

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.

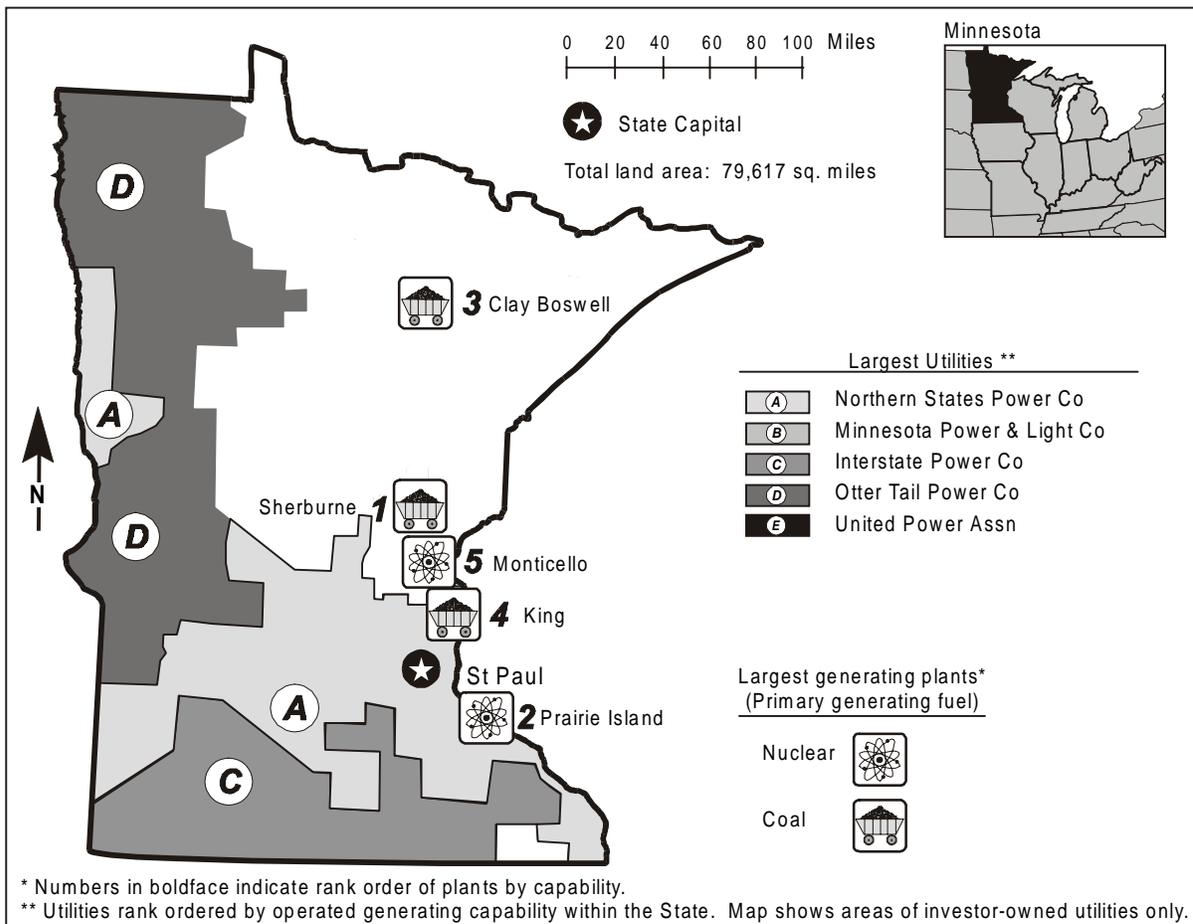


Table 1. 1996 Summary Statistics

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	98	27	Generation (MWh)	2,572,274	28
(Thousand Short Tons)			Percentage Share of		
Nitrogen Oxide Emissions	148	22	Generation	5.8	25
(Thousand Short Tons)					
Carbon Dioxide Emissions	38,444	23			
(Thousand Short Tons)					
Sulfur Dioxide/sq. mile (Tons)	1.23	34			
Nitrogen Oxides/sq. mile (Tons)	1.85	30			
Carbon Dioxide/sq. mile (Tons)	495.42	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

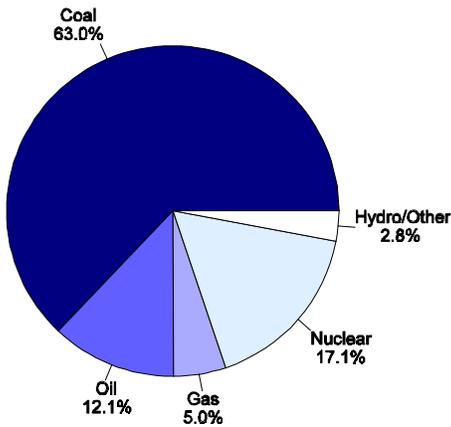


Figure 2. Utility Generation by Primary Energy Source, 1996

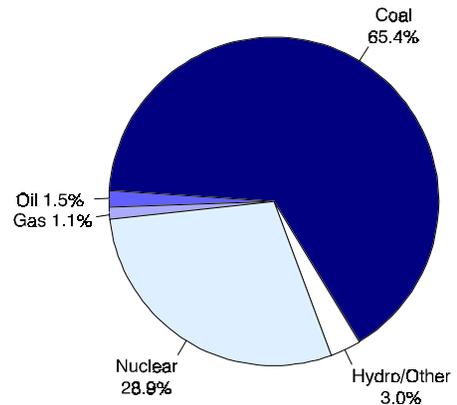


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

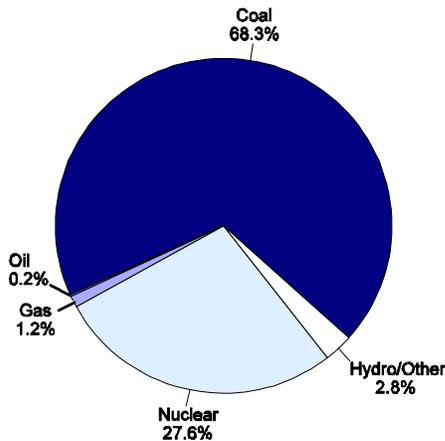


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

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	503	558	642	6.0	5.9	6.5
Industry	8,362	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	797,629	1,682,847	2,572,274	2.7	4.0	5.8
Industry	29,198,883	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

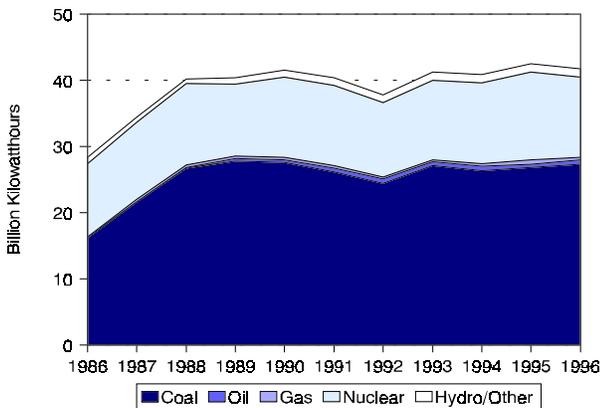


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

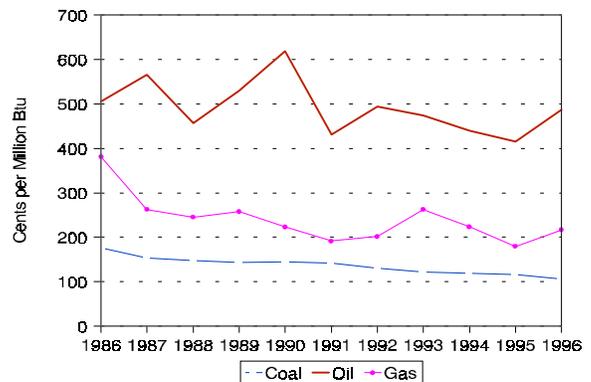


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

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	86	98	2.1
Nitrogen Oxides ^d . .	73	140	148	7.3
Carbon Dioxide ^d . . .	19,145	34,610	39,444	7.5

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

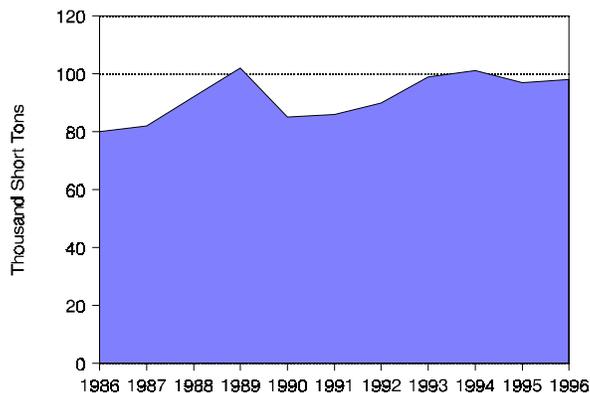


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

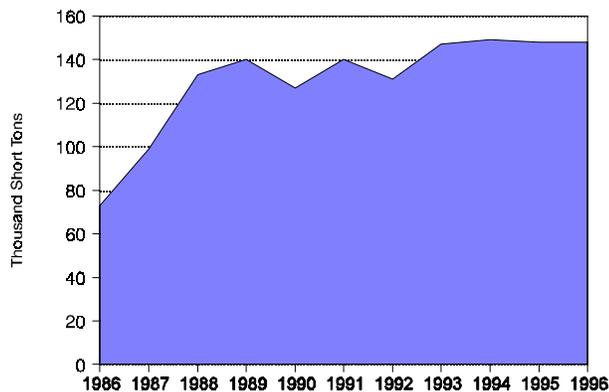


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

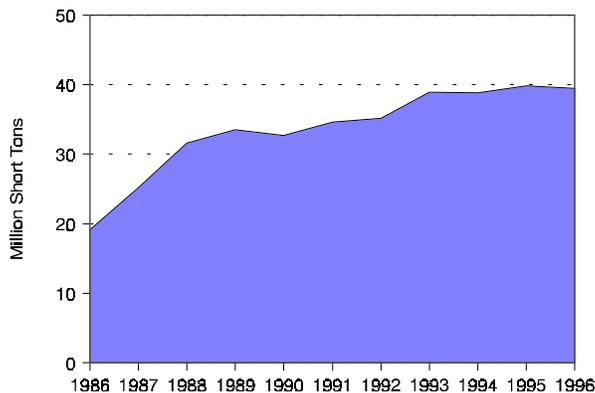


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential . .	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

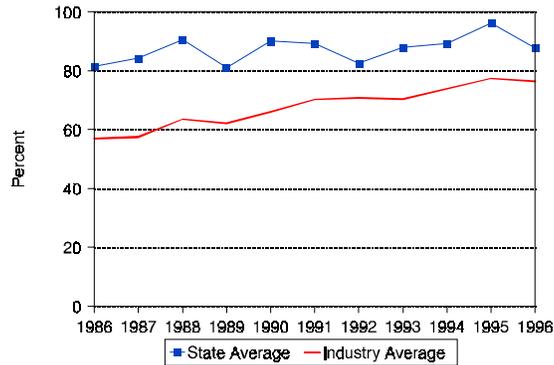


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

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.