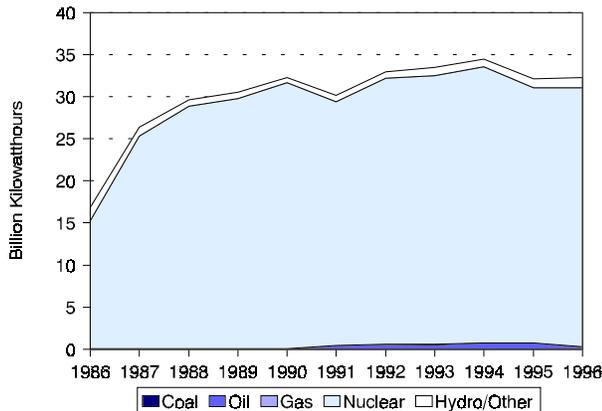


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

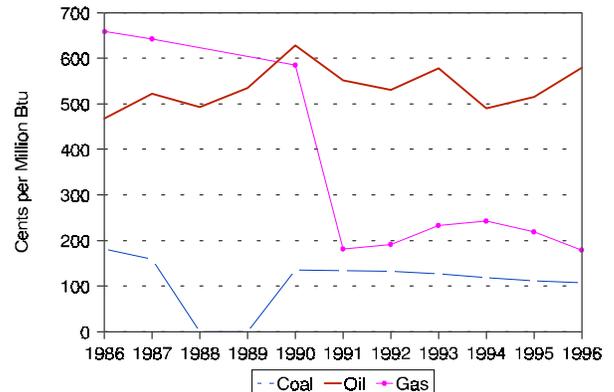


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	181.6	134.2	107.1	-5.1
Oil	467.2	551.1	579.2	2.2
Gas	658.3	181.5	179.0	-12.2

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	35	28	28	-2.2
Nitrogen Oxides ^d . .	54	104	124	8.7
Carbon Dioxide ^d . .	16,145	32,130	37,653	8.8

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

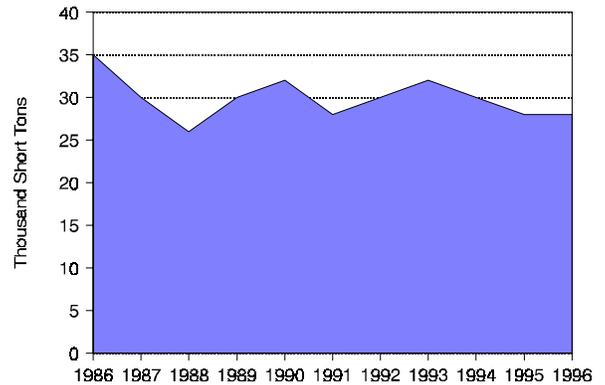


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

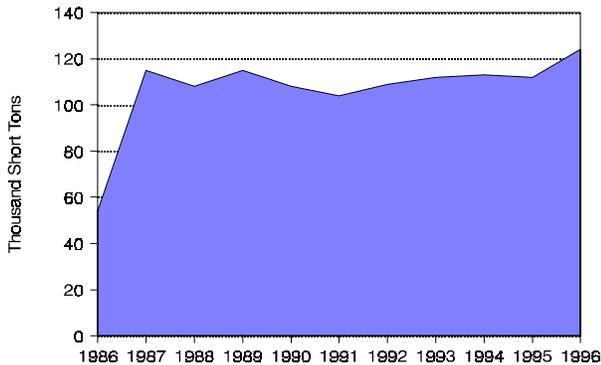


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

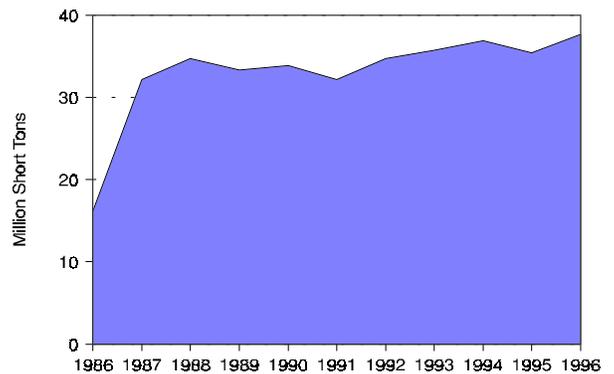


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	3,988,811	4,460,042	5,481,283	3.2	30.7	28.0	27.6
Commercial	3,912,872	4,733,977	5,911,250	4.2	30.1	29.8	29.8
Industrial . . .	4,318,493	5,875,925	7,659,819	5.9	33.2	36.9	38.6
Other	769,258	837,460	805,717	0.5	5.9	5.3	4.1
Total	12,989,435	15,907,404	19,858,069	4.3	100.0	100.0	100.0

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	2	37	1	9	49
Number of Retail Customers	459,380	115,109	5	21,434	595,928
Retail Sales (MWh)	10,453,683	1,838,453	21,808	675,491	12,989,435
Percentage of Retail Sales	80.5	14.2	0.2	5.2	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	930,360	128,625	250	52,761	1,112,069
Percentage of Revenue	83.7	11.6	(s)	4.7	100.0
1991					
Number of Utilities	1	37	1	9	48
Number of Retail Customers	495,855	125,901	8	23,185	644,949
Retail Sales (MWh)	12,839,075	2,320,798	65,264	682,267	15,907,404
Percentage of Retail Sales	80.7	14.6	0.4	4.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	774,319	155,583	946	45,295	976,260
Percentage of Revenue	79.3	15.9	0.1	4.6	100.0
1996					
Number of Utilities	1	41	1	9	52
Number of Retail Customers	567,268	158,321	7	27,054	752,650
Retail Sales (MWh)	16,168,351	2,966,649	62,715	660,354	19,858,069
Percentage of Retail Sales	81.4	14.9	0.3	3.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	824,516	182,601	1,144	40,994	1,049,255
Percentage of Revenue	78.6	17.4	0.1	3.9	100.0

(s) = Nonzero percentage less than 0.05.

Vermont

Vermont is the only State that has a plant among its five largest that is not a coal, gas, oil, nuclear, or hydroelectric plant. The J.C. McNeil plant, Vermont's third largest, is a wood-fired plant. Vermont had both the third smallest population and utility generating capability in 1996. Most of the utility electricity is generated at the Vermont Yankee nuclear plant, which is operated by the largest utility in the State, the Vermont Yankee Nuclear Power Corporation. In September 1998, the New England Electric System, the parent of the New England Power Company, the second largest utility in Vermont, sold the utility's generating assets to the U.S. Generating Company of Bethesda, Maryland. New England Power operated two of the five largest plants in Vermont in 1996: S.C. Moore and Bellows Falls. In addition to nuclear power, Vermont is also reliant on hydroelectric generation. There are no coal or gas utility units. The average price of electricity in Vermont, 9.74 cents per kilowatt-hour, was ninth most expensive in the Nation. Vermont is a net exporter of electricity.

Emissions of sulfur dioxide (SO₂) from Vermont generators were the lowest in the Nation in 1996. Nitrogen oxide (NO_x) and carbon dioxide (CO₂) emissions both were second lowest in 1996. The concentrations of SO₂ and NO_x per square mile were the lowest in the Nation and Vermont's CO₂ emissions concentration was fifth lowest. Emissions of SO₂ and NO_x were both less in 1996 than they were in 1986. CO₂ emissions, however, have increased substantially over the eleven-year period examined in this report. Vermont is part of the Ozone Transport Commission (OTC).¹ Each of the 13 States of the OTC is responsible for enacting regulations in order to achieve region-wide NO_x reductions in a consistent, enforceable manner and for

allocating its NO_x Budget Program allowances among NO_x sources in the State. The targets in this program are large industrial boilers and all electric generating facilities with a rated output of 15 megawatts or more. As of November 1998, Vermont had not issued its rulemaking for the NO_x Budget Program.

In 1986, the nuclear share of utility capability in Vermont was 44.6 percent, and the net generation share was 65.4 percent. In 1996, the nuclear share of capability rose to 45.4 percent, while the net generation share rose to 75.9 percent. Oil capability and generation were 11.6 percent and 0.5 percent, respectively, in 1986. By 1996, the oil shares had fallen to 10.9 percent and 0.1 percent, respectively.

In December 1996, the Vermont Public Services Board (PSB) issued a final plan for restructuring the State's electric power industry and allowing retail competition. The PSB plan called for retail choice for all consumers by 1998. Large investor-owned utilities would have to separate the generation, distribution, and transmission functions. Stranded costs would be recoverable through a non-bypassable competition transition charge collected by the distribution companies through 2012. Cooperatives, municipals, and small investor-owned utilities would have to provide retail choice and could seek recovery of stranded costs, but would not have to functionally unbundle distribution from generation. All competitive power suppliers would have to maintain a quota of renewable energy. The plan would need legislation to enact its provisions. In April 1998, legislation was passed by the Vermont Senate, but the House did not act on it, citing the need for more study of the issues. Legislation is expected to be addressed again in the 1999 legislative session.²

¹The Ozone Transport Region comprises the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Delaware, the northern counties of Virginia, and the District of Columbia.

²Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

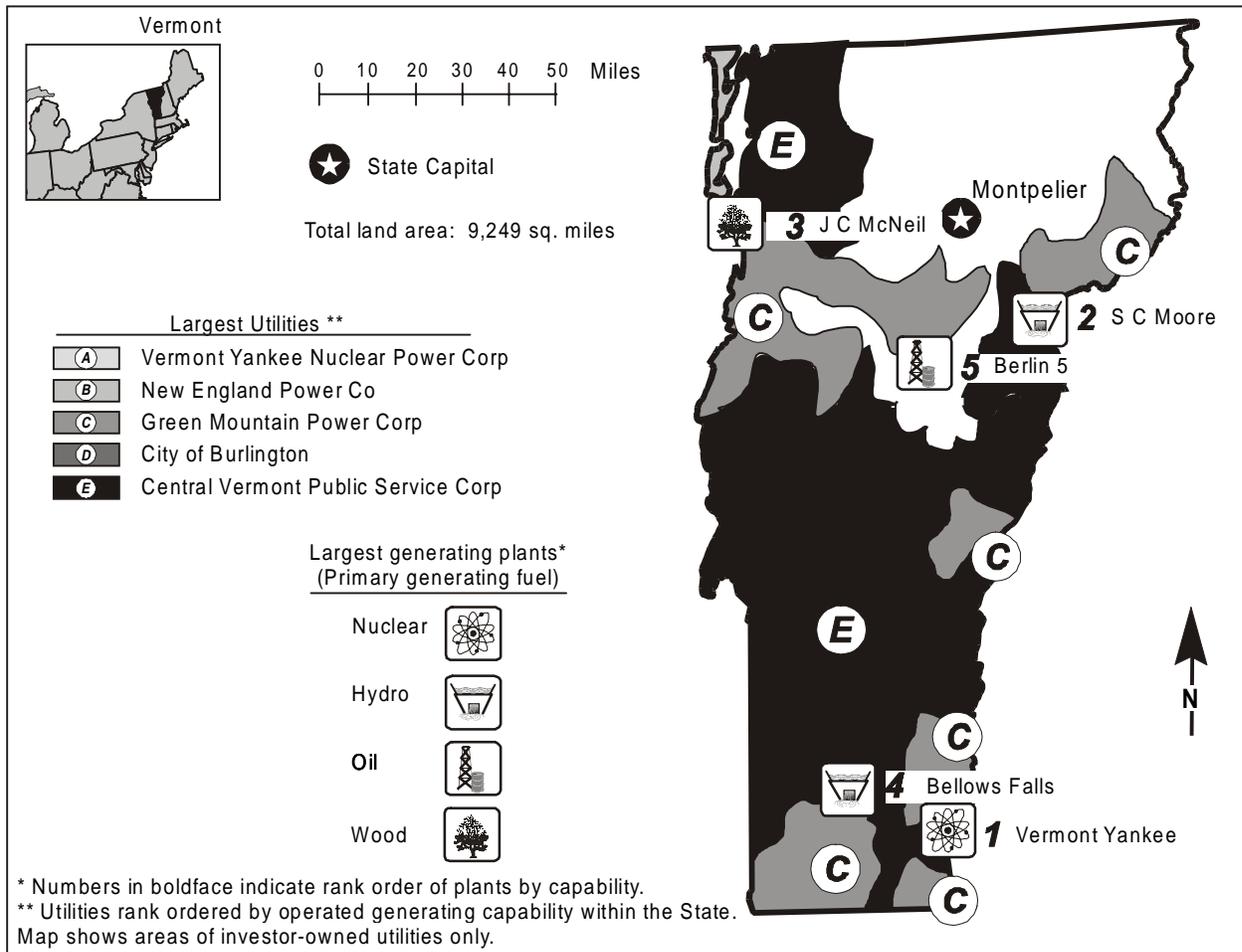


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		NPCC	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	1,092	49
State Primary Generating Fuel		Nuclear	Generation (MWh)	5,004,219	48
Population (as of 7/96)	586,461	49	Average Age of Coal Plants	--	
Average Revenue (cents/kWh)	9.74	^a 43	Average Age of Oil-fired Plants	28 years	
Industry			Average Age of Gas-fired Plants	--	
Capability (MWe)	1,165	^b 43	Average Age of Nuclear Plants	24 years	
Generation (MWh)	5,387,318	^b 44	Average Age of Hydroelectric Plants	53 years	
Capability/person (KWe/person)	1.99	^b 39	Average Age of Other Plants	12 years	
Generation/person (MWh/person)	9.19	^b 36	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	--	51	Capability (MWe)	73	42
Nitrogen Oxide Emissions (Thousand Short Tons)	(s)	51	Percentage Share of Capability	6.3	24
Carbon Dioxide Emissions (Thousand Short Tons)	572	50	Generation (MWh)	383,099	41
Sulfur Dioxide/sq. mile (Tons)	0.00	51	Percentage Share of Generation	7.1	23
Nitrogen Oxides/sq. mile (Tons)	0.00	50			
Carbon Dioxide/sq. mile (Tons)	61.84	48			

-- = Not applicable. (s) = Nonzero value less than 0.05.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Vermont Yankee	Nuclear	Vermont Yankee Nuc Pwr Corp	496
2. S C Moore	Hydro	New England Power Co	192
3. J C McNeil	Other	City of Burlington	50
4. Bellows Falls	Hydro	New England Power Co	49
5. Berlin 5	Oil	Green Mountain Power Corp	41

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Vermont Yankee Nucl Pwr Corp	496	--	--	--	496	--
B. New England Power Co	310	--	--	--	--	310
C. Green Mountain Power Corp	94	--	61	--	--	32
D. City of Burlington	69	--	19	--	--	50
E. Central Vermont Pub Serv Corp	63	--	23	--	--	40
Total	1,032	--	103	--	496	432
Percentage of Industry Capability	88.6	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

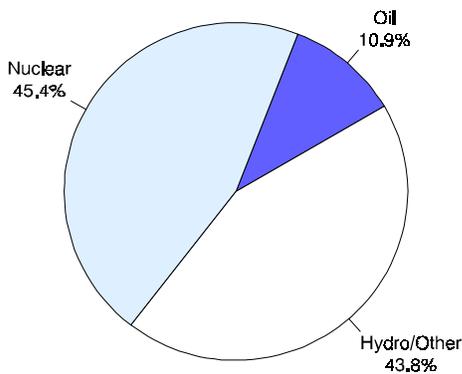


Figure 2. Utility Generation by Primary Energy Source, 1996

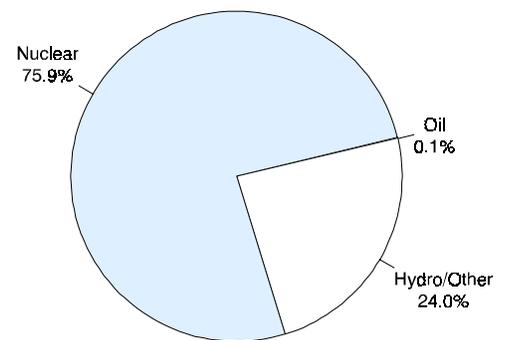


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

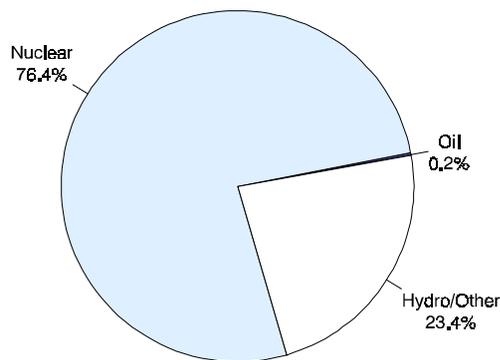


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	--	--	--	--	--	--
Oil	129	117	119	11.6	10.7	10.9
Gas	--	--	--	--	--	--
Nuclear	496	496	496	44.6	45.5	45.4
Hydro/Other	486	477	478	43.7	43.7	43.8
Total Utility	1,111	1,091	1,092	100.0	100.0	100.0
Total Nonutility	18	W	73	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	16,638	--	--	0.5	--	--
Oil	14,717	5,244	3,428	0.5	0.1	0.1
Gas	140	95,341	97	(s)	1.8	(s)
Nuclear	2,058,426	4,108,314	3,798,790	65.4	78.1	75.9
Hydro/Other	1,059,091	1,049,930	1,201,904	33.6	20.0	24.0
Total Utility	3,149,012	5,258,829	5,004,219	100.0	100.0	100.0
Total Nonutility	83,408	W	383,099	--	--	--

-- = Not applicable. (s) = Nonzero percentage less than 0.05. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	(s)	--	--	0.8	--	--
Oil	(s)	(s)	(s)	0.8	0.2	0.2
Gas	(s)	0.001	(s)	--	1.9	--
Nuclear	0.022	0.044	0.040	65.7	78.6	76.4
Hydro/Other	0.011	0.011	0.012	32.7	19.4	23.4
Total Utility	0.034	0.056	0.053	100.0	100.0	100.0
Total Nonutility	(s)	W	0.003	--	--	--

-- = Not applicable. (s) = Nonzero value less than 0.0005. W = Withheld.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

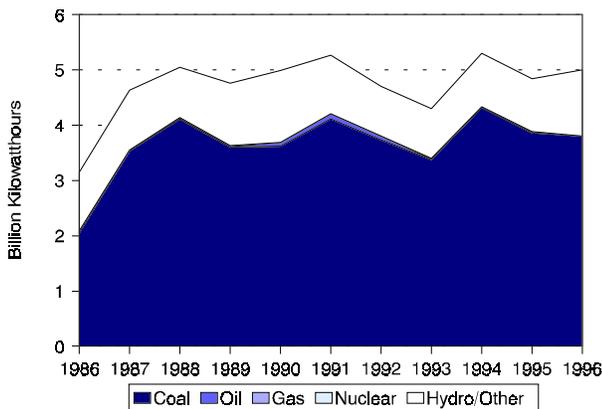


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

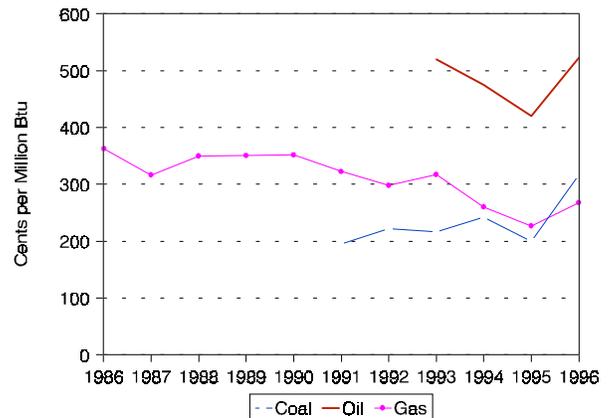


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	--	--	--	--
Oil	--	--	523.8	--
Gas	--	195.6	317.5	--

-- = Not applicable.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	1	--	--	--
Nitrogen Oxides ^d	(s)	(s)	(s)	--
Carbon Dioxide ^d	1,478	302	572	-9.1

-- = Not applicable. (s) = Nonzero value less than 0.05

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

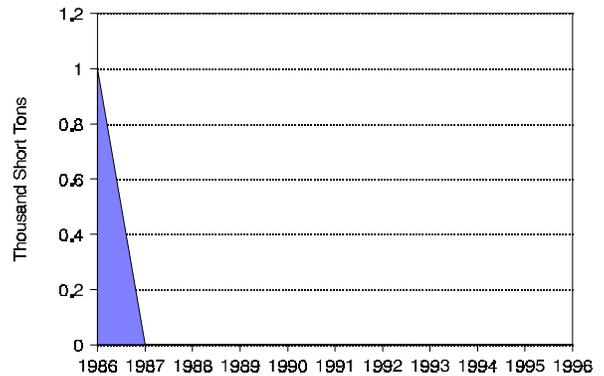


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

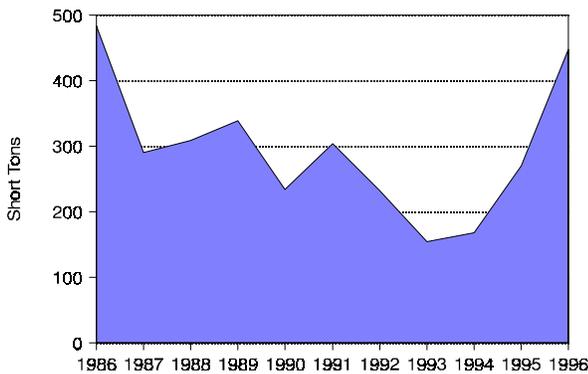


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

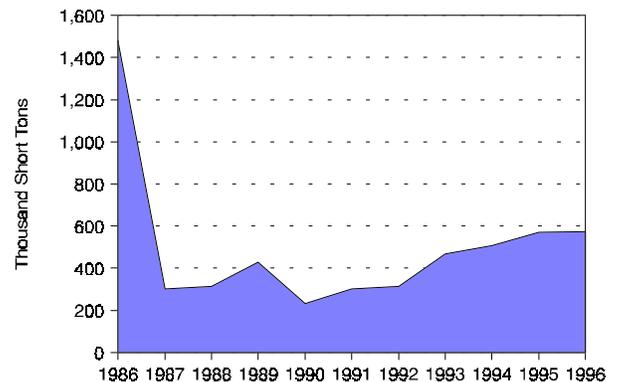


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential	1,156,107	1,783,451	2,006,213	5.7	31.0	37.9	38.3
Commercial	851,538	1,491,488	1,648,630	6.8	22.8	31.7	31.5
Industrial	1,575,736	1,389,670	1,537,130	-0.2	42.3	29.5	29.3
Other	143,874	39,848	47,519	-10.5	3.9	0.8	0.9
Total	3,727,253	4,704,457	5,239,492	3.5	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

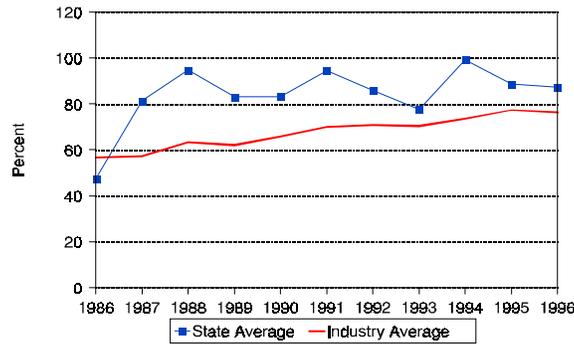


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	8	15	--	2	25
Number of Retail Customers	206,854	42,576	--	17,747	267,177
Retail Sales (MWh)	2,979,099	586,703	--	161,451	3,727,253
Percentage of Retail Sales	79.9	15.7	--	4.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	311,735	60,602	--	20,659	392,996
Percentage of Revenue	79.3	15.4	--	5.3	100.0
1991					
Number of Utilities	7	15	--	2	24
Number of Retail Customers	229,327	46,786	--	21,207	297,320
Retail Sales (MWh)	3,838,501	690,341	--	175,615	4,704,457
Percentage of Retail Sales	81.6	14.7	--	3.7	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	366,440	69,462	--	20,298	456,200
Percentage of Revenue	80.3	15.2	--	4.5	100.0
1996					
Number of Utilities	6	15	--	2	23
Number of Retail Customers	242,578	48,918	--	23,316	314,812
Retail Sales (MWh)	4,336,205	713,301	--	189,986	5,239,492
Percentage of Retail Sales	82.8	13.6	--	3.6	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	417,777	70,202	--	22,539	510,518
Percentage of Revenue	81.8	13.8	--	4.4	100.0

-- = Not applicable.

Virginia

The Commonwealth of Virginia had the twelfth largest population and the twentieth largest utility generating capability in 1996. The Virginia Power Company owns and operates over 65 percent of the generating capability, including the Commonwealth's five largest plants. Of the top five plants, the largest is the Bath County hydroelectric plant; also included in the top five are the only two nuclear plants in the State, North Anna and Surry; a coal-fired plant, Chesterfield; and an oil-fired plant, Possum Point. Nonutility generating capability in the Commonwealth increased from 3 percent in 1986 to nearly 20 percent in 1996. The nonutility generating capability share was the fourth largest in the Nation in 1996. Virginia is a net importer of electricity; in 1996, the retail sales total was almost 31 percent greater than net generation within the Commonwealth. In 1996, the average revenue per kilowatthour for all sectors (residential, commercial, and industrial) was 6.09 cents per kilowatthour, slightly below the national average of 6.86 cents per kilowatthour.

Approximately 42 percent of the electricity generated at utilities in the Commonwealth of Virginia in 1996 came from coal-fired power plants. Roughly 50 percent of the coal used for electricity generation is mined in Virginia. Virginia's coal deposits are located in three separate areas: the Eastern field, consisting of two basins located west of the Richmond; the Valley fields, comprising narrow coal-bearing areas in the west-central part of the State; and the Southwest field, which is part of the Appalachian coal basin. The Southwest field contains most of Virginia's coal reserves and is the source of virtually all the Commonwealth's coal production.¹ About 39 percent of the electricity generated in Virginia in 1996 came from the North Anna and Surry nuclear plants. They are among the most efficiently operated nuclear plants in the Nation, and, during the period from 1986 to 1996, with the exception of 1989, they operated at a capacity factor above the industry average. Since 1986, most of the net generation that was being produced by oil-fired plants was displaced with nonutility generation.

Nationally, emissions of sulfur dioxide, nitrogen oxides (NO_x), and carbon dioxide from Virginia's generators ranked nineteenth, twenty-sixth, and nineteenth, respectively. Emissions of all three pollutants increased from 1986 to 1996. Although no Virginia generators were mentioned in Title IV of the Clean Air Act Amendments of 1990, it is likely that Virginia's Department of Environmental Quality will need to design a State implementation plan for reducing groundlevel ozone in response to a proposal released by the Environmental Protection Agency (EPA) in October 1998. The EPA proposal does not mandate which sources must reduce pollution. However, the EPA states that utilities would be one of the most likely sources of NO_x emissions reductions. Virginia is also part of the Ozone Transport Commission (OTC).² Each of the thirteen States of the OTC is responsible for enacting regulations in order to achieve region-wide NO_x reductions in a consistent, enforceable manner, and for allocating its NO_x Budget Program allowances among NO_x sources in the State. The targets in this program are all electricity generating facilities with a rated output of 15 megawatts or more and large industrial boilers.

In April 1998, a law to restructure the electric power industry in Virginia was enacted. The law requires competition at the retail level to begin in 2002 and be available to all consumers by 2004. The details of implementation of retail competition have been left to the State Corporation Commission and the legislature to develop over the next several years. The restructuring law calls for creation of an independent system operator to operate the transmission lines, allows for recovery of stranded costs by utilities, and provides for public interest programs, such as low-income assistance and energy efficiency programs. The investor-owned utilities in the State must file plans for restructuring and pilot programs. Recently, Virginia Power agreed to \$920 million in refunds and rate reductions over the next five years. This was the biggest rate adjustment in the Commonwealth's electricity industry history, as Virginia Power has improved efficiencies and is preparing for a more competitive environment in the future.³

¹Energy Information Administration, *State Coal Profiles*, DOE/EIA-0576 (Washington, DC, January 1994), P. 95.

²The Ozone Transportation Region comprises the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Delaware, the northern counties of Virginia, and the District of Columbia.

³Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

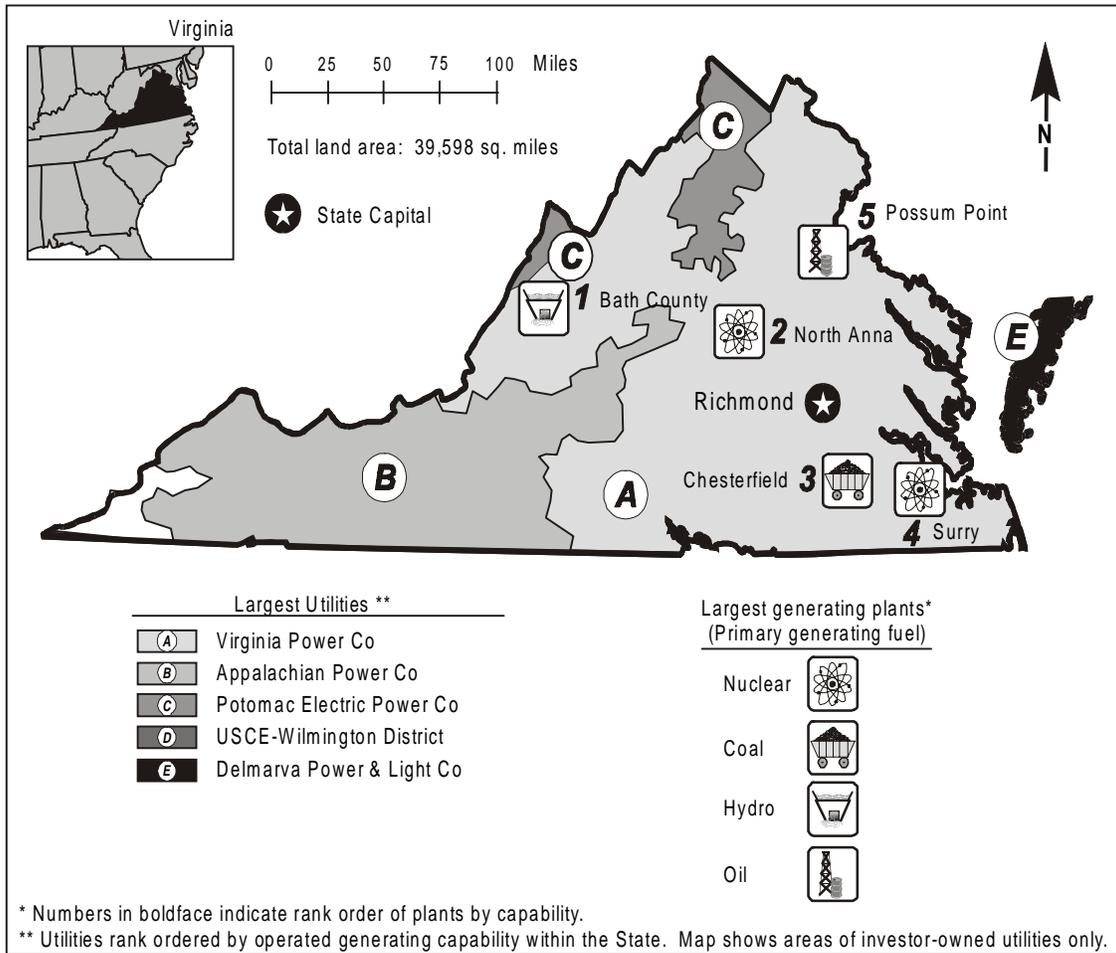


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)	ECAR/SERC/MAAC		Utility		
Net Exporter or Importer		Importer	Capability (MWe)	14,806	20
State Primary Generating Fuel		Coal	Generation (MWh)	56,532,918	21
Population (as of 7/96)	6,666,167	12	Average Age of Coal Plants	31 years	
Average Revenue (cents/kWh)	6.09	^a 23	Average Age of Oil-fired Plants	24 years	
Industry			Average Age of Gas-fired Plants	6 years	
Capability (MWe)	18,401	^b 15	Average Age of Nuclear Plants	20 years	
Generation (MWh)	67,031,106	^b 19	Average Age of Hydroelectric Plants	20 years	
Capability/person (KWe/person)	2.76	^b 27	Average Age of Other Plants	11 years	
Generation/person (MWh/person)	10.06	^b 33	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	258	19	Capability (MWe)	3,595	5
Nitrogen Oxide Emissions (Thousand Short Tons)	131	26	Percentage Share of Capability	19.5	4
Carbon Dioxide Emissions (Thousand Short Tons)	51,931	19	Generation (MWh)	10,498,188	9
Sulfur Dioxide/sq. mile (Tons)	6.52	20	Percentage Share of Generation	15.7	13
Nitrogen Oxides/sq. mile (Tons)	3.31	26			
Carbon Dioxide/sq. mile (Tons)	1,311.46	24			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Bath County	Hydro	Virginia Power Co	2,100
2. North Anna	Nuclear	Virginia Power Co	1,791
3. Chesterfield	Coal/Gas	Virginia Power Co	1,647
4. Surry	Nuclear	Virginia Power Co	1,602
5. Possum Point	Oil/Coal	Virginia Power Co	1,329

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Virginia Power Co	12,210	3,602	2,115	992	3,392	2,109
B. Appalachian Power Co	1,763	1,015	--	--	--	748
C. Potomac Electric Power Co	482	482	--	--	--	--
D. USCE-Wilmington District	252	--	--	--	--	252
E. Delmarva Power & Light Co	38	--	38	--	--	--
Total	14,745	5,099	2,153	992	3,392	3,109
Percentage of Industry Capability	80.1	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

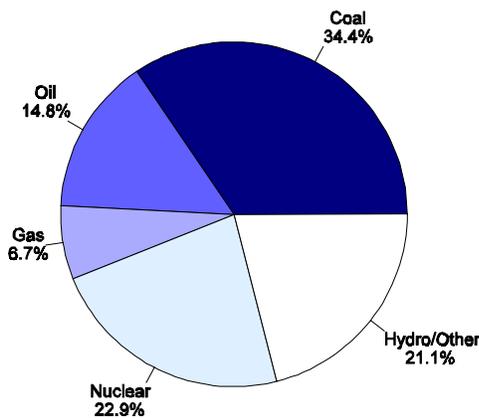


Figure 2. Utility Generation by Primary Energy Source, 1996

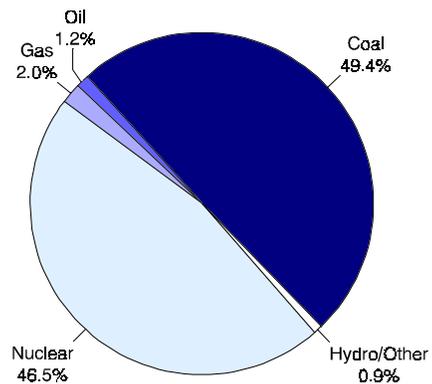


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

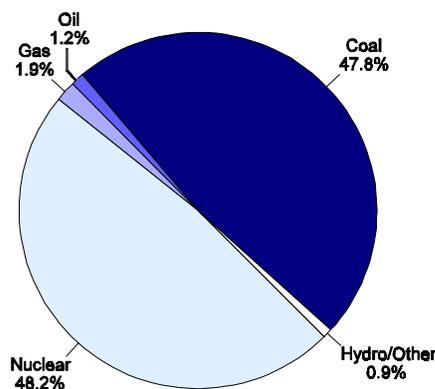


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	4,018	4,210	5,099	30.2	27.2	27.7
Oil	2,376	2,753	2,192	17.9	17.8	11.9
Gas	4	198	994	(s)	1.3	5.4
Nuclear	3,392	3,382	3,392	25.5	21.9	18.4
Hydro/Other	3,042	3,109	3,130	22.9	20.1	17.0
Total Utility	12,832	13,652	14,806	96.6	88.3	80.5
Total Nonutility	458	1,805	3,595	3.4	11.7	19.5
Industry	13,290	15,457	18,401	100.0	100.0	100.0

(s) = Nonzero percentage less than 0.05.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	18,131,714	21,939,027	27,930,011	39.5	40.3	41.7
Oil	3,175,949	2,036,478	683,363	6.9	3.7	1.0
Gas	73,047	1,104,440	1,123,697	0.2	2.0	1.7
Nuclear	21,214,556	23,886,268	26,286,283	46.2	43.9	39.2
Hydro/Other	47,488	-25,558	509,564	0.1	--	0.8
Total Utility	42,642,755	48,940,655	56,532,918	93.0	89.9	84.3
Total Nonutility	3,227,248	5,478,227	10,498,188	7.0	10.1	15.7
Industry	45,870,003	54,418,882	67,031,106	100.0	100.0	100.0

-- = Not applicable.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.188	0.218	0.277	30.1	33.0	34.3
Oil	0.031	0.020	0.007	4.9	3.0	0.9
Gas	0.001	0.010	0.011	0.1	1.5	1.3
Nuclear	0.229	0.257	0.279	36.6	38.8	34.6
Hydro/Other	(s)	(s)	0.005	0.1	(s)	0.6
Total Utility	0.450	0.504	0.579	71.8	76.2	71.7
Total Nonutility	0.176	0.158	0.229	28.2	23.8	28.3
Industry	0.626	0.662	0.808	100.0	100.0	100.0

(s) = Nonzero value less than 0.0005 or nonzero percentage less than 0.05.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

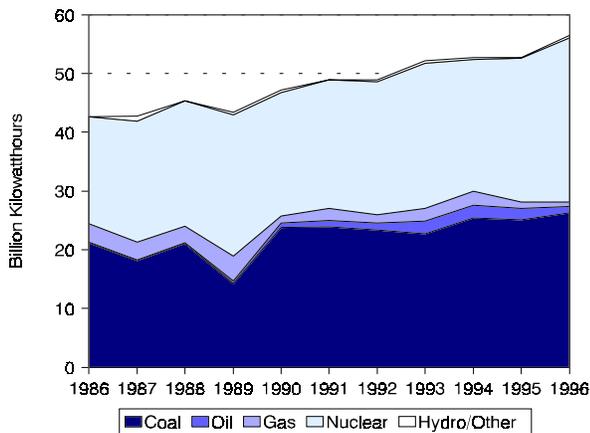


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

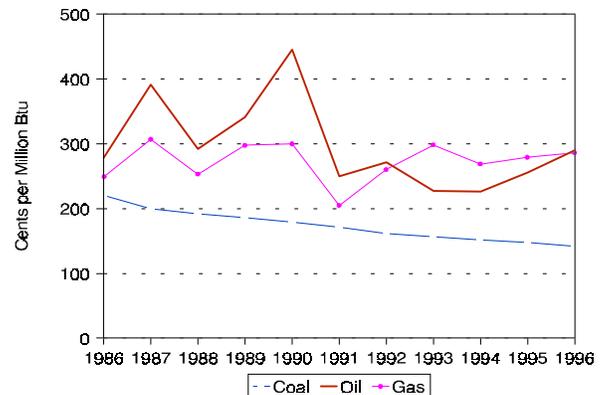


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	220.3	171.1	141.8	-4.3
Oil	278.4	250.3	290.0	0.4
Gas	249.1	204.8	281.6	1.2

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	146	246	258	5.9
Nitrogen Oxides ^d . .	66	107	131	7.1
Carbon Dioxide ^d . . .	21,594	40,293	51,931	9.2

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

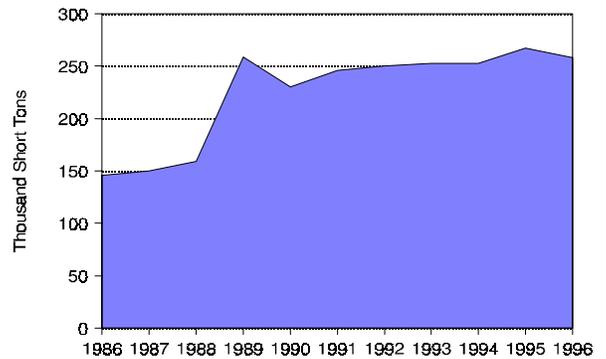


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

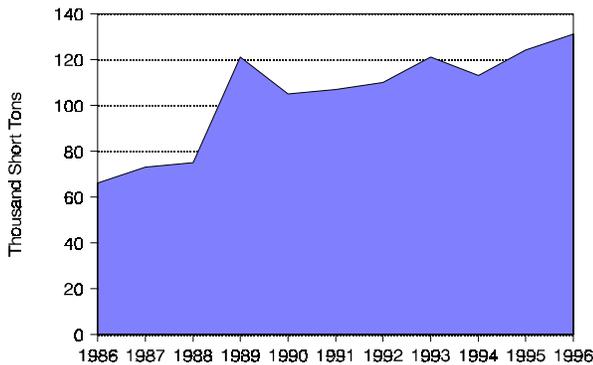


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

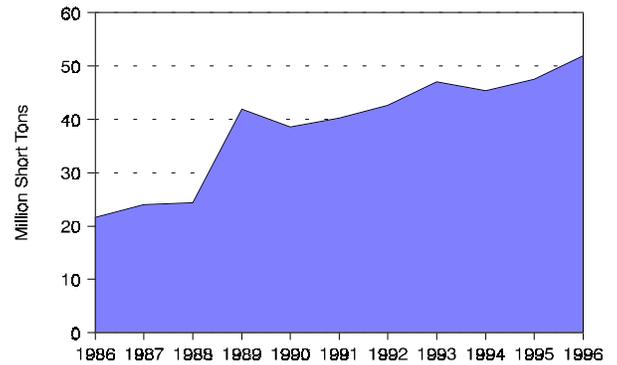


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	25,235,405	29,607,347	34,650,534	3.2	39.9	39.4	39.6
Commercial	16,540,876	21,230,493	24,564,931	4.0	26.1	28.3	28.0
Industrial . . .	14,448,556	16,028,804	19,020,734	2.8	22.8	21.3	21.7
Other	7,040,504	8,244,504	9,359,444	2.9	11.1	11.0	10.7
Total	63,265,338	75,111,148	87,595,643	3.3	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

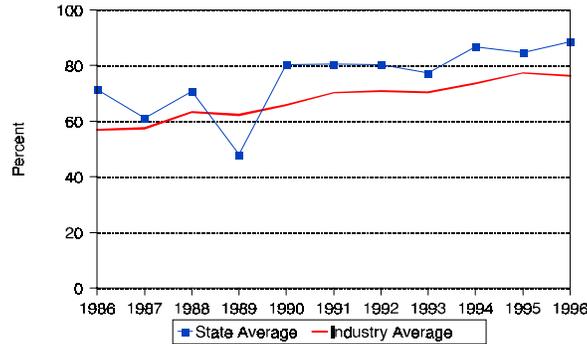


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	6	18	--	13	37
Number of Retail Customers	1,967,440	126,406	--	239,167	2,333,013
Retail Sales (MWh)	56,366,034	2,766,953	--	4,132,351	63,265,338
Percentage of Retail Sales	89.1	4.4	--	6.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	4,132,513	200,562	--	348,978	4,682,053
Percentage of Revenue	88.3	4.3	--	7.5	100.0
1991					
Number of Utilities	4	16	--	13	33
Number of Retail Customers	2,205,027	141,452	--	293,544	2,640,023
Retail Sales (MWh)	66,190,487	3,487,849	--	5,432,812	75,111,148
Percentage of Retail Sales	88.1	4.6	--	7.2	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	4,487,301	215,464	--	440,668	5,143,433
Percentage of Revenue	87.2	4.2	--	8.6	100.0
1996					
Number of Utilities	5	16	--	13	34
Number of Retail Customers	2,418,406	149,304	--	335,820	2,903,530
Retail Sales (MWh)	76,725,069	4,142,217	--	6,728,357	87,595,643
Percentage of Retail Sales	87.6	4.7	--	7.7	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	4,601,784	226,928	--	505,476	5,334,188
Percentage of Revenue	86.3	4.3	--	9.5	100.0

-- = Not applicable.

Washington

Over 80 percent of generating capability in Washington is hydroelectric, including the largest electric power plant in the United States—Grand Coulee Dam. Located on the Columbia River in central Washington and managed by the U.S. Bureau of Reclamation, an agency of the Department of Interior, the dam is the largest concrete structure in the Nation.¹ The dam has three roles: it is a major supplier of electricity to the Northwest with 24 generators providing up to 6.5 gigawatts of power; it provides irrigation for over half a million acres of the Columbia basin; and it provides flood control. Ten other dams are also located on the Columbia River.

Although most of Washington's electricity is produced using hydropower, the third largest plant in the State is a coal-fired plant, Centralia. In November 1998, PacifiCorp announced the sale by auction of the Centralia power plant and coal mine. The plant has eight joint owners, mostly utilities located in Washington. The coal mine is wholly owned by PacifiCorp. The fifth largest plant is Washington's only nuclear plant, WNP, operated by Washington Public Power Supply System. In 1996, hydropower generated 83 percent of electric power, coal-fired units generated about 7 percent, and the nuclear plant generated almost 5 percent.

Like all States west of Kansas, Washington had no units that were cited by Title IV of the Clean Air Act Amendments of 1990 to begin compliance with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x). Emissions of SO₂, NO_x, and carbon dioxide from Washington generators ranked thirty-third, thirty-eighth and thirty-seventh, respectively, in 1996. The concentration rankings per square mile were thirty-seventh, forty-third and forty-second, respectively. Washington's totals for all three pollutants increased from 1986 to 1991, and then increased again from 1991 to 1996. The rate of increase for all three was greater in the earlier period.

Washington enjoys some of the lowest priced electricity in the Nation. The average revenue per kilowatthour, 4.19 cents across all sectors, was the third least

expensive nationally in 1996. The residential average revenue per kilowatthour, 5.03 cents, was the least expensive nationally, and the commercial and industrial average revenue per kilowatthour were second least expensive at 4.88 and 2.85 cents, respectively. Washington's low electricity prices can be attributed to the presence of the federally owned dams of the Bureau of Reclamation and the U.S. Army Corps of Engineers. The power produced at these Federal dams is marketed through the Bonneville Power Administration (BPA). BPA supplies many of the State's 43 publicly owned utilities and 17 cooperatives with inexpensive Federal hydropower. Together the publicly owned and cooperative utilities represent over half the retail sales of electricity in the State. Investor-owned utilities, the largest being Puget Sound Energy, make up about 33 percent of retail sales. The remainder of retail sales, 14 percent, is sold by BPA to about 15 very large industrial customers.

With such low prices, restructuring to allow competition and reduce prices is not a priority in Washington. Puget Sound Energy and Washington Water Power are offering pilot programs in retail choice. The largest customers can have their choice of electricity generation suppliers, and some residential consumers can choose from a menu of optional pricing schemes or "green" power. In Washington Water Power's MOPS II program, electricity prices are based on several options: weekly market rates, annual market rates, a fixed rate based on Bonneville preference rates, and a "green" renewable resource rate. In May 1998, several bills concerning the electric power industry were passed by the Washington legislature as a result of their ongoing investigation into electric power industry restructuring. One allows net metering for customer on-site generation from solar, wind, or small hydroelectric sources. Another requires utilities to unbundle rates for generation, transmission, distribution, and services, and to file studies of costs, service quality, and reliability. The Washington Utilities and Transportation Commission (WUTC) completed Phase I of its investigation into electric industry restructuring in May 1998, concluding that the pace nationally toward competition is faster than expected.²

¹U.S. Bureau of Reclamation Grand Coulee Dam web site located at <http://borworld.usbr.gov/power/data/sites/grandcou/>.

² Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

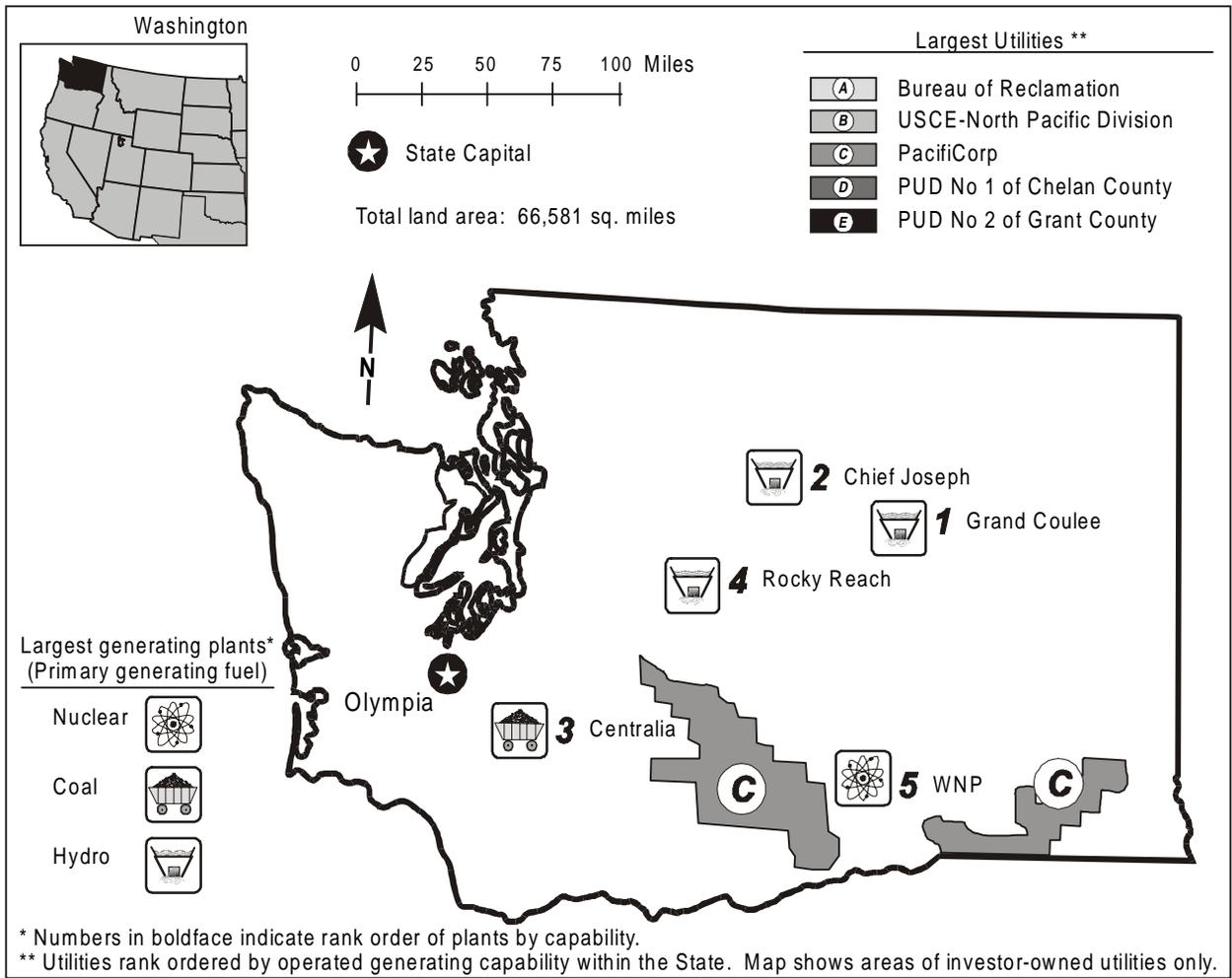


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		WSCC	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	24,276	8
State Primary Generating Fuel		Hydro	Generation (MWh)	112,606,349	8
Population (as of 7/96)	5,519,525	15	Average Age of Coal Plants	24 years	
Average Revenue (cents/kWh)	4.19	^a 3	Average Age of Oil-fired Plants	23 years	
Industry			Average Age of Gas-fired Plants	14 years	
Capability (MWe)	25,252	^b 8	Average Age of Nuclear Plants	12 years	
Generation (MWh)	118,644,693	^b 9	Average Age of Hydroelectric Plants	31 years	
Capability/person			Average Age of Other Plants	13 years	
(KWe/person)	4.58	^b 6	Nonutility^c		
Generation/person			Capability (MWe)	976	15
(MWh/person)	21.50	^b 4	Percentage Share		
Sulfur Dioxide Emissions			of Capability	3.9	34
(Thousand Short Tons)	77	33	Generation (MWh)	6,038,344	14
Nitrogen Oxide Emissions			Percentage Share of		
(Thousand Short Tons)	60	38	Generation	5.1	30
Carbon Dioxide Emissions					
(Thousand Short Tons)	18,608	37			
Sulfur Dioxide/sq. mile (Tons)	1.16	37			
Nitrogen Oxides/sq. mile (Tons)	0.90	43			
Carbon Dioxide/sq. mile (Tons)	279.48	42			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Grand Coulee	Hydro	Bureau of Reclamation	6,494
2. Chief Joseph	Hydro	USCE-North Pacific Division	2,337
3. Centralia	Coal	PacifiCorp	1,340
4. Rocky Reach	Hydro	PUD No 1 of Chelan County	1,280
5. WNP	Nuclear	Washington Pub Pwr Supply Sys	1,107

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Bureau of Reclamation	6,519	--	--	--	--	6,519
B. USCE-North Pacific Division	5,826	--	--	--	--	5,826
C. PacifiCorp	1,970	1,340	--	--	--	630
D. PUD No 1 of Chelan County	1,951	--	--	--	--	1,951
E. PUD No 2 of Grant County	1,914	--	--	--	--	1,914
Total	18,180	1,340	--	--	--	16,840
Percentage of Industry Capability	72.0	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

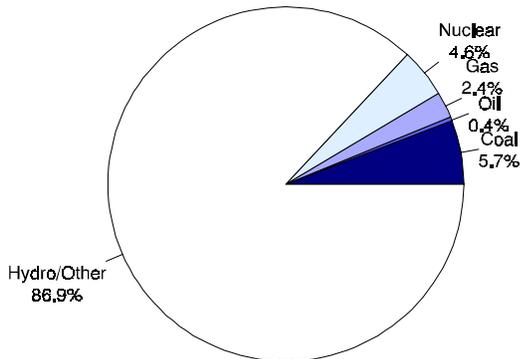


Figure 2. Utility Generation by Primary Energy Source, 1996

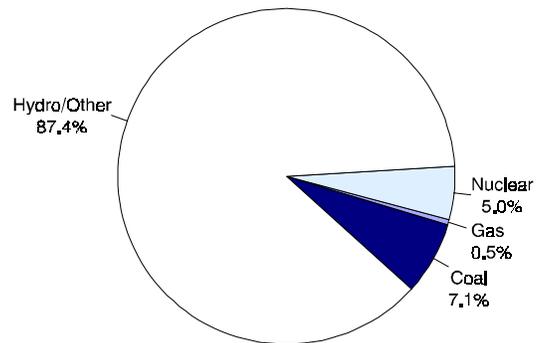


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

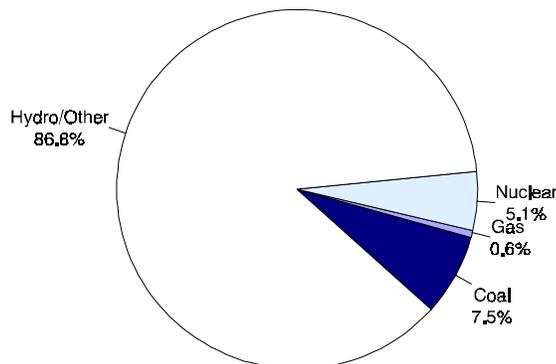


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	1,276	1,360	1,390	5.0	5.5	5.5
Oil	227	173	87	0.9	0.7	0.3
Gas	590	590	590	2.3	2.4	2.3
Nuclear	1,940	1,100	1,107	7.7	4.5	4.4
Hydro/Other	20,961	21,020	21,101	82.8	85.2	83.6
Total Utility	24,995	24,243	24,276	98.7	98.2	96.1
Total Nonutility	318	433	976	1.3	1.8	3.9
Industry	25,313	24,676	25,252	100.0	100.0	100.0

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	5,057,993	7,903,796	8,042,462	5.4	7.7	6.8
Oil	8,436	7,121	8,183	(s)	(s)	(s)
Gas	5,121	12,093	528,958	(s)	(s)	0.4
Nuclear	8,438,964	4,229,868	5,588,000	9.0	4.1	4.7
Hydro/Other	79,021,667	89,200,167	98,438,746	84.2	86.8	83.0
Total Utility	92,532,182	101,353,045	112,606,349	98.5	98.6	94.9
Total Nonutility	1,361,747	1,429,570	6,038,344	1.5	1.4	5.1
Industry	93,893,929	102,782,615	118,644,693	100.0	100.0	100.0

(s) Nonzero percentage less than 0.05.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.054	0.083	0.087	5.2	7.5	6.8
Oil	(s)	(s)	(s)	--	--	--
Gas	(s)	(s)	0.007	--	--	0.5
Nuclear	0.091	0.045	0.059	8.8	4.1	4.6
Hydro/Other	0.825	0.923	1.014	79.8	82.8	79.3
Total Utility	0.971	1.052	1.168	93.9	94.4	91.3
Total Nonutility	0.064	0.063	0.112	6.1	5.6	8.7
Industry	1.034	1.115	1.279	100.0	100.0	100.0

-- = Not applicable. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

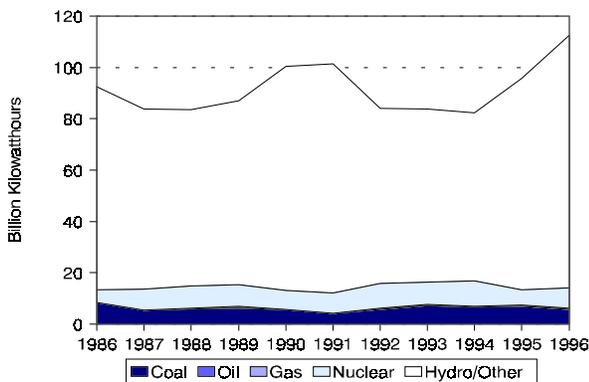


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

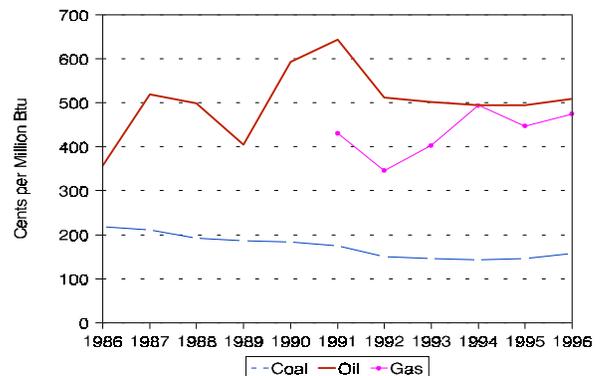


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	217.6	174.4	156.9	-3.2
Oil	356.5	643.9	508.5	3.6
Gas	--	430.5	474.8	--

-- = Not applicable.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	43	68	77	6.0
Nitrogen Oxides ^d . .	18	45	60	12.8
Carbon Dioxide ^d . . .	5,917	14,237	18,608	12.1

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

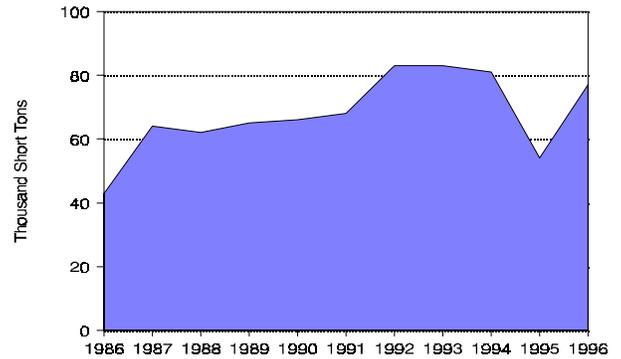


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

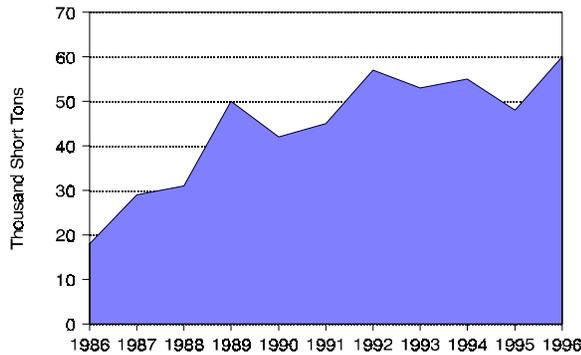


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

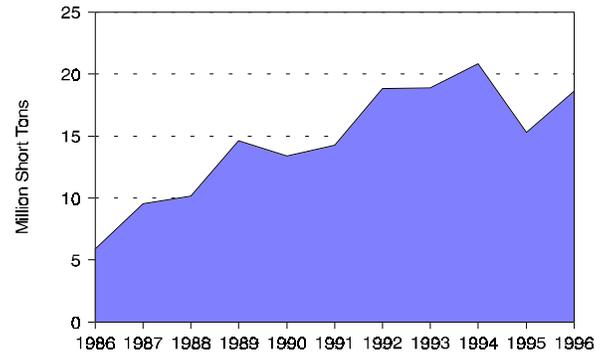


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	26,503,109	29,889,138	32,012,445	1.9	35.2	32.2	36.6
Commercial	15,539,460	18,143,350	21,446,321	3.3	20.6	19.6	24.5
Industrial . . .	30,039,669	40,838,988	30,241,380	0.1	39.9	44.0	34.6
Other	3,289,414	3,842,033	3,713,112	1.2	4.4	4.1	4.2
Total	75,371,652	92,713,509	87,413,258	1.5	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

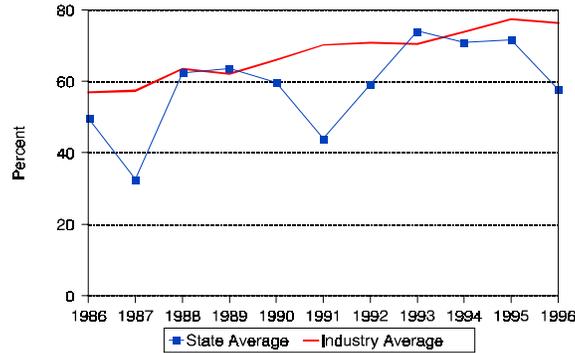


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	4	42	1	19	66
Number of Retail Customers	909,618	1,044,903	13	95,135	2,049,669
Retail Sales (MWh)	23,541,463	34,522,080	14,865,409	2,442,700	75,371,652
Percentage of Retail Sales	31.2	45.8	19.7	3.2	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,305,644	1,282,192	324,131	122,691	3,128,980
Percentage of Revenue	41.7	41.0	13.4	3.9	100.0
1991					
Number of Utilities	4	42	1	19	66
Number of Retail Customers	1,042,081	1,162,332	16	108,828	2,313,257
Retail Sales (MWh)	27,744,595	41,058,701	21,072,969	2,837,244	92,713,509
Percentage of Retail Sales	29.9	44.3	22.7	3.1	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,445,936	1,436,698	436,861	138,189	3,511,855
Percentage of Revenue	41.2	40.9	14.0	3.9	100.0
1996					
Number of Utilities	4	43	1	17	65
Number of Retail Customers	1,166,638	1,282,275	15	117,493	2,566,421
Retail Sales (MWh)	29,010,828	43,382,472	12,024,405	2,995,553	87,413,258
Percentage of Retail Sales	33.2	49.6	13.8	3.4	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,632,692	1,605,614	278,699	147,636	3,664,641
Percentage of Revenue	44.6	43.8	7.6	4.0	100.0

West Virginia

West Virginia had the thirty-fifth largest population and the twenty-first largest utility generating capability in 1996. The discrepancy in rankings is among the largest of all States. In 1996, coal-fired units made up over 99 percent of generating capability and net generation in the State. This reflects the fact that, in 1996, West Virginia was a leading producer of coal in the United States, second only to Wyoming.¹ Bituminous coal underlies more than two-thirds of West Virginia. Over half the coal mined is delivered to electric utilities outside the State, mostly in Pennsylvania and Ohio. Of the coal that stays in the State, most is consumed by the electric power industry. The proximity of the coal-fired plants to their fuel source results in low transportation costs and allows West Virginia utilities to offer rates lower than the national average. At 5.21 cents per kilowatt-hour, West Virginians enjoy the seventh least expensive electricity in the Nation.

The five largest plants are all coal-fired. The largest plant in the State is Appalachian Power Company's John E. Amos plant near Charleston. These five plants are located along the western and eastern frontiers of the State. West Virginia has no nuclear generating capability. There is a small amount of hydroelectric and oil-fired capability in the State. The largest utility in West Virginia in terms of operated generating capability is the Monongahela Power Company, with Appalachian Power Company a close second. In 1986, coal units represented 98.7 percent of West Virginia's utility generating capability and 99.2 percent of utility net generation. In 1996, the coal share of capability had risen to 99.5 percent, while the net generation share fell to 99.1 percent. Hydroelectric capability and net generation, on the other hand, were 1.3 percent and 0.5 percent, respectively, in 1986. By 1996, the hydroelectric capability fell to 0.4 percent, while the net generation share rose to 0.6 percent.

The Clean Air Act Amendments of 1990 specified a number of utility plants to begin compliance with

stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x). These plants included 7,352 megawatts of nameplate capacity at 6 West Virginia plants. In 1996, West Virginia's emissions of SO₂, NO_x, and carbon dioxide (CO₂) ranked fourth, seventh and seventh, respectively. West Virginia SO₂ emissions accounted for 6 percent of all electric power industry SO₂ emissions in the United States. The concentrations of these emissions per square mile in 1996 ranked third, fourth and fifth, respectively. Emissions of SO₂ increased from 1986 to 1991, but they declined below 1986 levels in 1996. NO_x and CO₂ totals were up slightly in 1991 over 1986 levels and then both showed bigger rises from 1991 to 1996. It is likely that West Virginia will need to design a State implementation plan (SIP) for reducing ground-level ozone in response to a proposal released by the Environmental Protection Agency (EPA) in October 1998. The EPA SIP call proposal does not mandate which sources must reduce pollution. However, EPA states that utilities would be one of the most likely sources of NO_x emissions reductions.

In December 1996, the State's Public Service Commission (PSC) opened a formal investigation into restructuring the electric power industry in West Virginia, and in March 1998, the legislature authorized the PSC to determine whether restructuring would benefit ratepayers and draft a restructuring plan if it was deemed to be in the interest of consumers. The PSC is conducting workshops where comments to a developing plan to restructure the industry can be made by the various special interest groups, ranging from low-income consumers to large industrial customers, power marketers, and utilities. Since West Virginia has relatively low electricity rates, there is a lack of interest in introducing competition in order to lower prices. Nearby States that are much further along in the process of restructuring their electric power industries may have an affect on eventually restructuring the electric power industry in West Virginia.²

¹Energy Information Administration, *State Coal Profiles*, DOE/EIA-0576 (Washington, DC, January 1994), p. 103.

²Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

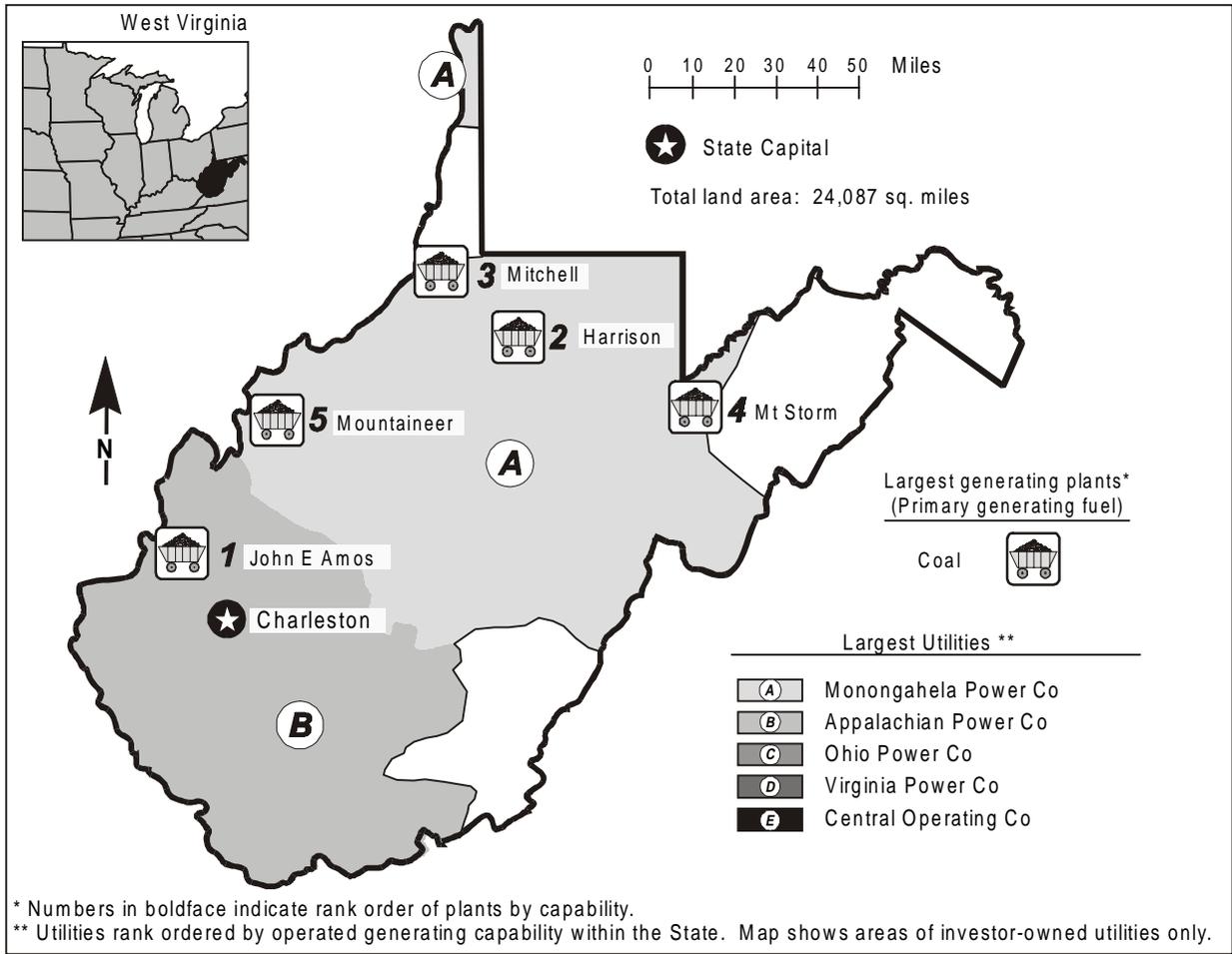


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		ECAR	Utility		
Net Exporter or Importer		Importer	Capability (MWe)	14,448	21
State Primary Generating Fuel		Coal	Generation (MWh)	83,978,125	16
Population (as of 7/96)	1,820,407	35	Average Age of Coal Plants	26 years	
Average Revenue (cents/kWh)	5.21	^a 7	Average Age of Oil-fired Plants	29 years	
Industry			Average Age of Gas-fired Plants	--	
Capability (MWe)	15,012	^b 20	Average Age of Nuclear Plants	--	
Generation (MWh)	87,251,394	^b 15	Average Age of Hydroelectric Plants	70 years	
Capability/person (KWe/person)	8.25	^b 1	Average Age of Other Plants	--	
Generation/person (MWh/person)	47.93	^b 1	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	846	4	Capability (MWe)	564	28
Nitrogen Oxide Emissions (Thousand Short Tons)	346	7	Percentage Share of Capability	3.8	35
Carbon Dioxide Emissions (Thousand Short Tons)	98,234	7	Generation (MWh)	3,273,269	24
Sulfur Dioxide/sq. mile (Tons)	35.12	3	Percentage Share of Generation	3.8	34
Nitrogen Oxides/sq. mile (Tons)	14.36	4			
Carbon Dioxide/sq. mile (Tons)	4,078.30	5			

-- = Not applicable.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. John E Amos	Coal	Appalachian Power Co	2,900
2. Harrison	Coal	Monongahela Power Co	1,920
3. Mitchell	Coal	Ohio Power Co	1,600
4. Mt Storm	Coal	Virginia Power Co	1,599
5. Mountaineer (1301)	Coal	Appalachian Power Co	1,300

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Monongahela Power Co	4,910	4,910	--	--	--	--
B. Appalachian Power Co	4,590	4,590	--	--	--	--
C. Ohio Power Co	2,200	2,200	--	--	--	--
D. Virginia Power Co	1,673	1,661	12	--	--	--
E. Central Operating Co	1,020	1,020	--	--	--	--
Total	14,393	14,381	12	--	--	--
Percentage of Industry Capability	95.9	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

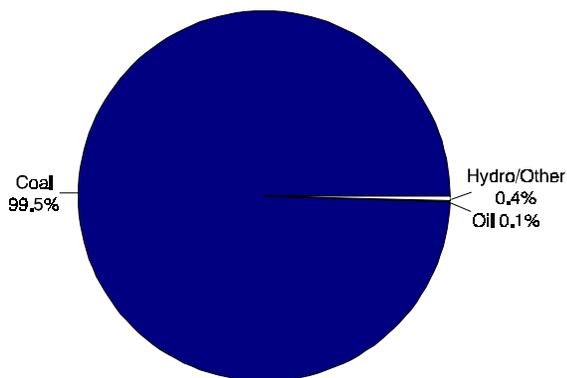


Figure 2. Utility Generation by Primary Energy Source, 1996

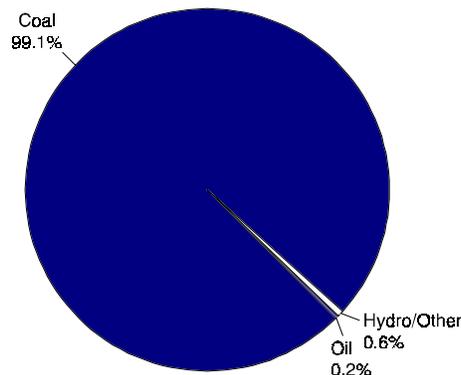


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

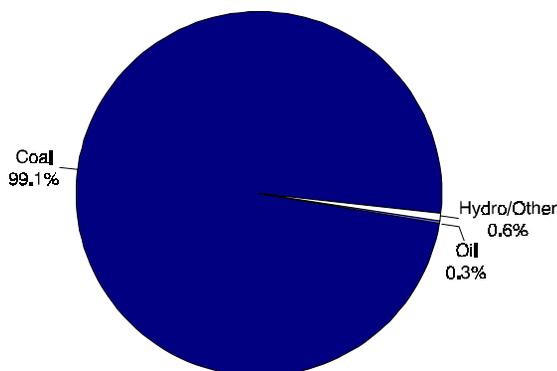


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	14,295	14,315	14,381	98.7	99.2	99.5
Oil	12	12	12	0.1	0.1	0.1
Gas	--	--	--	--	--	--
Nuclear	--	--	--	--	--	--
Hydro/Other	183	108	55	1.3	0.7	0.4
Total Utility	14,490	14,435	14,448	100.0	100.0	100.0
Total Nonutility	451	W	564	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	76,876,026	70,648,850	83,257,133	99.2	99.2	99.1
Oil	256,243	231,940	203,950	0.3	0.3	0.2
Gas	26,553	17,146	20,334	(s)	(s)	(s)
Nuclear	--	--	--	--	--	--
Hydro/Other	360,903	356,180	496,708	0.5	0.5	0.6
Total Utility	77,519,725	71,254,116	83,978,125	100.0	100.0	100.0
Total Nonutility	1,942,026	W	3,273,269	--	--	--

-- = Not applicable. (s) = Nonzero percentage less than 0.05. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.765	0.689	0.811	99.2	99.2	99.1
Oil	0.002	0.002	0.002	0.3	0.3	0.3
Gas	(s)	(s)	(s)	--	--	--
Nuclear	--	--	--	--	--	--
Hydro/Other	0.004	0.004	0.005	0.5	0.5	0.6
Total Utility	0.771	0.695	0.819	100.0	100.0	100.0
Total Nonutility	0.021	W	0.051	--	--	--

-- = Not applicable. (s) = Nonzero value less than 0.0005. W = Withheld.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

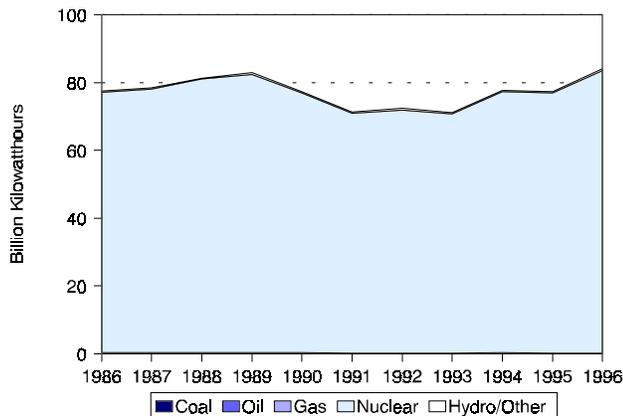


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

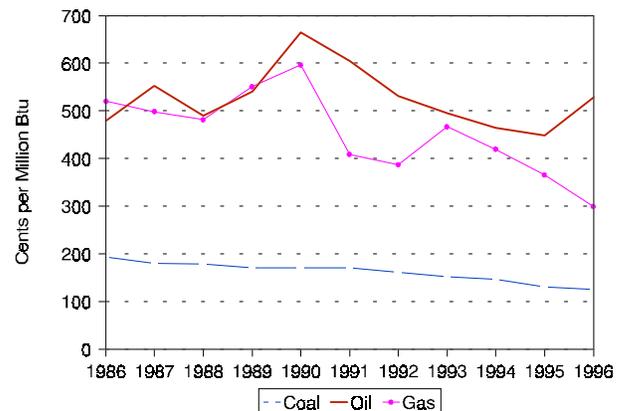


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	193.3	170.5	124.9	-4.3
Oil	478.5	604.0	528.7	1.0
Gas	519.8	408.4	299.0	-5.4

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	899	1,072	846	-0.6
Nitrogen Oxides ^d . .	313	313	346	1.0
Carbon Dioxide ^d . . .	77,678	78,626	98,234	2.4

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

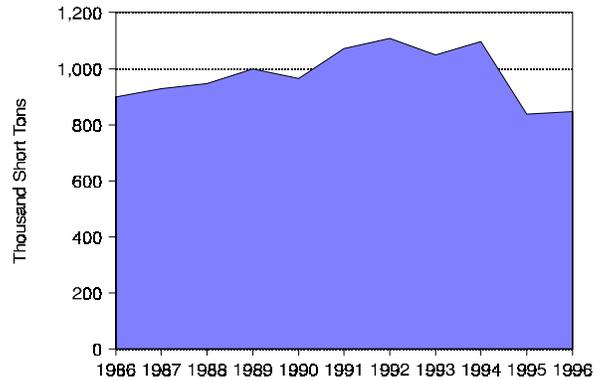


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

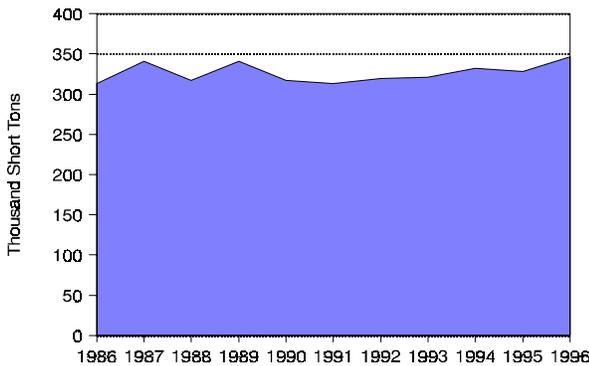


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

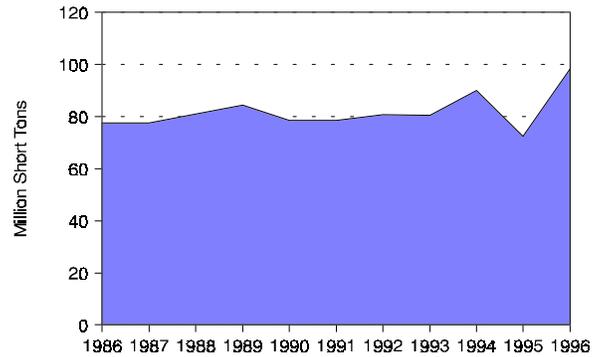


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	6,982,644	8,106,273	9,276,528	2.9	33.9	34.3	35.5
Commercial	4,512,596	5,218,905	5,936,377	2.8	21.9	22.1	22.7
Industrial . . .	9,003,349	10,205,954	10,820,337	1.9	43.7	43.2	41.4
Other	104,310	93,813	93,536	-1.1	0.5	0.4	0.4
Total	20,602,900	23,624,945	26,126,778	2.4	100.0	100.0	100.0

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	14	2	--	3	19
Number of Retail Customers	820,896	3,577	--	6,897	831,370
Retail Sales (MWh)	20,501,196	50,405	--	51,299	20,602,900
Percentage of Retail Sales	99.5	0.2	--	0.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,333,142	3,564	--	4,885	1,341,592
Percentage of Revenue	99.4	0.3	--	0.4	100.0
	1991				
Number of Utilities	12	2	--	3	17
Number of Retail Customers	856,819	4,165	--	7,460	868,444
Retail Sales (MWh)	23,506,230	57,232	--	61,483	23,624,945
Percentage of Retail Sales	99.5	0.2	--	0.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,276,182	3,968	--	6,065	1,286,215
Percentage of Revenue	99.2	0.3	--	0.5	100.0
	1996				
Number of Utilities	12	2	--	3	17
Number of Retail Customers	904,070	3,531	--	8,231	915,832
Retail Sales (MWh)	25,989,991	60,110	--	76,677	26,126,778
Percentage of Retail Sales	99.5	0.2	--	0.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	1,350,892	3,980	--	7,154	1,362,026
Percentage of Revenue	99.2	0.3	--	0.5	100.0

-- = Not applicable.

Wisconsin

Wisconsin had the eighteenth largest population and the twenty-fourth largest utility generating capability in 1996. Most of the electricity generated in the State comes from coal-fired plants. Four of the five largest plants in the State are coal-fired, including Pleasant Prairie, the largest. Wisconsin also relies on its two nuclear power plants, Kewaunee and Point Beach. The Point Beach plant is the third largest plant in the State. All of the five largest plants are close to the shore of Lake Michigan. The largest utility in the State, the Wisconsin Electric Power Company, operates three of the four largest plants. In 1996, retail electricity was sold by 12 investor-owned, 82 publicly owned, and 26 cooperative utilities in Wisconsin. The average price of electricity, 5.25 cents per kilowatt-hour, was tenth least expensive in the Nation. The largest utilities in terms of retail sales were Wisconsin Electric Power, Wisconsin Power & Light, and the Wisconsin Public Service Corporation. Wisconsin is a net exporter of electricity.

Unlike neighboring Illinois, which has large coal deposits, most of Wisconsin's coal is imported from other States, including Illinois. In 1996, Wyoming coal accounted for 74 percent of utility coal consumption in Wisconsin. In 1986, utility coal units represented 64.8 percent of Wisconsin's generating capability and 64.1 percent of its net generation. In 1996, the coal share of capability had fallen to 59.3 percent, while the net generation share rose to 70.0 percent. Nuclear capability and net generation, on the other hand, were 13.5 percent and 24.7 percent, respectively, in 1986. By 1996, the nuclear shares had fallen to 11.6 percent and 18.6 percent, respectively. Wisconsin's nuclear plants have a capability weighted average age of 24 years, and are among the oldest in the Nation. Both the Wisconsin Public Service Corporation, the operator of Kewaunee, and the Wisconsin Electric Power Company (WEPCO), operator of Point Beach, are contemplating license renewal for their respective nuclear units. The owners of the Kewaunee plant have approved steam generator replacement of the unit.¹ The agreement should assure Kewaunee operation through 2013, and perhaps open the door for license

renewal.² WEPCO is currently mulling over its options concerning Point Beach.³ Relicensing costs could reach \$200 million for Point Beach.⁴

The Clean Air Act Amendments of 1990 specified a number of utility plants to begin compliance with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x). Cited in the law were 2,038 megawatts of nameplate capacity at three Wisconsin plants. Emissions of SO₂, NO_x, and carbon dioxide (CO₂) in Wisconsin ranked sixteenth, fifteenth, and eighteenth, respectively, in 1996. SO₂ emissions in Wisconsin increased slightly from 1986 to 1991. In 1996, the totals were less than they were in 1986. Emissions of both NO_x and CO₂ increased in both time periods. The rise in the second time frame was not as great, however. It is likely that Wisconsin will need to design a State implementation plan (SIP) for reducing ground-level ozone in response to a proposal released by the Environmental Protection Agency (EPA) in October 1998. The EPA SIP call proposal does not mandate which sources must reduce pollution. However, EPA states that utilities would be one of the most likely sources of NO_x emissions reductions.

Wisconsin has not moved as quickly toward restructuring its electric power industry as some States that have higher electricity prices. In November 1997, the Wisconsin Public Service Commission (PSC) issued its final decision on restructuring. The plan does not recommend retail access before 2000, but focuses on improving the utility infrastructure. Recommendations include improving transmission facilities, removing barriers to open transmission access, developing an independent system operator ISO, promoting construction of merchant plants, and promoting the development of renewable energy resources.⁵ In April 1998, Wisconsin passed a law to improve reliability and prevent power shortages by establishing a competitive merchant plant generating industry and creating a regional ISO. The law allows merchant plants up to 100 megawatts in size to be built without PSC approval.

¹A steam generator acts as a heat exchanger, sending high pressure steam to the turbine.

²Wayne Barber, "Wisconsin Regulator Okays Kewaunee Ownership Deal", *Nucleonics Week*, (July 9, 1998), p. 2.

³Pete Millard, "WEPCO Considers Costly Relicense for Nuclear Plant," *Business Journal-Milwaukee*, (July 31, 1998), p. 1.

⁴*Ibid.*

⁵Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

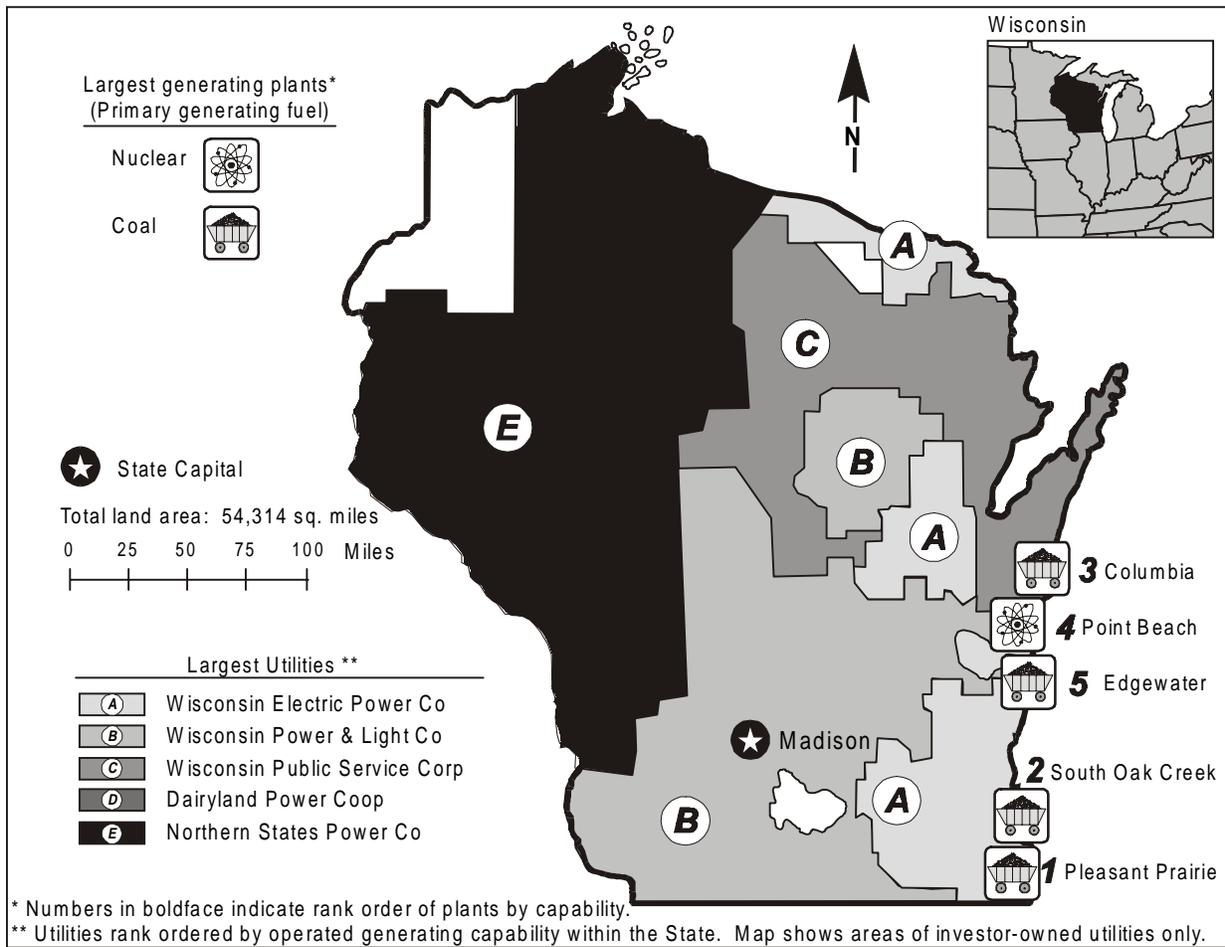


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		MAIN/MAPP	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	11,867	24
State Primary Generating Fuel		Coal	Generation (MWh)	51,651,435	22
Population (as of 7/96)	5,146,199	18	Average Age of Coal Plants	26 years	
Average Revenue (cents/kWh)	5.25	^a 10	Average Age of Oil-fired Plants	23 years	
Industry			Average Age of Gas-fired Plants	9 years	
Capability (MWe)	12,447	^b 22	Average Age of Nuclear Plants	24 years	
Generation (MWh)	54,463,471	^b 20	Average Age of Hydroelectric Plants	48 years	
Capability/person (KWe/person)	2.42	^b 32	Average Age of Other Plants	45 years	
Generation/person (MWh/person)	10.58	^b 31	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	276	16	Capability (MWe)	580	27
Nitrogen Oxide Emissions (Thousand Short Tons)	196	15	Percentage Share of Capability	4.7	29
Carbon Dioxide Emissions (Thousand Short Tons)	56,275	18	Generation (MWh)	2,812,036	27
Sulfur Dioxide/sq. mile (Tons)	5.08	25	Percentage Share of Generation	5.2	29
Nitrogen Oxides/sq. mile (Tons)	3.61	22			
Carbon Dioxide/sq. mile (Tons)	1,036.10	25			

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capacity (MWe)
1. Pleasant Prairie	Coal	Wisconsin Electric Power Co	1,200
2. South Oak Creek	Coal	Wisconsin Electric Power Co	1,155
3. Columbia	Coal	Wisconsin Power & Light Co	1,050
4. Point Beach	Nuclear	Wisconsin Electric Power Co	950
5. Edgewater	Coal	Wisconsin Power & Light Co	818

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Wisconsin Electric Power Co	4,811	2,941	249	684	934	3
B. Wisconsin Power & Light Co	2,885	2,255	189	401	--	41
C. Wisconsin Public Service Corp . . .	1,688	884	8	232	515	49
D. Dairyland Power Coop	982	961	--	--	--	21
E. Northern States Power Co	901	45	484	12	--	360
Total	11,267	7,086	930	1,329	1,449	474
Percentage of Industry Capability	90.5	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

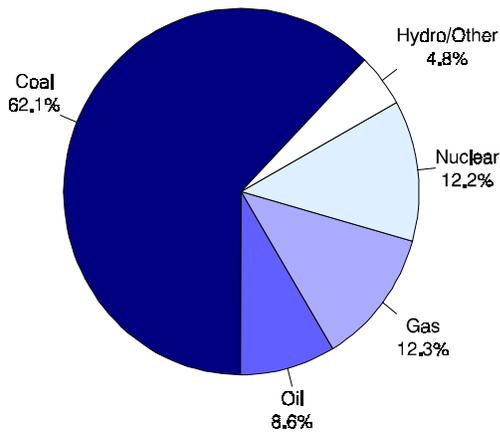


Figure 2. Utility Generation by Primary Energy Source, 1996

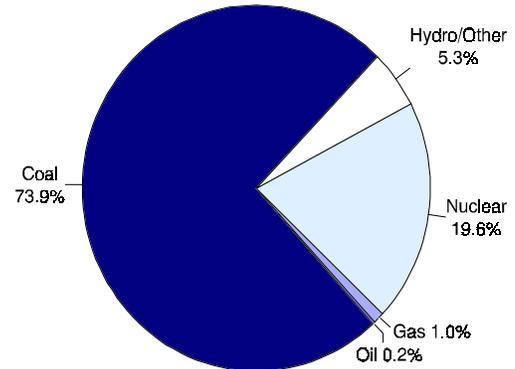


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

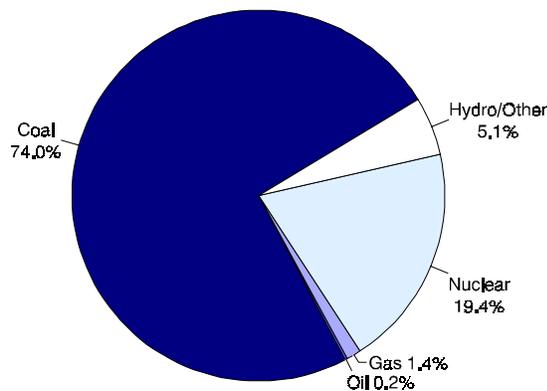


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	7,450	7,082	7,375	64.1	67.4	62.1
Oil	1,143	970	1,020	10.4	9.2	8.6
Gas	299	395	1,456	2.7	3.8	12.3
Nuclear	1,547	1,509	1,449	14.1	14.4	12.2
Hydro/Other	501	548	567	4.6	5.2	4.8
Total Utility	10,939	10,504	11,867	100.0	100.0	100.0
Total Nonutility	W	499	580	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	29,100,218	33,489,286	38,144,842	68.0	71.0	73.9
Oil	108,541	62,162	124,088	0.3	0.1	0.2
Gas	104,623	179,793	540,404	0.2	0.4	1.0
Nuclear	11,199,272	10,991,419	10,121,355	26.2	23.3	19.6
Hydro/Other	2,272,296	2,426,158	2,720,746	5.3	5.1	5.3
Total Utility	42,784,949	47,148,818	51,651,435	100.0	100.0	100.0
Total Nonutility	W	2,156,537	2,812,036	--	--	--

-- = Not applicable. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.323	0.359	0.411	68.5	71.0	74.0
Oil	0.002	0.001	0.001	0.3	0.2	0.2
Gas	0.002	0.003	0.007	0.4	0.5	1.4
Nuclear	0.121	0.118	0.108	25.7	23.3	19.4
Hydro/Other	0.024	0.025	0.028	5.0	5.0	5.1
Total Utility	0.471	0.506	0.555	100.0	100.0	100.0
Total Nonutility	W	0.074	0.094	--	--	--

-- = Not applicable. W = Withheld.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

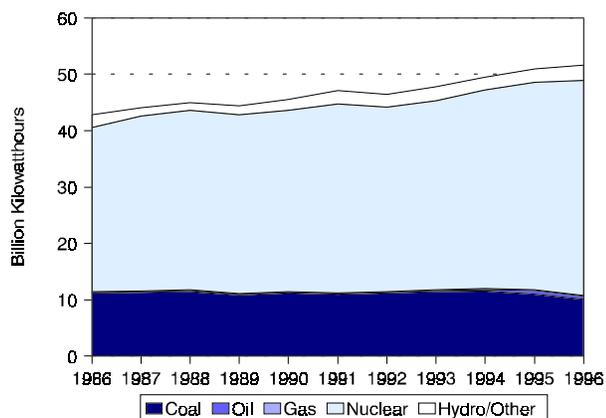


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

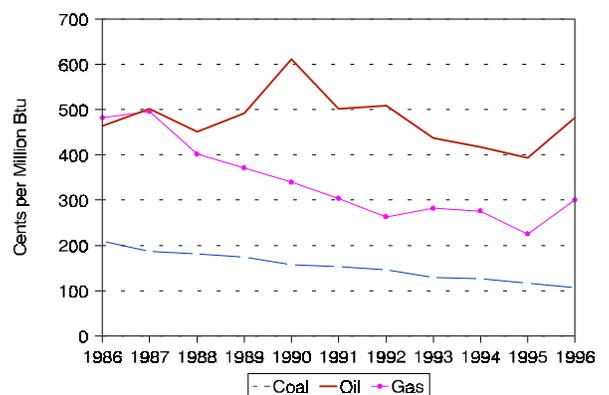


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	209.6	152.7	106.0	-6.6
Oil	464.3	501.1	481.6	0.4
Gas	482.1	303.8	300.6	-4.6

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	318	337	276	-1.4
Nitrogen Oxides ^d . .	159	190	196	2.1
Carbon Dioxide ^d . . .	36,339	50,496	56,275	4.5

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

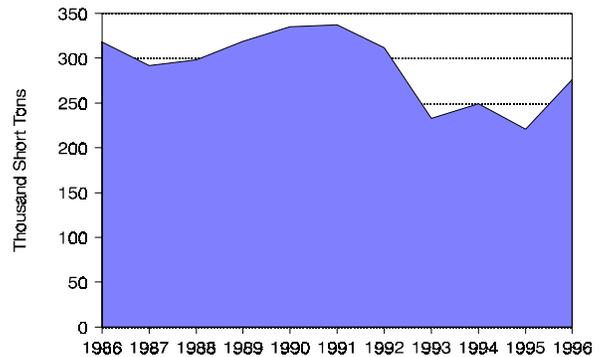


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

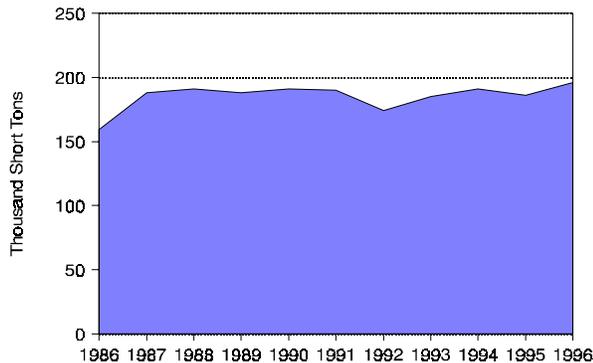


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

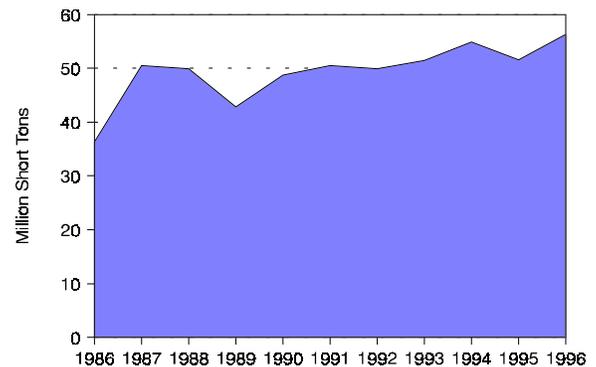


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	16,556,774	17,349,467	18,684,891	1.2	35.5	34.0	31.8
Commercial	11,471,084	13,308,794	15,433,148	3.0	24.6	26.1	26.3
Industrial . . .	17,798,591	19,685,677	23,870,906	3.0	38.1	38.6	40.6
Other	858,383	688,270	754,683	-1.3	1.8	1.3	1.3
Total	46,684,829	51,032,208	58,743,628	2.3	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

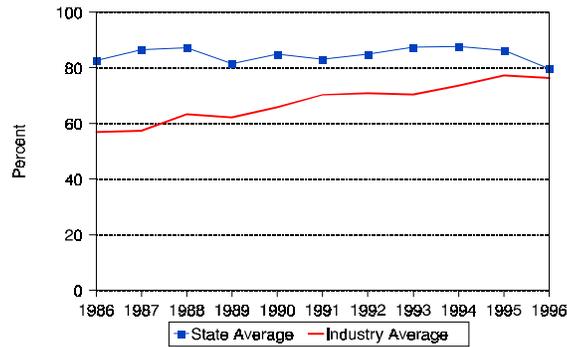


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	15	83	--	29	127
Number of Retail Customers	1,938,353	196,975	--	169,518	2,304,846
Retail Sales (MWh)	40,284,242	4,302,193	--	2,098,394	46,684,829
Percentage of Retail Sales	86.3	9.2	--	4.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,977,388	282,859	--	199,036	3,459,284
Percentage of Revenue	86.1	8.2	--	5.8	100.0
1991					
Number of Utilities	12	82	--	27	121
Number of Retail Customers	1,901,402	208,559	--	181,979	2,291,940
Retail Sales (MWh)	43,108,943	5,512,727	--	2,410,538	51,032,208
Percentage of Retail Sales	84.5	10.8	--	4.7	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,633,220	298,731	--	194,562	3,126,513
Percentage of Revenue	84.2	9.6	--	6.2	100.0
1996					
Number of Utilities	12	82	--	26	120
Number of Retail Customers	2,031,912	226,686	--	198,759	2,457,357
Retail Sales (MWh)	49,331,680	6,634,505	--	2,777,443	58,743,628
Percentage of Retail Sales	84.0	11.3	--	4.7	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	2,582,095	303,054	--	199,294	3,084,443
Percentage of Revenue	83.7	9.8	--	6.5	100.0

-- = Not applicable.

Wyoming

Wyoming had the smallest population and the thirty-fifth largest utility generating capability in 1996. This difference in rankings is the largest among the States. The proximity of the leading fuel source for electricity production in Wyoming, coal, is a major factor in making Wyoming an exporter of inexpensive electricity. Since 1988, Wyoming has been the leading coal producer in the Nation.¹ Vast amounts of primarily subbituminous coal underlie sparsely populated areas of the State. Wyoming's coal output has grown in response to the increasing demand for low-sulfur coal. The Powder River Basin is the center of the State's coal industry. Located there is the thickest coal bed in the Nation, Wyodak, averaging 70 feet, and the leading source of coal nationally for the last 11 years. In 1996, Wyoming claimed 7 of the 10 largest coal mines in the United States. Most of the 279 million short tons of coal produced in Wyoming in 1996 was shipped to out-of-state utilities to generate electricity. About 25 million short tons were consumed by utilities in Wyoming to generate electricity.

Almost all of the utility electricity generated in the State is produced at coal-fired plants. The five largest plants, all coal-fired, are located throughout the State with the exception of the northwest corner, the location of Yellowstone and Grand Teton National Parks. The largest of these plants is PacifiCorp's Jim Bridger. PacifiCorp is the largest utility in terms of operated generating capability within the State. Coal plants represent 95 percent of generating capability, hydropower about 5 percent, and gas and oil represent a very small part of generating capability. The State has no nuclear plants. Net generation in 1996 was 96.8 percent from coal-fired plants, and 3 percent from hydroelectric plants.

Like all States west of Kansas, Wyoming had no generating capability that was cited by The Clean Air

Act Amendments of 1990 to begin compliance with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x) in 1995 as part of Phase I of the Environmental Protection Agency's Acid Rain Program. All fossil-fueled units will need to begin compliance in Phase II of the program, which commences on January 1, 2000. Wyoming's emissions of SO₂ declined from 1986 to 1991. The 1996 totals were higher than they were in 1991, but were still below 1986 levels. NO_x and carbon dioxide emissions both rose over both time periods. The increases were greater for both in the period from 1986 to 1991.

Wyoming's five investor-owned utilities accounted for almost 73 percent of the retail sales in the State in 1996. PacifiCorp is the largest utility in the State in terms of retail sales. Cooperatives sold over 23 percent of the electricity in the State in 1996. The two largest cooperatives are Tri-County and Lower Valley Power and Light Cooperatives. The average price of electricity, 4.31 cents per kilowatthour, was fourth least expensive in the Nation.

The Wyoming Public Utility Commission (PUC) held public hearings in September 1997 on deregulating the electric power industry, and although both proponents and opponents feel deregulation is inevitable, they are reluctant for the State to take a lead, since prices are already among the lowest in the Nation. In June 1998, the PUC had scheduled a hearing on deregulation to establish voluntary guidelines for utilities, but canceled the hearing in response to legislators' concerns.² Also in June 1998, a restructuring bill that had been killed in January was revived. However, it is likely that Wyoming will continue taking a slow approach to restructuring, observing other States' experiences before implementing retail competition.

¹Energy Information Administration, *State Coal Profiles*, DOE/EIA0576 (Washington, DC, January 1994), p. 107.

²Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

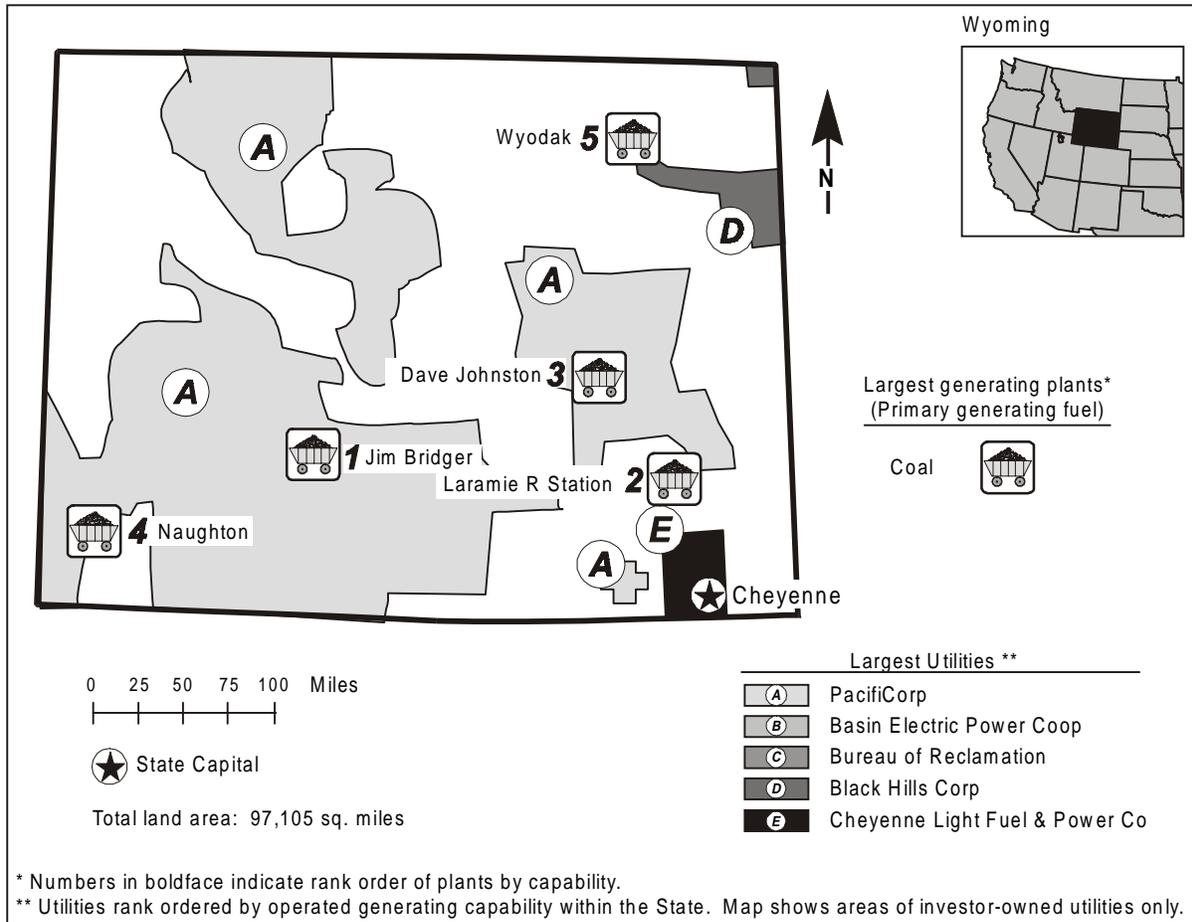


Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank	Item	Value	U.S. Rank
NERC Region(s)		WSCC	Utility		
Net Exporter or Importer		Exporter	Capability (MWe)	5,966	35
State Primary Generating Fuel		Coal	Generation (MWh)	40,851,631	28
Population (as of 7/96)	480,011	51	Average Age of Coal Plants	21 years	
Average Revenue (cents/kWh)	4.31	^a 4	Average Age of Oil-fired Plants	33 years	
Industry			Average Age of Gas-fired Plants	--	
Capability (MWe)	W	^b W	Average Age of Nuclear Plants	--	
Generation (MWh)	W	^b W	Average Age of Hydroelectric Plants	40 years	
Capability/person (KWe/person)	W	^b W	Average Age of Other Plants	--	
Generation/person (MWh/person)	W	^b W	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	91	31	Capability (MWe)	W	W
Nitrogen Oxide Emissions (Thousand Short Tons)	180	17	Percentage Share of Capability	W	W
Carbon Dioxide Emissions (Thousand Short Tons)	46,093	21	Generation (MWh)	W	W
Sulfur Dioxide/sq. mile (Tons)	0.94	39	Percentage Share of Generation	W	W
Nitrogen Oxides/sq. mile (Tons)	1.85	32			
Carbon Dioxide/sq. mile (Tons)	474.67	36			

-- = Not applicable. W = Withheld.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Jim Bridger	Coal	PacifiCorp	2,080
2. Laramie R Station	Coal	Basin Electric Power Coop	1,650
3. Dave Johnston	Coal	PacifiCorp	772
4. Naughton	Coal	PacifiCorp	700
5. Wyodak	Coal	PacifiCorp	335

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Name	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. PacifiCorp	3,888	3,887	--	--	--	1
B. Basin Electric Power Coop	1,650	1,650	--	--	--	--
C. Bureau of Reclamation	291	--	--	--	--	291
D. Black Hills Corp	125	125	--	--	--	--
E. Cheyenne Light Fuel & Power Co	10	--	10	--	--	--
Total	5,964	5,662	10	--	--	292
Percentage of Utility Capability ..	100.0	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

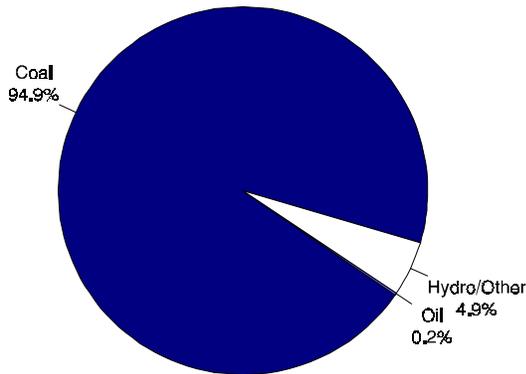


Figure 2. Utility Generation by Primary Energy Source, 1996

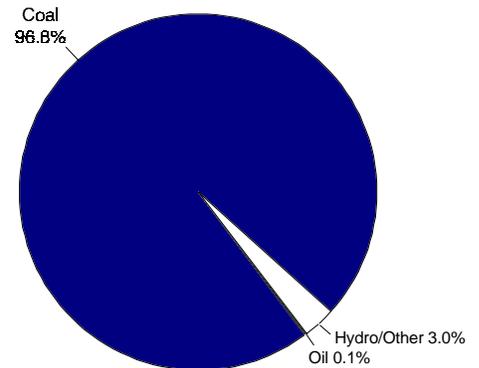


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

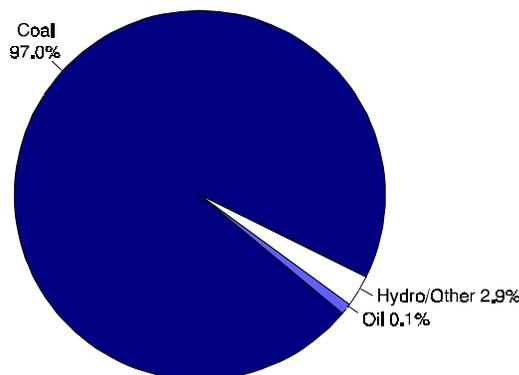


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	5,410	5,545	5,662	95.2	95.2	94.9
Oil	18	15	10	0.3	0.3	0.2
Gas	--	--	--	--	--	--
Nuclear	--	--	--	--	--	--
Hydro/Other	256	266	294	4.5	4.6	4.9
Total Utility	5,683	5,826	5,966	100.0	100.0	100.0
Total Nonutility	55	95	W	--	--	--

-- = Not applicable. W = Withheld.

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	27,561,690	37,862,584	39,551,555	95.8	97.9	96.8
Oil	59,095	60,850	59,443	0.2	0.2	0.1
Gas	12,044	7,796	8,836	(s)	(s)	(s)
Nuclear	--	--	--	--	--	--
Hydro/Other	1,140,857	735,932	1,231,797	4.0	1.9	3.0
Total Utility	28,773,686	38,667,162	40,851,631	100.0	100.0	100.0
Total Nonutility	370,875	599,938	W	--	--	--

-- = Not applicable. (s) = Nonzero percentage less than 0.05. W = Withheld.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.303	0.406	0.427	96.0	98.0	97.0
Oil	0.001	0.001	0.001	0.2	0.2	0.1
Gas	(s)	(s)	(s)	--	--	--
Nuclear	--	--	--	--	--	--
Hydro/Other	0.012	0.008	0.013	3.8	1.8	2.9
Total Utility	0.316	0.414	0.440	100.0	100.0	100.0
Total Nonutility	0.069	0.015	W	--	--	--

-- = Not applicable. (s) = Nonzero value less than 0.0005. W = Withheld.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

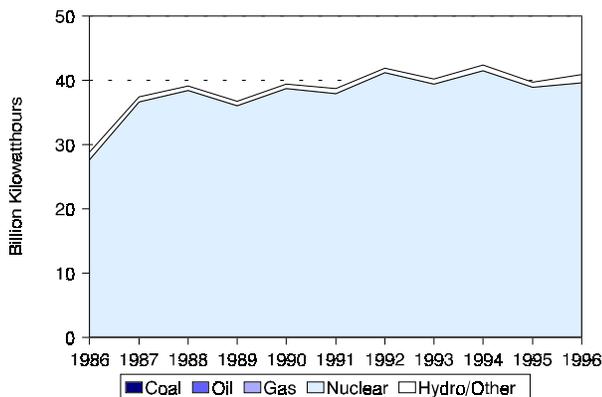


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

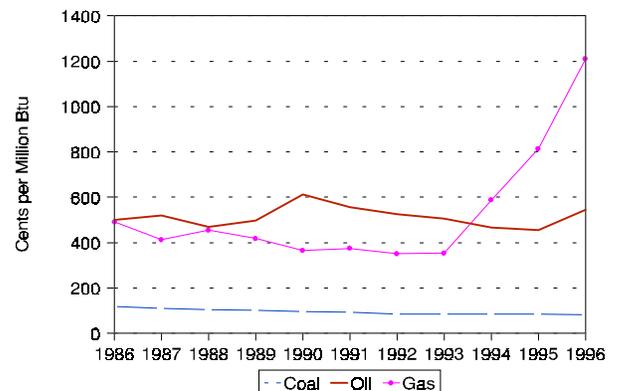


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	119.1	93.4	82.0	-3.7
Oil	499.5	555.6	545.6	0.9
Gas	491.1	375.0	1,211.2	9.4

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	96	82	91	-0.5
Nitrogen Oxides ^d . .	130	170	180	3.3
Carbon Dioxide ^d . . .	31,256	43,446	46,093	4.0

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

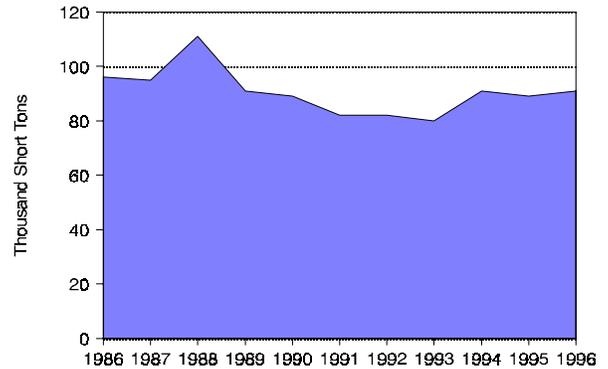


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

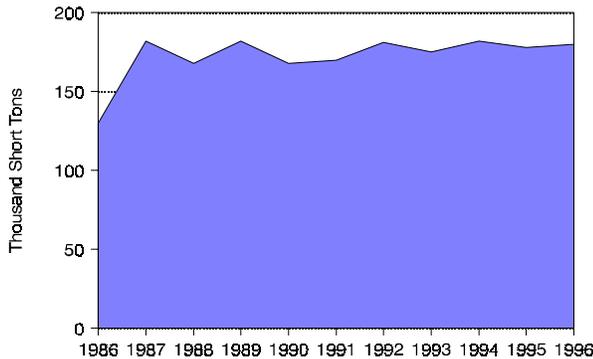


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

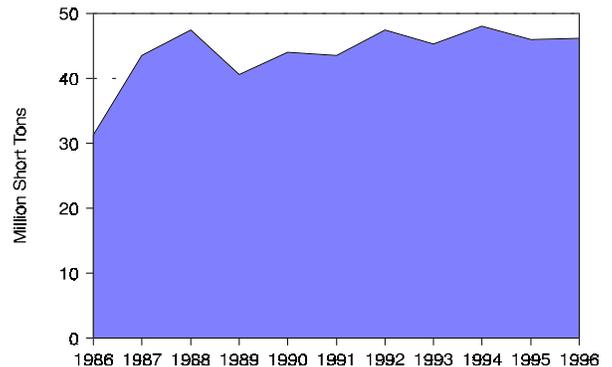


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	1,677,662	1,819,415	2,022,027	1.9	16.8	15.5	17.6
Commercial	2,074,873	2,310,467	2,424,519	1.6	20.8	19.7	21.1
Industrial . . .	6,047,462	7,498,103	6,890,808	1.3	60.6	63.8	60.1
Other	173,366	128,863	137,715	-2.3	1.7	1.1	1.2
Total	9,973,362	11,756,848	11,475,069	1.4	100.0	100.0	100.0

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	7	12	1	18	38
Number of Retail Customers	169,517	21,614	7	50,174	241,312
Retail Sales (MWh)	7,557,382	335,434	36,083	2,044,463	9,973,362
Percentage of Retail Sales	75.8	3.4	0.4	20.5	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	392,407	23,415	600	155,953	572,549
Percentage of Revenue	68.5	4.1	0.1	27.2	100.0
	1991				
Number of Utilities	6	13	1	16	36
Number of Retail Customers	170,903	22,635	7	48,698	242,243
Retail Sales (MWh)	9,223,346	393,766	28,000	2,111,736	11,756,848
Percentage of Retail Sales	78.5	3.4	0.2	18.0	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	403,994	23,906	268	133,001	561,202
Percentage of Revenue	72.0	4.3	0.1	23.7	100.0
	1996				
Number of Utilities	5	13	1	18	37
Number of Retail Customers	166,175	24,274	4	70,882	261,335
Retail Sales (MWh)	8,340,349	436,765	17,849	2,680,106	11,475,069
Percentage of Retail Sales	72.7	3.8	0.2	23.4	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	328,872	25,512	309	139,871	494,564
Percentage of Revenue	66.5	5.2	0.1	28.3	100.0

United States

In 1996, the United States had a population of 265,179,411 and a total electricity generating capability of 775,872 megawatts comprising 709,942 megawatts of utility capability and 65,930 megawatts of nonutility capability. The largest portion of utility capability in the country is fueled by coal. The largest plant, Grand Coulee of the Bureau of Reclamation, is a hydroelectric plant on the Columbia River in Washington. The largest utility in the country is the Tennessee Valley Authority (TVA), which provides electricity to seven southeastern States.¹ Although investor-owned utilities accounted for over three-quarters of U.S. retail electricity sales, both Grand Coulee and TVA are Federally-owned. The average price of electricity for the United States in 1996 was 6.86 cents per kilowatthour.

The Clean Air Act Amendments of 1990 (CAAA90) specified a number of utility plants to begin compliance with stricter emissions standards for sulfur dioxide (SO₂) and nitrogen oxides (NO_x) in 1995. These units included 130.9 gigawatts of nameplate capacity at 110 plants in 21 States. In 1986, SO₂ emissions from the electric power industry were 15.5 million tons. By 1996, the national emissions total had dropped to 13.8 million tons. Emissions of NO_x and carbon dioxide (CO₂) on the other hand, both increased over the 11 years examined in this report. NO_x went from 6.7 million tons in 1986 to 8.7 million tons in 1996. CO₂ emissions increased from 1.9 billion tons in 1986 to 2.7 billion tons in 1996. Congress established the Ozone Transport Commission (OTC)² as part of the CAAA90 to coordinate the regional development of control plans for ground-level ozone in the Northeast and mid-Atlantic States. The OTC has developed the NO_x Budget Program, which will utilize market-based emissions trading. Implementation of this program is to begin in May 1999.

In 1986, utility coal units represented 42.1 of United States generating capability and slightly over half of the

country's net generation. In 1996, the coal share of capability had fallen to under 40 percent while the generation share also declined, although the status as majority generator was maintained. The nonutility share of capability more than doubled from 1986 to 1996, so that in 1996 nonutilities provided almost 9 percent of the total. Although the share of utility gas capability increased, the share of net gas-fired generation declined. Nuclear capability and generation both increased over the period; in 1996 almost one-fifth of electricity was generated at nuclear plants. Capability and generation from oil and hydropower and other renewable sources declined over the 11-year period examined in this report.

There has been a surge of activity in the legislatures and public utility commissions in most of the States to examine retail competition. Some States have moved faster than others by passing restructuring legislation and instituting retail pilot programs. States with high electricity rates, such as California and those in the Northeast, had compelling reasons to promote competition in the hope of making lower rates available to their consumers. In fact, California, which has been the pathfinder through the unexplored world of direct retail access, ushered in full direct access for all customers beginning March 31, 1998. Currently, 12 other States have active pilot programs or direct access programs.³

Legislation introduced in the 105th Congress covers diverse spheres of restructuring activity. Some bills are comprehensive—expanding on initiatives in the Energy Policy Act of 1992 and building on Federal Energy Regulatory Commission actions—to facilitate retail competition by a certain date. Others focus on a variety of selected issues. The Administration released its Comprehensive Electricity Competition Plan in March 1998. The plan advances legislative changes which aim to provide customer choice, enhance competition, and diversify generation sources.⁴

¹The seven States are Tennessee, Mississippi, Alabama, Georgia, North Carolina, Virginia and Kentucky.

²The Ozone Transport Commission comprises Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Delaware, the northern counties and independent cities of Virginia, and the District of Columbia.

³Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

⁴Energy Information Administration, *The Changing Structure of the Electric Power Industry: Selected Issues, 1998*, DOE/EIA-0562(98) (Washington, DC, July 1998), pp. xi and 97.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Grand Coulee	Hydro	Bureau of Reclamation	6,494
2. Palo Verde	Nuclear	Arizona Public Service Co	3,751
3. W A Parish	Coal/Gas	Houston Lighting & Power Co	3,614
4. Scherer	Coal	Georgia Power Co	3,352
5. Bowen	Coal	Georgia Power Co	3,248

Table 3. Top Five Utilities with Largest Generating Capability, and Type, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Tennessee Valley Authority	28,268	14,903	1,096	840	6,540	4,889
B. Commonwealth Edison Co	21,942	6,450	1,600	2,210	11,679	3
C. Texas Utilities Electric Co	21,355	5,825	20	13,080	2,430	--
D. Duke Power Co	19,234	7,699	599	1,200	7,054	2,682
E. Georgia Power Co	19,183	12,832	1,228	341	3,950	832
Total	109,982	47,709	4,543	17,671	31,653	8,406
Percentage of Industry Capability	14.2	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

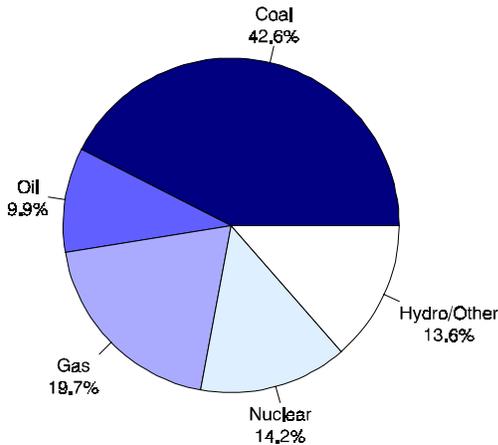


Figure 2. Utility Generation by Primary Energy Source, 1996

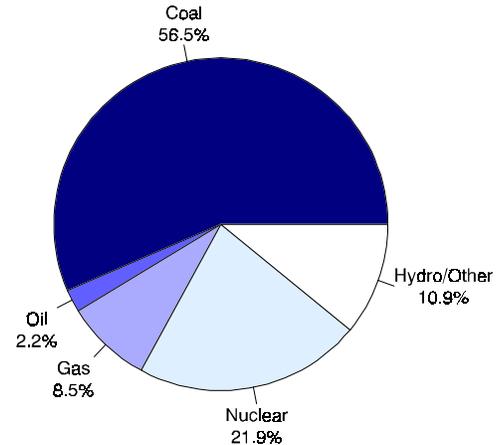


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

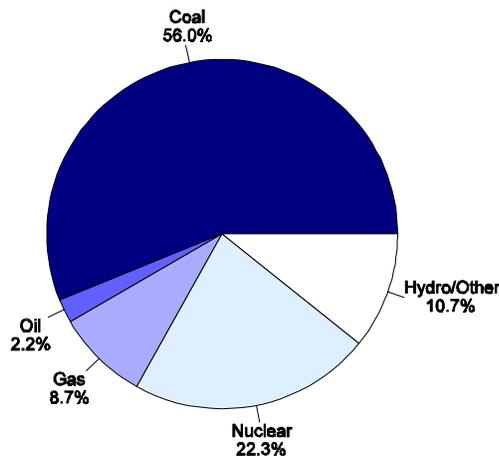


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	290,506	299,611	302,420	42.1	40.6	39.0
Oil	78,262	72,598	70,405	11.3	9.8	9.1
Gas	119,456	127,157	140,021	17.3	17.2	18.0
Nuclear	85,305	99,589	100,785	12.3	13.5	13.0
Hydro/Other	91,282	94,062	96,315	13.2	12.7	12.4
Total Utility	664,811	693,017	709,946	96.4	93.9	91.5
Total Nonutility	24,934	45,384	65,930	3.6	6.1	8.5
Industry	689,745	738,401	775,876	100.0	100.0	100.0

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	1,385,831,452	1,551,166,838	1,737,453,477	52.8	50.6	46.9
Oil	136,584,864	111,462,979	67,346,095	5.2	3.6	1.9
Gas	248,508,431	264,171,598	262,729,781	9.5	8.6	7.3
Nuclear	414,038,064	612,565,087	674,728,546	15.8	20.0	18.7
Hydro/Other	302,347,016	285,656,363	335,184,253	11.5	9.3	9.0
Total Utility	2,487,309,827	2,825,022,865	3,077,442,152	94.7	92.1	83.7
Total Nonutility	138,481,523	243,006,343	369,551,583	5.3	7.9	16.3
Industry	2,625,791,350	3,068,029,208	3,446,993,735	100.0	100.0	100.0

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	14.427	16.040	18.004	48.4	46.9	46.9
Oil	1.445	1.166	0.712	4.9	3.4	1.9
Gas	2.698	2.870	2.799	9.1	8.4	7.3
Nuclear	4.471	6.579	7.168	15.0	19.2	18.7
Hydro/Other	3.158	2.957	3.453	10.6	8.6	9.0
Total Utility	26.200	29.612	32.135	87.9	86.6	83.7
Total Nonutility	3.599	4.595	6.250	12.1	13.4	16.3
Industry	29.799	34.207	38.385	100.0	100.0	100.0

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

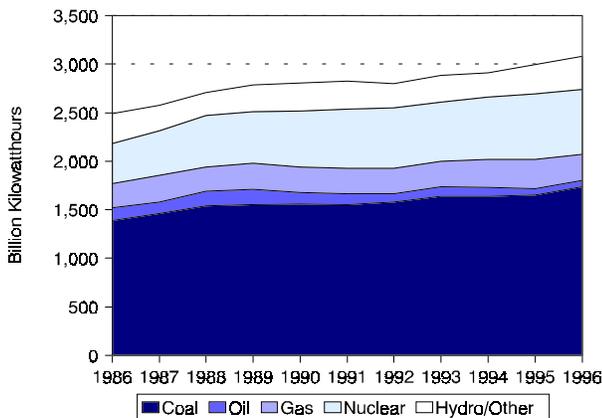


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

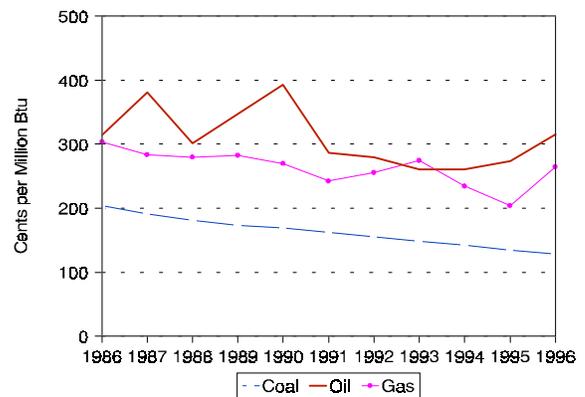


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	203.9	162.6	128.9	-4.5
Oil	314.7	286.4	315.7	(s)
Gas	303.8	242.3	264.8	- 1.4

(s)=Nonzero percent less than 0.05.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	15,533	16,624	13,758	-1.2
Nitrogen Oxides ^d	6,673	8,158	8,693	2.7
Carbon Dioxide ^d	1,870,052	2,370,237	2,692,656	3.7

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

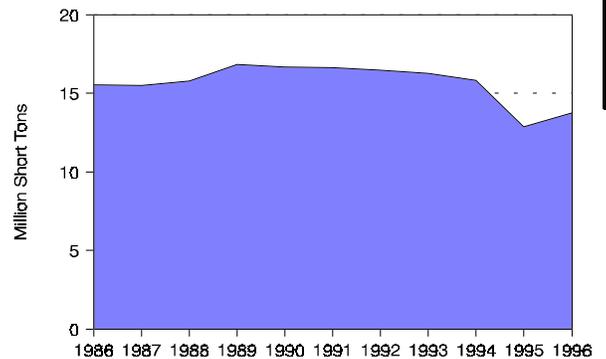


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

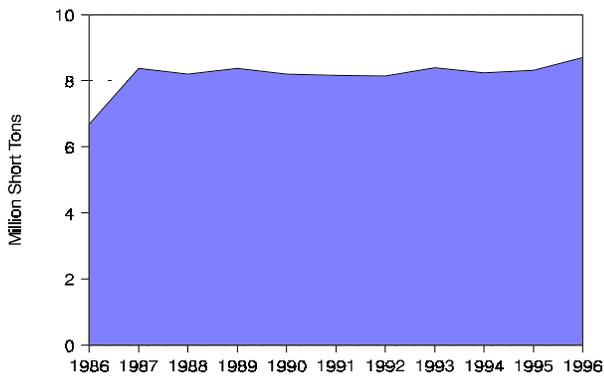


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

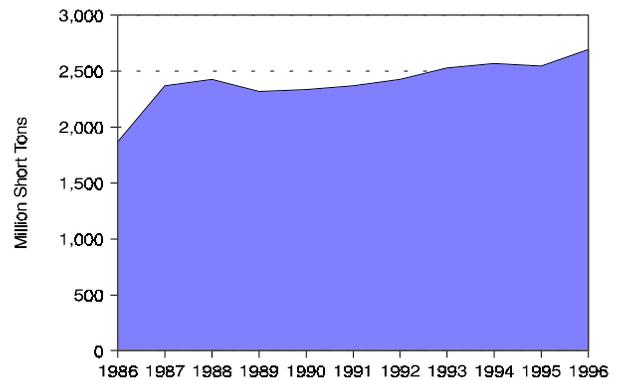


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential	819,088,319	955,417,350	1,082,490,541	2.8	34.6	34.6	34.9
Commercial	630,519,597	765,663,613	887,424,657	3.5	26.6	27.7	28.6
Industrial . . .	830,530,504	946,583,391	1,030,356,028	2.2	35.1	34.3	33.3
Other	88,614,629	94,338,686	97,538,719	1.0	3.7	3.4	3.1
Total	2,368,753,062	2,762,003,040	3,097,809,945	2.7	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor 1986-1996

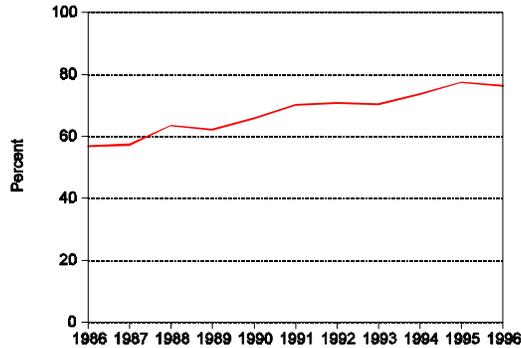


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
	1986				
Number of Utilities	240	1,928	6	905	3,079
Number of Retail Customers	78,244,422	14,116,618	24,311	10,375,164	102,760,515
Retail Sales (MWh)	1,821,460,746	335,844,917	45,353,680	166,093,719	2,368,753,062
Percentage of Retail Sales	76.9	14.2	1.9	7.0	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	156,513,576	23,734,303	1,628,999	14,594,801	196,471,679
Percentage of Revenue	79.7	12.1	0.8	7.4	100.0
1991					
Number of Utilities	223	1,944	6	891	3,064
Number of Retail Customers	84,973,630	15,304,087	29,700	11,708,848	112,016,265
Retail Sales (MWh)	2,110,528,121	393,448,324	52,943,716	205,082,879	2,762,003,040
Percentage of Retail Sales	76.4	14.2	1.9	7.4	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	165,882,853	26,020,444	1,479,079	15,901,401	209,283,776
Percentage of Revenue	79.3	12.4	0.7	7.6	100.0
1996					
Number of Utilities	210	1,953	7	873	3,043
Number of Retail Customers	90,299,048	16,398,233	31,148	13,273,664	120,002,093
Retail Sales (MWh)	2,342,808,015	450,927,720	45,626,484	258,447,726	3,097,809,945
Percentage of Retail Sales	75.6	14.6	1.5	8.3	100.0
Revenue from Retail Sales (thousand 1996 \$) ^e	166,795,617	27,098,025	1,152,025	17,408,907	212,454,574
Percentage of Revenue	78.5	12.8	0.5	8.2	100.0

Notes and Sources

Map Notes

Note: Most of the data contained in the maps are from EIA. However, utility service territories are based on the following:

Source: Electric Light and Power, *Electric Power Generating and Transmission Systems Map of the U.S. and Canada*, Third Edition, Rennwell Publishing Co. (Tulsa, OK, 1996).

Table Notes

Table 1:

^aThe ranking for Average Revenue is in ascending order, unlike the other rankings, which are in descending order.

^bIn order to avoid disclosure of individual company data, nonutility capability, and generation data are withheld for six States: Arizona, Kentucky, Mississippi, Nebraska, North Dakota, and Wyoming. Therefore, industry capability and generation rankings are based on the remaining 44 States and the District of Columbia.

^cIn order to avoid disclosure of individual company data, nonutility capability and generation data are withheld for six States: Arizona, Kentucky, Mississippi, Nebraska, North Dakota, and Wyoming. Therefore, all nonutility rankings are based on the remaining 44 States and the District of Columbia.

Notes: Emissions of carbon dioxide (CO₂), nitrogen oxides (NO_x), and sulfur dioxide (SO₂) incorporate the August 1998 Air Pollutant Emissions Factors (AP-42 5th release) of the Environmental Protection Agency (see Technical Notes Appendix D). Estimates are for steam-electric plants 1 megawatts and larger, based on fuel consumption data. "Other" is electricity produced from wind, photovoltaic, geothermal, wood and woodwaste, municipal solid waste, landfill gases, and other renewable sources connected to electric utility distribution systems. Average age by fuel is capability weighted.

Sources: **Population** - U.S. Bureau of the Census "Press Release CB97-213," December 31, 1997. **Utility Capability** - Energy Information Administration (EIA), Form EIA-860, "Annual Electricity Generator Report." **Utility Generation** - EIA, Form EIA-759, "Monthly Power Plant Report." **Nonutility Capability and Generation** - EIA, Form EIA-867, "Annual Nonutility Power Producer Report." **Emissions** - EIA, Form EIA-767, "Steam-Electric Plant Operation and Design Report." **Export/Import** - EIA, "State Energy Data Report 1995 - Consumption Estimates, DOE/EIA-0214(95) (Washington DC, December 1997) p. 11. **Average Revenue** - EIA, Form EIA-861, "Annual Electric Utility Report."

Table 2:

Note: Type refers to the primary fuels used to generate electricity. Fuels used in more than 10 percent of capability are also listed. Jet fuel and kerosene are included as "oil." Non-hydro renewable units are referred to as "other."

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

Table 3:

Note: Total may not equal sum of components due to independent rounding.

Source: Energy Information Administration (EIA), Form EIA-860, "Annual Electricity Generator Report."

Table 4:

Note: Percentage share of fuel is based on industry data except for States with "W," for those States (22 in total) percentage share of fuel is based on utility data. Totals may not equal sum of components due to independent rounding. "Other" is electricity produced from wind, photovoltaic, geothermal, wood and woodwaste, municipal solid waste, landfill gases, and other renewable sources connected to electric utility distribution systems. 1986 nonutility data are estimates based on nameplate capacity.

Source: Energy Information Administration (EIA), Form EIA-860, "Annual Electric Generator Report," and EIA-867, "Annual Nonutility Power Producers Report."

Table 5:

Note: Percentage share of fuel is based on industry data except for States with "W", for those States (22 in total) percentage share of fuel is based on total utility data. Totals may not equal sum of components due to independent rounding. "Other" is electricity produced from wind, photovoltaic, geothermal, wood and woodwaste, municipal solid waste, landfill gases and other renewable sources connected to electric utility distribution systems. 1986 nonutility data are estimates based on gross generation.

Source: Energy Information Administration (EIA), Form EIA-759, "Monthly Power Plant Report," Form EIA-867, "Annual Nonutility Power Producers Report."

Table 6:

Note: Percentage share of fuel is based on industry data except for States with "W"; for those States (22 in total) percentage share of fuel is based on total utility data. Totals may not equal sum of components due to independent rounding. "Other" is electricity produced from wind, photovoltaic, geothermal, wood and woodwaste, municipal solid waste, landfill gases and other renewable sources connected to electric utility distribution systems. 1986 nonutility data is estimated.

Source: Energy Information Administration (EIA), Form EIA-759, "Monthly Power Plant Report," Form EIA-867, "Annual Nonutility Power Producers Report," and Federal Energy Regulatory Commission, Form 423, "Monthly Report of Coal and Quality of Fuels for Electric Plants."

Table 7:

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

Table 8:

^dAs of 1993 data, CO₂ emissions from the emission factor for light oil and NO_x emissions reduction from control technologies have been revised due to a software problem-- (see Technical Notes Appendix D)-- historical data were revised to reflect these changes.

Note: Emissions of CO₂, NO_x, and SO₂ incorporate the August 1998 Air Pollutant Emissions Factors (AP-42 5th release) of the Environmental Protection Agency (see Technical Notes Appendix C). Estimates are for steam-electric plants 1 megawatt and larger, based on fuel consumption data. Nonutility emissions were not collected until 1989; therefore, the emissions presented for 1986, 1987, and 1988 are estimates based on 1989 and 1992 data.

Source: Energy Information Administration (EIA), Form EIA-767, "Steam-Electric Plant Operation and Design Report," and Form EIA-867, "Annual Nonutility Power Producers Report."

Table 9:

Note: Totals may not equal sum of components due to independent rounding.

Source: Energy Information Administration (EIA), Form EIA-861, "Annual Electric Utility Report."

Table 10:

^eSales include Residential, Commercial, Industrial, and Other, which include sales for public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.

Note: Total may not equal sum of components due to independent rounding.

Source: Energy Information Administration (EIA), Form EIA-861, "Annual Electric Utility Report."

Figure Notes**Figure 1:**

Note: "Other" is electricity produced from wind, photovoltaic, geothermal, wood and woodwaste, municipal solid waste, landfill gases and other renewable sources connected to electric utility distribution systems.

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

Figure 2:

Note: "Other" is electricity produced from wind, photovoltaic, geothermal, wood and woodwaste, municipal solid waste, landfill gases, and other renewable sources connected to electric utility distribution systems.

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

Figure 3:

Note: "Other" is electricity produced from wind, photovoltaic, geothermal, wood and woodwaste, municipal solid waste, landfill gases, and other renewable sources connected to electric utility distribution systems.

Source: Energy Information Administration (EIA), Form EIA-759, "Monthly Power Plant Report;" Federal Energy Regulatory Commission, FERC Form 423, "Monthly Report of Coal and Quality of Fuels for Energy Plants."

Figure 4:

Note: "Other" is electricity produced from wind, photovoltaic, geothermal, wood and woodwaste, municipal solid waste, landfill gases, and other renewable sources connected to electric utility distribution systems.

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

Figure 5:

Source: Energy Information Administration (EIA), Federal Energy Regulatory Commission, FERC Form 423, "Monthly Report of Coal and Quality of Fuels for Energy Plants."

Figure 6:

Source: Energy Information Administration (EIA), Form EIA-767, "Steam-Electric Plant Operation and Design Report," and Form EIA-867, "Annual Nonutility Power Producer Report." Nonutility emissions were not collected until 1989; therefore, the emissions presented for 1986, 1987, and 1988 are estimates based on 1989 and 1992 data.

Figure 7

Source: Energy Information Administration (EIA), Form EIA-767, "Steam-Electric Plant Operation and Design Report," and Form EIA-867, "Annual Nonutility Power Producer Report." Nonutility emissions were not collected until 1989; therefore, the emissions presented for 1986, 1987, and 1988 are estimates based on 1989 and 1992 data.

Figure 8:

Source: Energy Information Administration (EIA), Form EIA-767, "Steam-Electric Plant Operation and Design Report," and Form EIA-867, "Annual Nonutility Power Producer Report." Nonutility emissions were not collected until 1989; therefore, the emissions presented for 1986, 1987, and 1988 are estimates based on 1989 and 1992 data.

Figure 9:

Note: The annual capacity factors are calculated as the actual yearly net generation is divided by the maximum possible generation for the year. That fraction is then multiplied by 100 to obtain a percentage. The maximum possible generation is the number of hours in a year multiplied by the net summer capability at the end of the year.

Source: Energy Information Administration (EIA), Form EIA-759, "Monthly Power Plant Report;" and Form EIA-860, "Annual Electric Generator Report."

Appendix A

**1996 National
Ranking of State
Electricity Statistics**

Table A1. Miscellaneous Statistics on States with Both Utility and Nonutility Data, 1996

State	Importer/ Exporter	State's Primary Generating Fuel	Utility Average Revenue (cents/kWh)	Average Revenue Rank	Industry Capability (MWe)	Industry Generation (MWh)	Industry Sulfur Dioxide Emissions (Thousand Short Tons)	Industry Nitrogen Oxides Emissions (Thousand Short Tons)	Industry Carbon Dioxide Emissions (Thousand Short Tons)	Industry Sulfur Dioxide Emissions Rank	Industry Nitrogen Oxides Emissions Rank	Industry Carbon Dioxide Emissions Rank
Alabama	Exporter	COAL	5.35	13	21,729	121,705,111	594	307	107,366	8	10	6
Alaska	N/A	GAS	10.24	45	2,010	6,147,022	16	30	7,730	45	40	44
Arizona	--	--	--	--	--	--	--	--	--	--	--	--
Arkansas	Exporter	COAL	6.15	25	10,030	46,076,282	98	102	38,628	28	32	25
California	Importer	HYDRO	9.48	42	54,156	176,991,280	69	162	63,763	34	19	17
Colorado	Importer	COAL	6.05	21	7,462	37,161,443	96	147	38,013	30	23	26
Connecticut	Exporter	NUCLEAR	10.51	48	6,982	20,211,086	37	25	13,214	42	42	41
Delaware	Importer	COAL	6.88	33	2,421	8,854,448	78	29	9,835	32	41	43
District of Columbia	Importer	OIL	7.35	37	806	109,809	1	(s)	154	50	50	51
Florida	Importer	COAL	7.18	36	40,774	167,122,728	700	395	137,506	7	4	4
Georgia	Exporter	COAL	6.43	29	24,189	104,393,589	550	224	98,211	9	13	8
Hawaii	N/A	OIL	12.12	51	2,367	10,628,106	38	23	11,244	41	43	42
Idaho	Importer	HYDRO	3.96	1	2,987	14,087,774	9	4	2,466	48	49	49
Illinois	Exporter	COAL	7.69	39	33,927	148,009,801	785	386	90,095	6	6	10
Indiana	Exporter	COAL	5.23	8	21,581	109,971,063	884	672	162,504	3	2	2
Iowa	Exporter	COAL	5.94	18	8,497	34,455,527	171	156	37,175	21	21	28
Kansas	Exporter	COAL	6.52	30	9,743	39,945,525	103	134	36,376	27	25	30
Kentucky	--	--	--	--	--	--	--	--	--	--	--	--
Louisiana	Importer	GAS	6.07	22	20,104	78,266,814	428	183	73,456	14	16	13
Maine	Importer	NUCLEAR	9.46	41	3,747	15,158,958	45	18	14,962	40	46	40
Maryland	Importer	COAL	6.96	34	11,570	46,273,487	256	134	42,203	20	24	23
Massachusetts	Importer	COAL	10.13	44	11,204	38,049,471	108	64	28,735	25	37	33
Michigan	Exporter	COAL	7.10	35	24,924	112,636,317	450	326	91,160	13	9	9
Minnesota	Importer	COAL	5.54	14	9,822	44,363,780	105	153	43,324	26	22	22
Mississippi	--	--	--	--	--	--	--	--	--	--	--	--
Missouri	Exporter	COAL	6.11	24	16,087	68,124,736	347	245	64,773	15	11	16
Montana	Exporter	HYDRO	4.72	5	5,064	26,837,425	21	49	16,260	44	39	39
Nebraska	--	--	--	--	--	--	--	--	--	--	--	--
Nevada	Exporter	COAL	5.95	19	6,392	25,619,540	52	78	23,110	37	34	35
New Hampshire	Exporter	NUCLEAR	11.59	50	2,767	17,075,153	49	13	7,490	38	47	45
New Jersey	Importer	NUCLEAR	10.50	47	16,828	37,663,185	47	77	22,837	39	36	36
New Mexico	Exporter	COAL	6.76	32	5,314	30,185,827	61	122	31,271	36	28	32
New York	Importer	NUCLEAR	11.13	49	35,712	135,820,641	268	159	66,346	17	20	14
North Carolina	Importer	COAL	6.53	31	22,773	112,358,955	490	238	83,496	12	12	12
North Dakota	--	--	--	--	--	--	--	--	--	--	--	--
Ohio	Importer	COAL	6.30	28	27,613	144,431,762	1459	571	144,353	1	3	3

See notes at end of table.

Table A1. Miscellaneous Statistics on States with Both Utility and Nonutility Data, 1996

State	Importer/ Exporter	State's Primary Generating Fuel	Utility Average Revenue (cents/kWh)	Average Revenue Rank	Industry Capability (MWe)	Industry Generation (MWh)	Industry Sulfur Dioxide Emissions (Thousand Short Tons)	Industry Nitrogen Oxides Emissions (Thousand Short Tons)	Industry Carbon Dioxide Emissions (Thousand Short Tons)	Industry Sulfur Dioxide Emissions Rank	Industry Nitrogen Oxides Emissions Rank	Industry Carbon Dioxide Emissions Rank
Oklahoma	Exporter	COAL	5.56	15	13,863	52,036,045	132	165	49,633	23	18	20
Oregon	Importer	HYDRO	4.77	6	11,429	51,044,645	9	21	6,716	47	45	46
Pennsylvania ..	Exporter	COAL	7.96	40	36,439	192,030,229	1098	392	128,999	2	5	5
Rhode Island ..	Importer	GAS	10.48	46	979	7,967,377	2	22	5,715	49	44	47
South Carolina .	Exporter	NUCLEAR	5.67	17	17,550	78,645,821	258	111	41,728	18	31	24
South Dakota ..	Exporter	HYDRO	6.18	27	2,954	10,066,274	14	13	2,864	46	48	48
Tennessee	Importer	COAL	5.24	9	17,871	92,142,427	537	218	64,964	10	14	15
Texas	Importer	COAL	6.16	26	73,360	327,371,326	519	754	268,921	11	1	1
Utah	Exporter	COAL	5.28	11	5,062	32,951,860	28	124	37,653	43	27	27
Vermont	Exporter	NUCLEAR	9.74	43	1,165	5,387,318	0	(s)	572	51	51	50
Virginia	Importer	COAL	6.09	23	18,401	67,031,106	258	131	51,931	19	26	19
Washington	Exporter	HYDRO	4.19	3	25,252	118,644,693	77	60	18,608	33	38	37
West Virginia ..	Importer	COAL	5.21	7	15,012	87,251,394	846	346	98,234	4	7	7
Wisconsin	Exporter	COAL	5.25	10	12,447	54,463,471	276	196	56,275	16	15	18
Wyoming	--	--	--	--	--	--	--	--	--	--	--	--

-- = Not applicable. N/A = Not available. (s) = Nonzero value less than 0.5.

Table A2. Miscellaneous Statistics for States in Which Nonutility Data Cannot be Presented, 1996

State	Importer/ Exporter	State's Primary Generating Fuel	Utility Average Revenue (cents/kWh)	Average Revenue Rank	Utility Capability (MWe)	Utility Generation (MWh)	Industry Sulfur Dioxide Emissions (Thousand Short Tons)	Industry Nitrogen Oxides Emissions (Thousand Short Tons)	Industry Carbon Dioxide Emissions (Thousand Short Tons)	Industry Sulfur Dioxide Emissions Rank	Industry Nitrogen Oxides Emissions Rank	Industry Carbon Dioxide Emissions Rank
Arizona	Exporter	COAL	7.54	38	15,146	70,877,043	111	120	36,592	24	29	29
Kentucky	Exporter	COAL	4.03	2	15,686	88,438,224	789	339	88,375	5	8	11
Mississippi	Importer	COAL	6.01	20	7,177	28,838,302	98	78	27,675	29	35	34
Nebraska	Exporter	COAL	5.32	12	5,632	27,322,697	61	84	18,593	35	33	38
North Dakota ..	Exporter	COAL	5.65	16	4,207	30,769,712	139	113	34,459	22	30	31
Wyoming	Exporter	COAL	4.31	4	5,966	40,851,631	91	180	46,093	31	17	21

Appendix B

**Major Characteristics
of U.S. Utilities and
Nonutilities**

U.S. Electric Utilities by Type of Ownership

Ownership	Major Characteristics
<p>Investor-Owned Utilities (IOUs)</p> <p>IOUs account for about three-quarters of all utility generation and capacity. There are 243 in the United States, and they operate in all States except Nebraska. They are also referred to as privately owned utilities.</p>	<ul style="list-style-type: none"> • Earn a return for investors; either distribute their profits to stockholders as dividends or reinvest the profits • Are granted service monopolies in certain geographic areas • Have obligation to serve and to provide reliable electric power • Are regulated by State and sometimes Federal governments, which in turn approve rates that allow a fair rate of return on investment • Most are operating companies that provide basic services for generation, transmission, and distribution
<p>Federally Owned Utilities</p> <p>There are 10 Federally owned utilities in the United States, and they operate in all areas except the Northeast, the upper Midwest, and Hawaii.</p>	<ul style="list-style-type: none"> • Power not generated for profit • Publicly owned utilities, cooperatives, and other nonprofit entities are given preference in purchasing from them • Primarily producers and wholesalers • Producing agencies are the U.S. Army Corps of Engineers, the U.S. Bureau of Reclamation, the International Water and Boundary Commission, U.S. Bureau of Indian Affairs, and Tennessee Valley Authority. • The electricity generated by these agencies is marketed by Federal power marketing administrations in DOE (Bonneville Power Administration, Southeastern Power Administration, Southwestern Power Administration, and Western Area Power Administration) • The Alaska Power Administration is in the process of being privatized per Public Law 104-58 enacted on November 28, 1995 • The Tennessee Valley Authority is the largest producer of electricity in this category and markets at both wholesale and retail levels
<p>Other Publicly Owned Utilities</p> <p>Other publicly owned utilities include: Municipals Public Power Districts State Authorities Irrigation Districts Other State Organizations</p> <p>There are 2,010 in the United States.</p>	<ul style="list-style-type: none"> • Are non-profit State and local government agencies • Serve at cost; return excess funds to the consumers in the form of community contributions, economic and efficient facilities, and reduced rates • Most municipals just distribute power, although some large ones produce and transmit; they are financed from municipal treasuries and revenue bonds • Public power districts and projects are concentrated in Nebraska, Washington, Oregon, Arizona, and California; voters in a public power district elect commissioners or directors to govern the district independent of any municipal government • Irrigation districts may have still other forms of organization (e.g., in the Salt River Project Agricultural Improvement and Power District in Arizona, votes for the Board of Directors are apportioned according to the size of land holdings) • State authorities, such as the New York Power Authority and the South Carolina Public Service Authority, are agencies of their respective State governments
<p>Cooperatively Owned Utilities</p> <p>There are 932 cooperatively owned utilities in the United States, and they operate in all States except Connecticut, Hawaii, Rhode Island, and the District of Columbia.</p>	<ul style="list-style-type: none"> • Owned by members (small rural farms and communities) • Provide service mostly to members only • Incorporated under State law and directed by an elected board of directors which, in turn, selects a manager • The Rural Utilities Service (formerly the Rural Electrification Administration) in the U.S. Department of Agriculture was established under the Rural Electrification Act of 1936 with the purpose of extending credit to cooperatives to provide electric service to small rural communities (usually fewer than 1,500 consumers) and farms where it was relatively expensive to provide service

Source: Energy Information Administration, *Electric Power Annual 1996*, Volume II, DOE/EIA-0348(96)/2 (Washington, DC, December 1997).

Major Characteristics of U.S. Nonutilities by Type¹	
Type	Major Characteristics
Cogenerators (QF)	<ul style="list-style-type: none"> ● Are qualified under PURPA by meeting certain ownership, operating, and efficiency criteria established by FERC ● Sequentially produce electric energy and another form of energy, such as heat or steam, using the same fuel source ● Are guaranteed that utilities will purchase their output at a price based on the utility's "avoided cost" and will provide backup service at nondiscriminatory rates
Small Power Producers (QF)	<ul style="list-style-type: none"> ● Are qualified under PURPA by meeting certain ownership, operating, and efficiency criteria, established by FERC ● Use biomass, waste, renewable resources (water, wind, solar), or geothermal as a primary energy source ● Fossil fuels can be used but renewable resources must provide at least 75 percent of the total energy input ● Are guaranteed that utilities will purchase their output at a price based on the utility's "avoided cost" and will provide backup service at nondiscriminatory rates
Exempt Wholesale Generators	<ul style="list-style-type: none"> ● Creation authorized by EPACT ● Are exempt from PUHCA's corporate and geographic restrictions ● Are wholesale producers; do not sell retail ● Do not possess significant transmission facilities ● Utilities are not required to purchase their electricity ● Are regulated but usually may charge market-based rates
Cogenerators (Non-QF)	<ul style="list-style-type: none"> ● Are not qualified under the provisions of PURPA ● Are nonutilities, utilizing a cogenerating technology, which may themselves consume part of the electricity they cogenerate
Noncogenerators (Non-QF)	<ul style="list-style-type: none"> ● Are not qualified under the provisions of PURPA ● Do not utilize a cogenerating technology
<p>¹There were 1,994 nonutilities in the United States in 1996. QF = Qualifying facility (under PURPA). Note: An entity can be any combination of cogenerator QF, small power producer QF, and exempt wholesale generator. Source: Energy Information Administration, <i>Electric Power Annual 1996</i>, Volume II, DOE/EIA-0348(96)/2 (Washington, DC, October 1997).</p>	

Appendix C

**State Agencies
Concerned With
Electric Power**

Appendix C

State Agencies Concerned With Electric Power

Regulatory Commissions

Alabama Public Service Commission
PO Box 991
Montgomery, AL 36101

Alaska Public Utilities Commission
1016 West Sixth Avenue, Suite 400
Anchorage, AK 99501-1963

Arizona Corporation Commission
Utilities Division
1200 West Washington
Phoenix, AZ 85007-2996

Arkansas Public Service Commission
1000 Center
P.O. Box 400
Little Rock, AR 72203-0400

California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102

The Colorado Public Utilities Commission
1580 Logan Street, Office Level 2
Denver, CO 80203

Connecticut Department of Public Utility Control
Central Office-Ten Franklin Square
New Britain, CT 06051

Delaware Public Service Commission
861 Silver Lake Boulevard
Cannon Building, Suite 100
Dover, DE 19904

District of Columbia Public Service Commission
450 5th Street, NW
Washington, DC 20001

Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, FL 32399-0850

Georgia Public Service Commission
47 Trinity Avenue
Atlanta, GA 30334

Hawaii Public Utilities Commission
465 South King Street
Kekuanao'a Building, # 103
Honolulu, HI 96813

Idaho Public Utilities Commission
PO Box 83720
Boise, ID 83720-0074

Illinois Commerce Commission
527 E. Capitol Avenue
P.O. Box 19280
Springfield, IL 62794-9280

Indiana Utility Regulatory Commission
302 West Washington Street Suite E306
Indianapolis, IN 46204

Iowa Utilities Board
350 Maple Street
Des Moines, IA 50319

Kansas Corporation Commission
1500 SW Arrowhead Road
Topeka, KS 66604

Kentucky Public Service Commission
730 Schenkel Lane
P.O. Box 615
Frankfort, KY 40602 - 0615

Louisiana Public Service Commission
One American Place
Suite 1630
Post Office Box 91154
Baton Rouge, LA 70821-9154

Maine Public Utilities Commission
242 State Street
18 State House Station
Augusta, ME 04333-0018

Maryland Public Service Commission
William Donald Schaefer Tower
6 St. Paul Street
Baltimore, MD 21202

Massachusetts Department of Telecommunications
and Energy
100 Cambridge Street
Boston, MA 02202

Michigan Public Service Commission
P.O. Box 30221
Lansing, MI 48909

Minnesota Public Utilities Commission
121 7th Place East
Suite 350
St. Paul, MN 55101-2147

Mississippi Public Service Commission
Walter Sillers State Office Bldg.
P.O. Box 1174
Jackson, MS 39215-1174

Missouri Public Service Commission
PO Box 360
Harry S Truman State Office Building, Fifth Floor
Jefferson City, MO 65102

Montana Public Service Commission
1701 Prospect Ave - P.O. Box 202601
Helena, MT 59620-2601

Nebraska Public Service Commission
300 The Atrium, 1200 N Street
P.O. Box 94927
Lincoln, NE 68509-4927

Nevada Public Utilities Commission
1150 East Williams St.
Carson City, NV 89701-3109

New Hampshire Public Utilities Commission
8 Old Suncook Road
Concord, NH 03301

New Jersey Board of Public Utilities
2 Gateway Center
Newark, NJ 07102

New Mexico Public Utility Commission
224 East Palace Avenue, Marian Hall
Santa Fe, NM 87501

New York State Public Service Commission
Department of Public Service
3 Empire State Plaza
Albany, NY 12223-1350

North Carolina Utilities Commission
PO Box 29510
Raleigh, NC 27626-0510

North Dakota Public Service Commission
Public Utilities Division
North Dakota Public Service Commission
600 East Boulevard
Bismarck, ND 58505-0480

Public Utilities Commission of Ohio
180 E. Broad St.
Columbus, OH 43215-3793

Oklahoma Corporation Commission
2101 N. Lincoln Blvd.
Oklahoma City, OK. 73152-2000

Oregon Public Utility Commission
550 Capitol Street N.E.
Salem, OR 97310-1380

Pennsylvania Public Utilities Commission
PO Box 3265
Harrisburg, PA 17105-3265

Rhode Island Public Utilities Commission
100 Orange Street
Providence, RI 02903

Public Service Commission of South Carolina
111 Doctors Circle
P.O. Drawer 11649
Columbia, SC 29211

South Dakota Public Utilities Commission
Capitol Building, 1st floor
500 East Capitol Avenue
Pierre, SD 57501-5070

Tennessee Regulatory Authority
460 James Robertson Parkway
Nashville, TN 37243-0505

Public Utilities Commission of Texas
1701 North Congress Avenue, PO Box 13326
Austin, TX 78711-3326

Public Service Commission of Utah
Heber M. Wells Building, 4th Floor
160 East 300 South
Salt Lake City, UT 84111

Vermont Public Service Board
112 State Street (Chittenden Bank Building)
Drawer 20
Montpelier, VT 05620-2701

The Virginia State Corporation Commission
P.O. Box 1197
Richmond, VA 23218

Washington Utilities and Transportation Commission
1300 South Evergreen Park Dr., SW
Olympia, WA 98504-7250

Public Service Commission of West Virginia
201 Brooks Street
Charleston, WV 25323

Wisconsin Public Service Commission
610 North Whitney Way
P.O. Box 7854
Madison, WI 53707-7854

Wyoming Public Service Commission
2515 Warren Avenue, Hansen Building, Suite 300
Cheyenne, WY 82002

State Environmental Offices

Alabama Department of Environmental Management
P.O. Box 301463
Montgomery, AL 36130-1463

Alaska Division of Air and Water Quality
Department of Environmental Conservation
410 Willoughby Avenue, Suite 105
Juneau, AK 99801-1795

Arizona Department of Environmental Quality
3033 North Central Avenue
Phoenix, AZ 85012

Arkansas Department of Pollution Control and Ecology
8001 National Drive
Little Rock, AR 72209

California Environmental Protection Agency
555 Capitol Mall Suite 525
Sacramento, CA 95814

Colorado Department of Public Health & Environment
4300 Cherry Creek Drive South
Denver, CO 80222-1530

Connecticut Department of Environmental Protection
79 Elm Street
Hartford, CT 06106-5127

District of Columbia Environmental Regulation Administration
Air Resources Management
2100 Martin Luther King Ave., SE
Washington, DC 20020

State of Delaware
Department of Natural Resources & Environmental Control
89 Kings Highway
Dover, DE 19901

Florida Department of Environmental Protection
3900 Commonwealth Blvd.
Tallahassee, FL 32399-3000

Georgia Environmental Protection Division
Air Protection Branch
4244 International Parkway
Suite 120
Atlanta, GA 30354

Hawaii Environmental Health Administration
Hawaii Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

Idaho Division of Environmental Quality
1410 N Hilton
Boise, ID 83706

Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, IL 62794-9276

Indiana Department of Environmental Management
Indiana Government Center North
100 N. Senate
P.O. Box 6015
Indianapolis, IN 46206-6015

Iowa Department of Natural Resources
7900 Hickman Road, Suite 1
Urbandale, IA 50322

Kansas Department of Health and Environment
Landon State Office Building,
Topeka, KS 66612

Kentucky Department for Environmental Protection
Division for Air Quality
803 Schenkel Lane
Frankfort, KY 40601-1403

Louisiana Department of Environmental Quality
7290 Bluebonnet Blvd
Baton Rouge, LA 70810

Maine Department of Environmental Protection
17 State House Station
Augusta ME 04333-0017

Maryland Department of the Environment
2500 Broening Highway
Baltimore, MD 21224.

Massachusetts Department of Environmental
Protection
One Winter Street
4th Floor
Boston, MA 02108

Michigan Department of Environmental Quality
Air Quality Division
Hollister Building, 4th Floor
P.O. Box 30260
106 W. Allegan
Lansing, MI 48909-7760

Minnesota Pollution Control Agency
520 Lafayette Road N.
St. Paul, MN 55155-4194

Mississippi Department of Environmental Quality
P.O. Box 20305
Jackson, MS 39289-1305

Missouri Department of Natural Resources
Division of Environmental Quality
Air Pollution Control Program
P. O. Box 176, Jefferson City, MO 65102

Montana Department of Environmental Quality
1520 E. Sixth Avenue
Helena, MT 59620

Nebraska Department of Environmental Quality
1200 "N" Street, Suite 400
PO Box 98922
Lincoln, NE 68509

Nevada Division of Environmental Protection
333 West Nye Lane
Room 138
Carson City, NV 89706-0851

New Hampshire Department of Environmental
Services
6 Hazen Drive
PO Box 95
Concord, NH 03302-0095.

New Jersey Department of Environmental Protection
401 E. State Street
7th Floor, East Wing
P.O. Box 402
Trenton, NJ 08625-0402

New Mexico Environment Department
Harold S. Runnels Building
1190 St. Francis Dr.
Santa Fe, NM 87505-4182

New York State Department of Environmental
Conservation
50 Wolf Road
Albany, NY 12233-1016

North Carolina Department of Environment and
Natural Resources
512 North Salisbury Street
Post Office Box 27687
Raleigh, NC 27611-7687

North Dakota Health Department
Environmental Health Section
1200 Missouri Ave.
P.O. Box 5520
Bismarck, ND 58506-5520

Ohio Environmental Protection Agency
1800 Watermark Drive
P.O. Box 1049
Columbus, OH 43216-1049

Oklahoma Department of Environmental Quality
P.O. Box 1677
Oklahoma City, OK 73101-1677

Oregon Department of Environmental Quality
811 SW 6th Ave.
Portland, OR 97204-1390

Pennsylvania Department of Environmental Protection
Rachel Carson State Office Building
400 Market Street
Harrisburg, PA 17105

Rhode Island Department of Environmental
Management
235 Promenade Street
Providence, RI 02908

South Carolina Department of Health and
Environmental Control
2600 Bull Street
Columbia, SC 29201

South Dakota Department of Environment and
Natural Resources
Joe Foss Building
523 E. Capitol
Pierre, SD 57501

Tennessee Department of Environment and
Conservation
21st Floor, L&C Tower
401 Church Street
Nashville, TN 37243

Texas Natural Resource Conservation Commission
P.O. Box 13087
Austin, TX 78711-3087

Utah Department of Environmental Quality
P.O. Box 144810-4810
168 North 1950 West
Salt Lake City, UT 84114-4810

Vermont Air Pollution Control Division
103 South Main Street. Building 3 South
Waterbury, VT 05671

Virginia Department of Environmental Quality
P.O. Box 10009
Richmond, VA 23240

Washington Department of Ecology
PO Box 47600
Olympia, WA 98504-7600

Wisconsin Dept. of Natural Resources
P.O. Box 7921
Madison, WI 53707-7921

West Virginia Division of Environmental Protection
10 McJunkin Road
Nitro, WV 25143

Wyoming Department of Environmental Quality
122 West 25th Street, Herschler Building
Cheyenne, WY 82002

Appendix D

Technical Notes

Appendix D

Technical Notes

Sources of Data

State Electricity Profiles 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 *State Electricity Profiles* are compiled from several forms filed annually by electric utilities and one form filed annually by nonutility power producers. Those forms are: the Form EIA-759, "Monthly Power Plant Report"; the Form EIA-860, "Annual Electric Generator Report." the Form EIA-861, "Annual Electric Utility Report"; the Federal Energy Regulatory Commission (FERC) Form 1, "Annual Report of Major Electric Utilities, Licensees, and Others"; the FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants"; the Form EIA-767, "Steam-Electric Plant Operation and Design Report"; and the Form EIA-867, "Annual Nonutility Power Producer 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.

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.

Form EIA-861

The Form EIA-861 is a mandatory census of electric utilities in the United States, its territories, and Puerto Rico. The Form EIA-861 data contained in this publication are for the United States only. The survey is used to collect information on power production and sales of electricity and demand-side management (DSM) information from approximately 3,200 electric utilities. The data collected are used to update the electric utility frame data base maintained by the EIA. This data base supports queries from the Executive Branch, Congress, other public agencies, and the general public. Summary data from the Form EIA-861 are also contained in the *Electric Power Monthly*; the *Electric Sales and Revenue*; the *Financial Statistics of Major U.S. Investor-Owned Electric Utilities*; the *Financial Statistics of Major U.S. Publicly Owned Electric Utilities*; the *Annual Energy Outlook*; the *U.S. Electric Utility Demand-Side Management*; the *Electric Power Annual Volume I and II*; and the *Electric Trade in the United States*. These reports present aggregate totals for electric utilities on national, State, and regional levels by ownership type.

DSM data collected on the Form EIA-861 are estimated by electric utilities based on engineering data or statistical analysis. The utilities also use a variety of verification methodologies for these estimates. The Energy Policy Act (EPACT) of 1992, Section 171(a), mandated that EIA verify DSM data estimates and the methodologies used for estimation and verification. In response to this mandate, EIA conducted a study of

DSM estimation methodologies and DSM verification methodologies. The report describes typical estimation methodologies and DSM verification methodologies, as well as the difficulties in reaching broad conclusions concerning the quality of savings estimates reported to EIA. The report is featured in the EIA publication, *U.S. Electric Utility Demand-Side Management 1993*, released in July 1995.

Instrument and Design History. The Form EIA-861 was implemented in January 1985 to collect data as of year-end 1984. The Federal Administration Act of 1974 (Public Law 93-275) defines the legislative authority to collect these data.

Data Processing. The Form EIA-861 is mailed to the respondents to collect data as of the end of the calendar year. The completed forms are to be returned to the EIA by April 30. The data are entered into the interactive on-line system. Internal edit checks are performed to verify that current data total across and between schedules and are comparable to data reported the previous year. Edit checks are also performed to compare data reported on the Form EIA-861 and similar data reported on the Forms EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions," the FERC Form 1, and the Form EIA-412. These are utility-level checks. Respondents are telephoned to obtain clarification of reported data and to obtain missing data.

FERC Form 1

The FERC Form 1 is a mandatory restricted-universe census of major investor-owned electric utilities in the United States having, in each of the last three consecutive years, sales or transmission service that exceeds one or more of the following: (1) 1 million megawatthours of total annual sales, (2) 100 megawatthours of annual sales for resale, (3) 500 megawatthours of annual power exchanges delivered, or (4) 500 megawatthours of annual wheeling for others (deliveries plus losses). All major U.S. investor-owned electric utilities, licensees, or others subject to the Federal Power Act of 1935 must submit this form annually to the FERC. Classification of such entities is provided in the FERC Uniform System of Accounts Prescribed for Public Utilities and Licensees Subject to the Provisions of the Federal Power Act. Approximately 179 electric utilities are classified as major. Excluded from the summary data are the independent power producers and cooperatives jurisdictional to the FERC. The FERC has determined that eight independent power producers (IPPs): Black Creek Hydro, Inc., Catalyst Old

River Hydroelectric Limited Partnership, Entergy Power Inc., Hardee Power Partners Limited, Hermiston Generating Company, L.P., Nevada Sun-Peak Limited Partnership, Ocean State Power, and Ocean State Power II are under FERC jurisdiction. These IPPs must therefore submit the FERC Form 1. The FERC has also determined that Anoka Electric Cooperative; Golden Spread Electric Cooperative; New Hampshire Electric Cooperative; Midwest Energy, Incorporated; Old Dominion Electric Cooperative; People's Electric Cooperative; Pacific Northwest Generating Cooperative; Rayburn Country Electric Cooperative; Soyland Power Cooperative, Inc.; and Valley Electric Association, Inc. should file a FERC Form 1 under Section 201 of the Federal Power Act. Data from these 10 entities were not included since they are classified as cooperative electric utilities on the Form EIA-861.

The FERC Form 1 is used to collect data on income and earnings, taxes, depreciation and amortization, distribution of salaries and wages, electric operating revenues, electric maintenance expenses, generating plant statistics, planned construction data, year-end balance sheets, and general corporate information. Respondents are required to report data on historical plant cost and power production expenses for their hydroelectric plants with a generator nameplate capacity of 10 or more megawatts; each steam-electric plant with a generator nameplate capacity of 25 or more megawatts; and each gas-turbine plant with a generator nameplate capacity of 10 or more megawatts. Less detailed data are required for other plants.

This data base supports queries from the Executive Branch, Congress, other public agencies, and the general public. Summary and detailed data from the FERC Form 1 are also contained in the *State Energy Data Report*; the *Financial Statistics of Major U.S. Investor-Owned Electric Utilities*; the *State Energy Price and Expenditure Report*; the *Annual Energy Review*; the *Electric Power Annual Volumes I and II*; and the *Electric Trade in the United States*. These reports present aggregate totals for electric utilities on a national level, by State, and by ownership type.

Instrument and Design History. The Federal Power Commission's (FPC) Form 1, the predecessor of the FERC Form 1, was implemented in 1935 by the FPC. When the FPC was merged with the DOE in October 1977, the processing of data on the survey became the responsibility of the EIA. In 1991, the collection responsibility reverted to the FERC. This mandatory survey is conducted in accordance with the FERC *Uniform System of Accounts Prescribed for Private Utilities and Licensees*.

Data Processing. The completed surveys, both hard copy and diskettes, are returned to the FERC on or before April 30, containing data for the preceding calendar year. A copy of each survey and diskette is forwarded to the EIA for processing. Manual editing of the reported data is completed prior to data entry. Additional edit checks of the data are performed through computer programs. The program edits include both deterministic checks, in which records are checked for the presence of data in required fields, and statistical checks, in which the data are checked against a range of values based on historical data values and for logical or mathematical consistency with data elements reported in the survey. Discrepancies found in the data, as a result of these checks, are resolved either by the processing office or by further information obtained from a telephone call to the respondent company.

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-767

The Form EIA-767 is a mandatory restricted-universe census of all electric power plants with a total existing or planned organic- or nuclear-fueled steam-electric generator nameplate rating of 10 or more megawatts. The entire form is filed by approximately 700 power plants with a nameplate capacity of 100 or more megawatts. An additional 200 power plants with a nameplate capacity between 10 and 100 megawatts submit information only on fuel consumption/quality, boiler/generator configuration, and flue-gas desulfurization equipment, if applicable. The Form EIA-767 is used to collect data annually on plant operations and equipment design (including boiler, generator, cooling system, flue gas desulfurization, flue gas particulate collectors, and stack data). Data from the Form EIA-767 are used for economic, regulatory, and environmental analyses conducted by the DOE and the Environmental Protection Agency.

This data base supports queries from the Executive Branch, Congress, other public agencies, and the general public. Summary and detail data from the Form EIA-767 are also contained in the *Electric Power Annual Volume I* and the *Coal Industry Annual*. These reports present aggregate totals for electric utilities on a national level, by State, and by ownership type.

Instrument and Design History. The Federal Energy Administration Act of 1974 (Public Law 93-275) defines the legislative authority to collect these data. The predecessor form, FPC-67, "Steam-Electric Plant Air and Water Quality Control Data," was used to collect data from 1969 to 1980, when the form number was changed to Form EIA-767. In 1982, the form was completely redesigned and given the name Form EIA-767, "Steam-Electric Plant Operation and Design Report." In 1986, the respondent universe of 700 was increased to 900 to include plants with nameplate capacity from 10 megawatts to 100 megawatts. Respondents for these 200 additional plants complete only pages 1, 5, 6, and, if applicable, 13, and 14.

Data Processing. The Form EIA-767 is mailed to respondents in January to collect data as of the end of the preceding calendar year. The completed forms are to be returned to the EIA by May 1. Equipment design 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 reviewed 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.

Form EIA-867

The Form EIA-867 is a mandatory survey of all existing and planned nonutility electric generating facilities in the United States with a total generator nameplate capacity of 1 or more megawatts. In 1992, the reporting threshold of the Form EIA-867 was lowered to include all facilities with a combined nameplate capacity of 1 or more megawatts. Previously, data were collected every 3 years from facilities with a nameplate capacity between 1 and 5 megawatts. Planned generators are defined as a proposal by a company to install electric generating equipment at an existing or planned facility. The proposal is based on the owner having obtained (1) all environmental and regulatory approvals, (2) a contract for the electric energy, or (3) financial closure on the facility. The Form consists of Schedule I, "Identification and Certification"; Schedule II, "Facility Information"; Schedule III, "Standard Industrial Classification Code Designation"; Schedule IVA, "Facility Fuel Information"; Schedule IVB, "Facility Thermal and Generation Information"; Schedule V, "Facility Environmental Information"; and Schedule VI, "Electric Generator Information."

Submission of the Form EIA-867 is required from all facilities that have a combined facility nameplate capacity of 1 megawatt or more. Schedule V, "Facility Environmental Information" is only required of those facilities of 25 megawatts or more.

The form is used to collect data on the installed capacity, energy consumption, generation, and electric energy sales to electric utilities and other nonutilities by facility. Additionally, the form is used to collect data on the quality of fuels burned and the types of environmental equipment used by the respondent.

Instrument and Design History. The Form EIA-867 was implemented in December 1989 to collect data as of year-end 1989. The Federal Energy Administration Act of 1984 (Public Law 93-275) defines the legislative authority to collect these data.

Data Processing. The Form EIA-867 is mailed to the respondents in January to collect data as of the end of the preceding calendar year. Static data for each respondent are preprinted from the previous year, and

the respondents are instructed to verify all preprinted information and to supply the missing data. The completed forms are to be returned to the EIA by April 30. The response rate for all facilities for which addresses were confirmed was 100 percent. The data are manually edited before being keyed for automated data processing. Computer programs containing additional edit checks are run. Respondents are telephoned to obtain corrections or clarifications of reported data and to obtain missing data as a result of the manual and automated editing.

Data Quality. The Manufacturing Energy Consumption Survey (MECS) produces detailed estimates of manufacturing electricity generation by industry and Census Division on a triennial basis. The data are published in the *Manufacturing Energy Consumption Survey, Consumption of Energy*. Gross generation by nonutility power producers by major industry groups, and Census division, for 1992 through 1996 presented in this report, are reasonable given the growth in manufacturing on site generation.

Data for the Form EIA-867 are collected from all existing and planned nonutility generating facilities in the United States with a total generator nameplate capacity of 1 or more megawatts. These data are aggregated to provide geographic totals for selected States and at the Census division and national levels. Since the Form EIA-867 data are considered confidential, suppression of some data is necessary to protect the confidentiality of the individual respondent data. See "Confidentiality of the Data" in this section for further information on the nondisclosure of data.

Allocating Capacity. The installed capacity for nonutility generating units is allocated to one energy source using the following algorithms:

- For generating units using a single fossil energy source, the capacity is allocated totally to that energy source.
- For generating units that use hydraulic, geothermal, solar, biomass, or wind energy, the capacity is allocated to that energy source (even if a secondary fuel is burned).
- For generating units using a combination of fossil energy and renewable energy sources, capacity is classified as fossil or renewable based on the greatest percentage of Btu consumed when summed.

- To allocate capacity by fuel within the fossil energy and renewable energy sources, the single fuel within that energy source with the greatest percentage of Btu consumed is used.

Allocating Generation. The generation for nonutility facilities is allocated to one energy source using the following algorithms:

- For generating units that use energy sources that are not burned (hydraulic, geothermal, nuclear, solar, or wind energy), the generation is allocated to that energy source (even if a secondary fuel is burned).
- For facilities having generating units using energy sources that are burned, the generation is allocated based on the percentage of Btu consumed. This algorithm assumes that unit efficiency is the same for all energy sources.

A comparison of installed capacity for facilities of 1 megawatt or more of EIA's data with data published by Edison Electric Institute (EEI) in *Capacity and Generation of Non-Utility Sources of Energy* shows a difference of approximately 1 percent.

Gross-to-Net Generation Conversion Methodology. Gross electricity generation data from the Form EIA-867, reported by generator, are aggregated to provide totals by energy source and geographic area. Nonutility power producers report gross electricity generated on the Form EIA-867, unlike electric utilities that report net generation on various EIA and FERC forms. Nonutilities generally do not measure and record electrical consumption used solely for the production of electricity. Nonutility generators and associated auxiliary equipment are often an integral part of a manufacturing or other industrial process and individual watthour meters are not generally installed on auxiliary equipment.

Estimated values for net generation from nonutility power producers were developed by EIA using gross generation, prime mover, fuels, and type of air pollution control data reported on the Form EIA-867. The difference between gross and net generation is the electricity consumed by auxiliary equipment and environmental control devices such as pumps, fans, coal pulverizers, particulate collectors, and flue gas desulfurization (FGD) units. The difference between gross and net generation is sometimes called parasitic load. In smaller power plants rotating auxiliaries are

almost always electric motors. In large power plants that produce steam, rotating auxiliaries can be powered by either steam turbines or electric motors and sometimes both because of cold startup requirements.

This methodology for estimating net generation from gross generation is based on determining typical energy consumption for auxiliary electrical equipment associated with electrical generators. For instance, wind turbines have none of the auxiliaries common to a coal-burning power plant such as coal pulverizers, fans, and emission controls. On the other hand, windfarms do consume electricity since automatic, computer-based control systems are used to control blade pitch and speed thereby affecting generator electricity output.

Shown below are the conversion factors used to estimate net generation by nonutility generators. The factors are typical of a modern electric power plant but could vary significantly between individual plants. Net generation is calculated by multiplying the appropriate conversion factor by the reported gross electrical generation.

Prime Mover Type	Gross-to-Net Generation Conversion Factor
Gas (Combustion Turbine)	.98
Steam Turbine97 ^a
Internal Combustion98
Wind Turbine99
Solar-Photovoltaic99
Hydraulic Turbine99
Fuel Cell99
Other97

^aFactor reduced by .01 if the facility has flue gas particulate collectors and another .03 if the facility has flue gas desulfurization (FGD) equipment. Facilities under 25 megawatts and burning coal in traditional boilers (e.g., not fluidized bed boilers) are assumed to have particulate and FGD equipment.

These conversion factors were estimated by the staff of the Office of Coal, Nuclear, Electric and Alternate Fuels, Energy Information Administration. The primary reference used in developing the conversion factors was *Steam, Its Generation and Use*, 40th Edition, Babcock & Wilcox, Barberton, Ohio.

Emissions for the Production of Electricity Methodology. Emissions for nonutility power producers include emissions from cogeneration facilities that produce electric power as an integral part of a manufacturing or other thermal consuming process. Emissions are directly proportional to the quantities of fuels consumed. To calculate emissions for the production of electricity, a methodology was developed to estimate the consumption of fuel associated with the production of electricity by cogeneration facilities. The methodology is based on net generation heat rates by primary fuel and prime-mover. The primary fuel is the predominant energy source for the generator based on fuel consumption at the facility expressed in total Btu by fuel type. The heat rates were estimated by the staff of the Office of Coal, Nuclear, Electric and Alternate Fuels; Energy Information Administration. The primary reference used in developing the conversion factors was *TAG--Technical Assessment Guide*, Volume 1: Electricity Supply--1986, Electric Power Research Institute, Palo Alto, California, December 1986. The procedure to estimate the fuel consumed for the production of electricity is to calculate net generation by primary fuel and prime-mover (see gross-to-net generation methodology), multiply the net generation by the appropriate heat rate to obtain total Btu consumed for the production of electricity, and apportion by the total Btu weighted by energy source.

Net generation heat rates by primary fuel and prime mover are as follows:

Prime Mover	Heat Rate (Btu/kWh - net) By Primary Fuel			
	Coal	Petroleum	Natural Gas	Other
Gas (Combustion Turbine)				
Single Cycle	N/A	14,000	14,500	N/A
Combined Cycle	N/A	8,100	8,200	N/A
Steam Turbine				
Single Cycle	10,200	9,600	9,600	16,500
Combined Cycle	9,000	9,000	9,000	10,500
Internal Combustion	N/A	11,700	11,700	N/A
Other	10,200	11,700	11,700	10,500

N/A = Not applicable.

Nameplate Capacity to Summer Capability Conversion Methodology. Form EIA-867, "Annual Nonutility Power Producer Report," collects nameplate capacity for electric generating units. Estimated values for net summer capability from nameplate capacity are aggregated to provide a U.S. total. The methodology used for estimating summer capability from nameplate capacity is the same methodology shown in this Appendix for the Form EIA-860.

Business Classification. The nonutility industry consists of all manufacturing, agricultural, forestry, transportation, finance, service and administrative industries, based on the Office of Management and Budget's Standard Industrial Classification (SIC) Manual.¹ The following is a list from the Form EIA-867 of the main classifications and the category of primary business activity within each classification.

Agriculture, Forestry, and Fishing

- 01 Agriculture production-crops
- 02 Agriculture production, livestock and animal specialties
- 07 Agricultural services
- 08 Forestry
- 09 Fishing, hunting, and trapping

Mining

- 10 Metal mining
- 12 Coal mining
- 13 Oil and gas extraction
- 14 Mining and quarrying of nonmetallic minerals except fuels

Construction

- 15 to 17

Manufacturing

- 20 Food and kindred products
- 21 Tobacco products
- 22 Textile and mill products
- 23 Apparel and other finished products made from fabrics and similar materials
- 24 Lumber and wood products, except furniture
- 25 Furniture and fixtures
- 26 Paper and allied products (other than 2621 or 2631)
 - 2621 Paper mills, except building paper
 - 2631 Paperboard mills
- 27 Printing and publishing
- 28 Chemicals and allied products (other than 2819, 2821, 2869, or 2873)

- 2819 Industrial Inorganic Chemicals
- 2821 Plastics materials and resins
- 2869 Industrial organic chemicals
- 2873 Nitrogenous fertilizers
- 29 Petroleum refining and related industries (other than 2911)
 - 2911 Petroleum refining
- 30 Rubber and miscellaneous plastic products
- 31 Leather and leather products
- 32 Stone, clay, glass, and concrete products (other than 3241)
 - 3241 Cement, hydraulic
- 33 Primary metal industries (other than 3312 or 3334)
 - 3312 Blast furnaces and steel mills
 - 3334 Primary aluminum
- 34 Fabricated metal products, except machinery and transportation equipment
- 35 Industrial and commercial equipment and components except computer equipment
- 36 Electronic and other electrical equipment and components except computer equipment
- 37 Transportation equipment
- 38 Measuring, analyzing, and controlling instruments, photographic, medical, and optical goods, watches and clocks
- 39 Miscellaneous manufacturing industries

Transportation and Public Utilities

- 40 Railroad transportation
- 41 Local and suburban transit and interurban highway passenger transport
- 42 Motor freight transportation and warehousing
- 43 United States Postal Service
- 44 Water transportation
- 45 Transportation by air
- 46 Pipelines, except natural gas
- 47 Transportation services
- 48 Communications
- 49 Electric, gas, and sanitary services
 - 4922 Natural gas transmission
 - 4941 Water supply
 - 4952 Sewerage systems
 - 4953 Refuse systems
 - 4971 Irrigation systems

Wholesale Trade

- 50 to 51

Retail Trade

- 52 to 59

¹Office of Management and Budget, *Standard Industrial Classification Manual, 1972* (Washington, DC,1987).

Finance, Insurance, and Real Estate

- 60 Depository Institutions
- 61 Nondepository credit institutions
- 62 Security and commodity brokers, dealers, exchanges, and services
- 63 Insurance carriers
- 64 Insurance agents, brokers, and services
- 65 Real estate
- 67 Holding and other investment offices

Services

- 70 Hotels
- 72 Personal services
- 73 Business services
- 75 Automotive repair, services, and parking
- 76 Miscellaneous repair services
- 78 Motion pictures
- 79 Amusement and recreation services
- 80 Health services
- 81 Legal services
- 82 Education services
- 83 Social services
- 84 Museums, art galleries, and botanical and zoological gardens
- 86 Membership organizations
- 87 Engineering, accounting, research, management, and related services
- 88 Private households
- 89 Miscellaneous services

Public Administration

- 91 to 97

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.

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.

Confidentiality of the Data

In general, the data collected on the forms used for input to this report are not confidential. However, data from the Form EIA-867, "Annual Nonutility Power Producer Report," are considered confidential and must adhere to EIA's "Policy on the Disclosure of Individually Identifiable Energy Information in the Possession of the EIA" (45 *Federal Register* 59812 (1980)). In order to protect the confidentiality of individual respondents' data, a procedure was developed to suppress the data for publication. The procedure is described as follows.

Disclosure of Data

Data reported on the Form EIA-867, "Annual Nonutility Power Producer Report," are confidential. In order to protect the confidentiality of data for an individual respondent, a policy was implemented to ensure that the reporting of survey data would not associate those data with a particular company. The final phase in the data quality assurance and control procedures is to determine which data must be suppressed (withheld) during publication to provide the necessary confidentiality for respondents that operate in small reporting areas. These procedures are performed as follows:

- Primary Withholding Based on the Number of Respondents in a Cell--All cells with three or fewer respondents are suppressed.
- Residual Withholding Dominance Rule--All cells containing four or more respondents are tested using a linear sensitivity rule.
- Complementary Suppression--All tables are reviewed to identify cells that should have data withheld to prevent disclosure of already suppressed cells. An example of this concept, when U.S. totals are available, would be the complementary suppression of a second State in order to prevent the derivation of an initially suppressed State.
- 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.
- 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.
- After data are published as final, corrections will be made only 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.

The withholding/suppression of data is performed as an adjunct to Quality Assurance (QA) procedures. The work is performed by survey editors and the QA staff and is reviewed by the survey manager before being submitted to the division level QA review.

All sensitive cells identified in the withholding analysis are denoted with the symbol/letter "W." The use of the symbol/letter applies to primary, complementary and inter-table suppressions as well as all withheld data.

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:

- 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.

Air Emissions

This section describes the methodology employed to calculate estimates of sulfur dioxide (SO_2), nitrogen oxides (NO_x), and carbon dioxide (CO_2) emissions from utility and nonutility electric generating plants.

Utility Air Emissions

The following describes the methodology employed to calculate estimates of SO_2 , NO_x , and CO_2 emissions from power plants operated by electric utilities. These air emissions are estimated using information contained on Form EIA-767, "Steam-Electric Plant Operation and Design Report." Form EIA-767 collects information annually for all U.S. power plants with a total existing or planned organic- or nuclear-fueled steam-electric generator nameplate rating of 10 megawatts (MW) or larger. Power plants with a total generator nameplate rating of 100 MW or more must complete the entire form, providing, among other things, information about fuel consumption and quality, legal air emission limits, and flue gas desulfurization (FGD) efficiency.

Power plants with a total generator nameplate rating from 10 MW to less than 100 MW complete only part of the form, including information on fuel consumption and FGD sulfur removal efficiency, if applicable.

Uncontrolled Air Pollutant Emissions. Uncontrolled air pollutant emissions are those emissions that would occur in the absence of any control equipment. Uncontrolled SO_2 , NO_x , and CO_2 emissions are determined by multiplying the quantity of fuel burned

by an emission factor. An emission factor is the average quantity of a pollutant released from a boiler when a unit of fuel is burned.

The source of the SO_2 and NO_x emission factors, when available, is the Environmental Protection Agency report AP-42, "Compilation of Air Pollutant Emission Factors" (Table A3).² Environmental Protection Agency emission factors are based on boiler type, firing configuration, and fuel burned.

In 1992, a special study of the relationship between the heat and carbon content of coal was completed by the Energy Information Administration's Analysis and Systems Division of the Office of Coal, Nuclear, Electric and Alternate Fuels. The hypothesis underlying this study was that the ratio of carbon-to-heat content varies not only by coal rank (i.e., anthracite, bituminous, subbituminous, and lignite), but also by geographic location of the coal. In this study, the hypothesis was tested and the results of the analysis supported the hypothesis. That is, it was concluded from the analysis that coal rank and location of the coal are significant factors in the variation of the ratio of carbon-to-heat content. After this determination, a set of emission factors, by rank and State were derived on the basis of data contained in EIA's Coal Analysis File.³

In editions prior to 1992 of this publication, separate conversion factors by coal rank were published and used to estimate emissions of CO_2 . The special study by EIA concluded that since geographic location of coal in addition to rank of coal is a significant factor in determining the carbon/heat content relationship, the use of emission factors that consider both of these elements may yield more accurate estimates of CO_2 emissions. The emission factors for coal were developed in the units of pounds of CO_2 per million Btu of coal.

The emission factors for CO_2 (Table A4) from coal are applied by power plant, based on the rank, amount of coal received, and the State from which the coal originated, as reported in FERC Form 423, "Cost and Quality of Fuels for Electric Utility Plants." Thus, a weighted average emissions factor is obtained by plant and multiplied by the quantity of coal consumed

by plant, as reported on Form EIA-767, "Steam-Electric Plant Operation and Design Report," to determine the emissions of CO_2 . The emission factors for CO_2 are based on 100-percent combustion of the carbon in the fuel. Since a small percentage of the carbon in the coal is not converted to CO_2 , this publication assumes 99 percent combustion. The 1 percent of emissions is deducted at the State/National level. The emissions at the State level are based on the State in which the plant is located.

Uncontrolled emissions of SO_2 and NO_x do not always accurately depict the quantity of emissions released into the atmosphere because they fail to reflect reductions from control equipment and/or operating technologies. Consequently, controlled emissions are calculated to provide a more accurate estimate of actual utility air emissions. *Controlled Sulfur Dioxide Emissions.* Because of environmental regulations controlling SO_2 emissions, many utilities are required to install FGD units at their coal-fired plants.⁴ FGD units typically remove between 70 to 90 percent of SO_2 from the boiler flue gas although higher removal efficiencies can be achieved. Electric utilities report both sulfur removal efficiency (percent) and their most stringent SO_2 emission limits on the Form EIA-767. To determine controlled SO_2 emissions, the uncontrolled emissions are reduced by the annual average removal efficiencies reported on the Form EIA-767.

This emission is the controlled emission. As a check, the controlled emission is compared with the most stringent legal limit reported on the Form EIA-767. The controlled emission should be less than the legal limit because research indicates that utilities routinely remove more SO_2 than required to assure an operating margin of safety. If the controlled emission is not less than the most stringent legal limit, it implies that the utility is out of legal compliance and could be subject to fines and other penalties.

Utilities are permitted to take credit for sulfur that remains in bottom ash— as remaining in the bottom of the furnace after the coal is burned. For example, if a utility is required to remove 90 percent of the sulfur in the coal and 3 percent remains in the ash, it has to remove only 87 percent using scrubbers. This credit is

² *Compilation of Air Pollutant Emission Factors*, Vol. 1: Stationary Point and Area Sources (AP-44); 5th Edition (including Supplement A) Research Triangle Park, North Carolina, January 1996.

³ For a description of methodology and data use to develop the EIA CO_2 emission factors, see B. D. Hong and E. R. Slatick, "Carbon Dioxide Emission Factors for Coal," *Quarterly Coal Report, January-March 1994*, DOE/EIA-0121(94/1Q) (Washington, DC, August 1994), Energy Information Administration.

⁴ Flue gas desulfurization units may also reduce sulfur dioxide emissions from plants that burn oil and petroleum coke.

included in emissions data in this report. It is likely, however, that in many cases the credit is not taken. In order to take the ash credit, utilities need to monitor the coal consumed on a daily basis; this is both time-consuming and costly. To the extent that utilities do not take the ash credit, emissions might be slightly overstated.

Sulfur Dioxide Emission Comparison. Title IV of the Clean Air Act Amendments of 1990 requires annual sulfur dioxide (SO_2) emissions from electric power plants to be reduced 10 million tons below their 1990 level by the year 2010. The Clean Air Act required electric utility units covered under the Acid Rain Program (units 25 megawatts and greater) to be equipped with continuous emission monitoring systems (CEMS). CEMS are the industry standard for measuring and recording hourly SO_2 , nitrogen oxide (NO_x), and carbon dioxide (CO_2) emissions. In 1994, the first 263 utility units covered under the Acid Rain Program were required to install CEMS and submit a year's worth of emissions data to the Environmental Protection Agency (EPA). In 1995, the operators of more than 2,000 additional units were required to measure and report emissions data. EPA published 1994 CEMS emissions data by state and plant in its publication *Acid Rain Program, Emissions Scorecard 1994 (EPA430/R-95-012)*.

Preliminary 1995 CEMS data for about 1,000 power plants was received from EPA just prior to the publication deadline. A comparison was made between SO_2 emissions data from 719 electric utility plants for which both EPA and EIA collected data for 1995. On a national basis, the data collected by EPA is 5 percent higher than SO_2 emissions calculated by EIA. When 1995 CEMS data are finalized by EPA, EIA plans to conduct a plant-by-plant comparison of CEMS and EIA-calculated SO_2 , NO_x , and CO_2 emissions.

Controlled Nitrogen Oxide Emissions. The controlled NO_x emission is calculated by applying the appropriate reduction factor in Table A5. Prior to 1995 for utility boilers with regulated nitrogen oxide emission limits, the annual controlled estimate used was the lesser of the controlled estimate or the annual limitation. When more than one control technology is reported, the highest single reduction factor is used to estimate the annual controlled NO_x emission.

Carbon Dioxide Emissions. There are no Federal regulations that limit CO_2 emissions. Information pertinent to the estimation of controlled CO_2 emissions is not collected on the Form EIA-767; therefore, no estimates of controlled CO_2 emissions are made.

A degree of complexity is added to this approach, however, because air emission standards are not reported in consistent units. In some rare instances, emission standards are reported in units that cannot be directly compared with estimated uncontrolled emission rates. Examples of such standards are ones that specify the concentration of NO_x allowed in the flue gas or the ambient concentration of NO_x (parts per million). In cases where these types of standards are reported, the uncontrolled emission estimate is used. Such standards are uncommon, however, and do not significantly affect the results.

Air Emissions from Small Plants. The Form EIA-767 does not collect data for generators powered by internal combustion engines, gas turbines, combined cycle units (for example, gas turbines with waste heat boilers), and boilers at steam-electric plants with a total nameplate capacity of less than 10 MW. Accordingly, utility air emission from these generators are not estimated by the methodology. An estimate of air emissions from these generating units based on a similar methodology using 1991 fuel consumption data reported on the Form EIA-759, "Monthly Power Plant Report," was performed. Results of this effort indicate that the emissions of SO_2 , NO_x , and CO_2 from .*.cb utility sources not included on the Form EIA-767, are less than 0.1, 1.2, and 1.1 percent, respectively, of total utility air emissions.

Nonutility Air Emissions

The following describes the methodology employed to calculate estimates of SO_2 , NO_x , and CO_2 emissions from power plants operated by nonutilities. The emissions are estimated using information contained on Form EIA-867, "Annual Nonutility Power Producer Report." Form EIA-867 collects information annually from all nonutility power producers with a total generator nameplate rating of 1 megawatt (MW) or more, including cogenerators, small power producers, and other nonutility electricity generators. Facilities with a total generator nameplate rating of 1 MW or more must complete the entire form, providing, among other things, information about fuel consumption and quality. Facilities with a combined nameplate capacity of less than 25 megawatts are not required to complete Schedule V "Facility Environmental Information" of the Form EIA-867.

Uncontrolled Emissions. Uncontrolled air pollutant emissions are those emissions that would occur in the absence of any control equipment. Uncontrolled SO_2 , NO_x , and CO_2 emissions are determined by multiplying the quantity of fuel burned by an emission factor. An emission factor is the average quantity of a pollutant

released from a boiler when a unit of fuel is burned. As with electric utilities, the source of both the SO_2 and NO_x emission factors, when available, is the Environmental Protection Agency report AP-42, "Compilation of Air Pollutant Emission Factors."⁵ However, the boiler type and firing configuration are not reported on the Form EIA-867 so all boilers are assumed to be large boilers⁶ with pulverized coal firing and dry bottoms.

For other types of prime movers (for example, gas turbines, combined cycle, and internal combustion engines) the same set of emission factors are used. The methodology for determining emissions of CO_2 from nonutility electric power plants has been revised. The new methodology uses the results of the coal study discussed under "Utility Air Emissions." Based on the coal rank, the quality of coal received and its State of origin, weighted average emission factors are determined by State for electric utility plants. It is assumed that nonutility plants located in the same State as utility plants obtain coal from the same State. The weighted emission factors by State for utility coal-fired plants are multiplied by the coal consumption reported for nonutility plants in the respective State on Form EIA-867.

Uncontrolled emissions of SO_2 and NO_x do not always accurately depict the quantity of emissions released into the atmosphere because they fail to reflect reductions from control equipment and operating technologies. Consequently, controlled emissions are calculated to provide a more accurate estimate of actual nonutility air emissions.

Controlled Sulfur Dioxide Emissions. The Clean Air Act of 1971 established Federal emission limits for new fossil-fueled steam generators—1.2 pounds of SO_2 per million Btu of solid fossil fuel consumed and 0.8 pounds for liquid fossil fuels. The Clean Air Act of 1978 established even more stringent sulfur dioxide emission limits. The revised law mandates the installation of flue gas desulfurization (FGD) equipment at some new industrial and commercial facilities built after June 19, 1984, and requires that these facilities remove 90 percent of the SO_2 in the flue gases. Nonutilities report whether they have FGD equipment at their facilities and the date of first electrical generation on the Form EIA-867. Air emission limits are based on the date construction began. It is assumed that it takes two years from the

start of construction to the date of first electrical generation, as reported on the form.

Controlled SO_2 emissions are calculated for respondents reporting FGD equipment or fluidized bed combustion. For facilities reporting first electrical generation before August 1973, no reductions are assumed. For facilities reporting first electrical generation between August 1973 and June 1986, the controlled emission is estimated as the lesser of either: the uncontrolled emission, or a weighted average of 1.2 and 0.8 pounds of SO_2 per million Btu of solid and liquid fossil fuel consumed, respectively. For facilities reporting first electrical generation after June 1986, the controlled emission is estimated as the lesser of either: the uncontrolled emission reduced by 90 percent, or a weighted average of 1.2 and 0.8 pounds of SO_2 per million Btu of solid and liquid fossil fuel consumed, respectively.

Facilities with a total nameplate rating between 5 MW and 25 MW are not required to report whether they have FGD units. Controlled SO_2 emissions for these facilities are calculated based on the year electricity was first generated at the facility as reported on the Form EIA-867. For facilities reporting electrical generation before August 1973, no control equipment is assumed and the controlled SO_2 emission is equal to the uncontrolled emission as calculated above. For facilities reporting the date of their first electrical generation as between August 1973 and August 1980, the controlled SO_2 emission is estimated as the lesser of either: the uncontrolled SO_2 emission, or 1.2 pound of SO_2 per million Btu of fuel consumed. For facilities reporting their first electrical generation after August 1980, the controlled SO_2 emission is estimated as the lesser of either: the uncontrolled emission reduced by 80 percent, or 1.2 pounds of sulfur dioxide per million Btu of fuel consumed.

Controlled Nitrogen Oxide Emissions. Nonutilities with a total facility nameplate rating of 25 MW or more are required to report on the Form EIA-867 whether they have any NO_x control equipment and its type. Controlled NO_x emissions estimates are based on assumed removal efficiencies for the different types of NO_x control equipment. The percent removal efficiencies of the NO_x control equipment and/or operating technologies are shown in Table A5.

⁵"*Compilation of Air Pollutant Emission Factors*, Vol. I: Stationary Point and Area Sources (AP-42)," 5th Edition (including Supplement A) Research Triangle Park, North Carolina, January 1996.

⁶Boilers with a gross heat rate of 100 million Btu per hour or greater.

The controlled NO_x emission is calculated by reducing the uncontrolled emission by the appropriate reduction percentage based on the NO_x technology. In cases where more than one type of technology is reported, the highest single reduction percentage of the equipment reported is applied. Facilities with a total nameplate rating between 5 MW and 25 MW are not required to report whether they have NO_x reduction equipment. However, the Clean Air Act limits NO_x emissions to 0.8 pounds per million Btu of fuel consumed. Controlled NO_x emissions for these facilities are calculated based on the year electricity was first generated at the facility as reported on the Form EIA-867. For facilities reporting

electrical generation before August 1973, no control equipment is assumed and the controlled NO_x emission is estimated to be equal to the uncontrolled emission as calculated above. For facilities reporting the first date of electrical generation after August 1973, the controlled NO_x emission is estimated as the lesser of either: the uncontrolled NO_x emission, or 0.8 pounds of NO_x per million Btu of fuel consumed. *Controlled Carbon Dioxide Emissions.* There are no Federal regulations that limit CO_2 emissions. Information pertinent to the estimation of controlled CO_2 emissions is not collected on the Form EIA-867; therefore, no estimates of controlled CO_2 emissions are provided.

Glossary

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

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.

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.

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.

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.

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.

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 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.

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.

Inoperable Capacity: Utility-owned or operated capacity that is totally or partially out of service for reasons such as: environmental restrictions, legal or regulatory restrictions, extensive modifications or repair, or capacity specified as being in a mothballed state.

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.

Megawatt (MW): One million watts.

Megawatthour (MWh): One million watthours.

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 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.

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.

North American Electric Reliability Council (NERC): A council formed in 1968 by the electric utility industry to promote the reliability and adequacy of bulk power supply in the electric utility systems of North America. NERC consists of ten regional reliability councils and encompasses essentially all the power regions of the contiguous United States, Canada, and Mexico. The NERC Regions are:

ASCC - Alaskan System Coordination Council

ECAR - East Central Area Reliability Coordination Agreement

ERCOT - Electric Reliability Council of Texas

MAIN - Mid-America Interconnected Network

MAAC - Mid-Atlantic Area Council

MAPP - Mid-Continent Area Power Pool

NPCC - Northeast Power Coordinating Council

SERC - Southeastern Electric Reliability Council

SPP - Southwest Power Pool

WSCC - Western Systems Coordinating Council

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.

Operable Nuclear Unit: A nuclear unit is "operable" 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.

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.

Photovoltaic Energy: Photovoltaic energy is energy radiated by the sun as electromagnetic waves (electromagnetic radiation) that is converted at electric utilities into electricity by means of solar (photovoltaic) cells or concentrating (focusing) collectors.

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.

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.

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. Apartment houses are also included.

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.

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.

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

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.

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.

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.

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.