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.

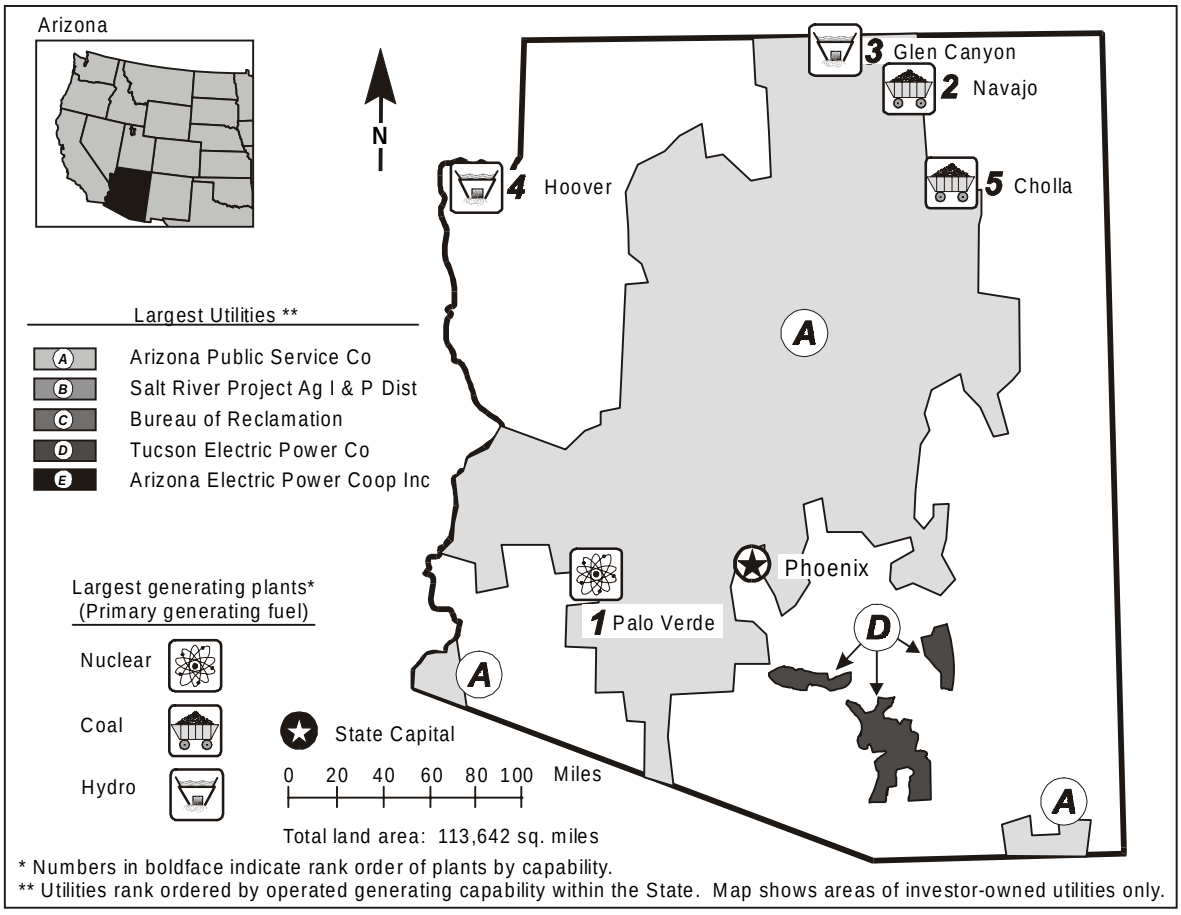

Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank
NERC Region(s)		WSCC
Net Exporter or Importer		Exporter
State Primary Generating Fuel		Coal
Population (as of 7/96)	4,434,340	21
Average Revenue (cents/kWh)	7.54	[a]38
Industry		
Capability (MWe)	W	[b]W
Generation (MWh)	W	[b]W
Capability/person (KWe/person)	W	[b]W
Generation/person (MWh/person)	W	[b]W
Sulfur Dioxide Emissions (Thousand Short Tons)	109	24
Nitrogen Oxide Emissions (Thousand Short Tons)	116	27
Carbon Dioxide Emissions (Thousand Short Tons)	36,628	27
Sulfur Dioxide/sq. mile (Tons)	0.96	36
Nitrogen Oxides/sq. mile (Tons)	1.02	40
Carbon Dioxide/sq. mile (Tons)	313.51	40

Item	Value	U.S. Rank
Utility		
Capability (MWe)	15,146	19
Generation (MWh)	70,877,043	18
Average Age of Coal Plants	18 years	
Average Age of Oil-fired Plants	22 years	
Average Age of Gas-fired Plants	29 years	
Average Age of Nuclear Plants	9 years	
Average Age of Hydroelectric Plants	40 years	
Average Age of Other Plants	--	
Nonutility[c]		
Capability (MWe)	W	W
Percentage Share of Capability	W	W
Generation (MWh)	W	W
Percentage Share of Generation	W	W

-- = 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

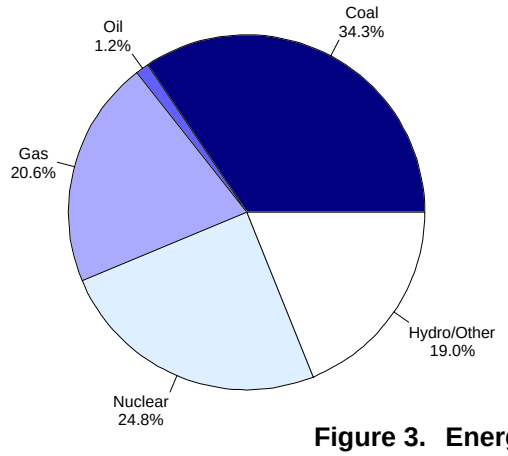

Figure 2. Utility Generation by Primary Energy Sources, 1996

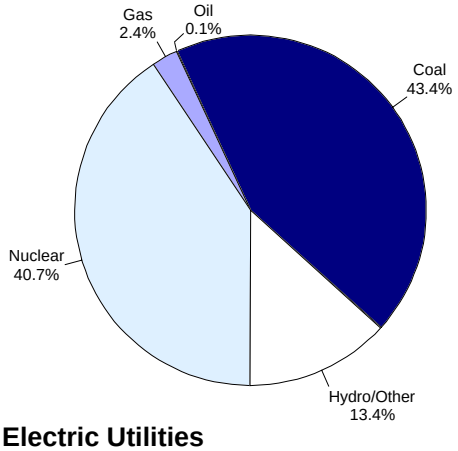

Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

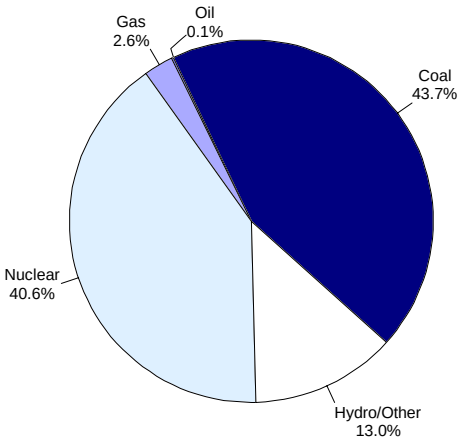

Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

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

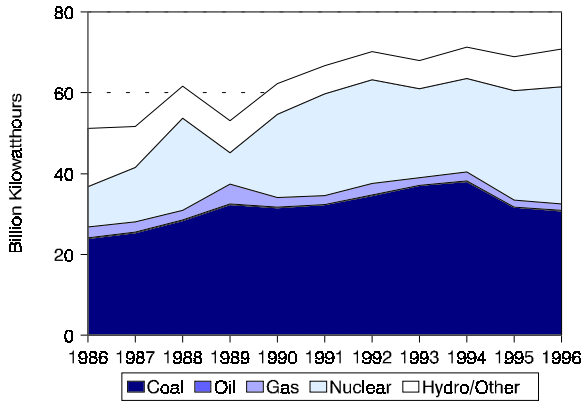

Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

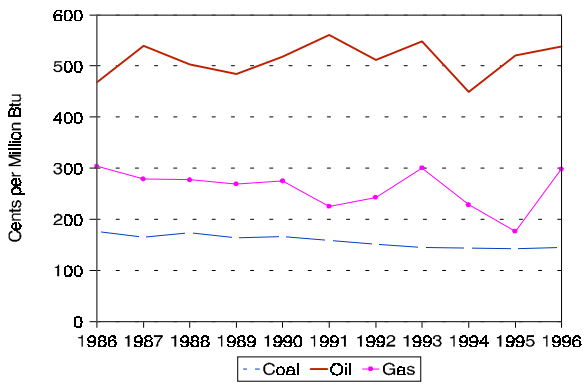

Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

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	124	109	3.4
Nitrogen Oxides[d]	89	121	116	2.6
Carbon Dioxide[d]	27,479	36,966	36,628	2.6

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

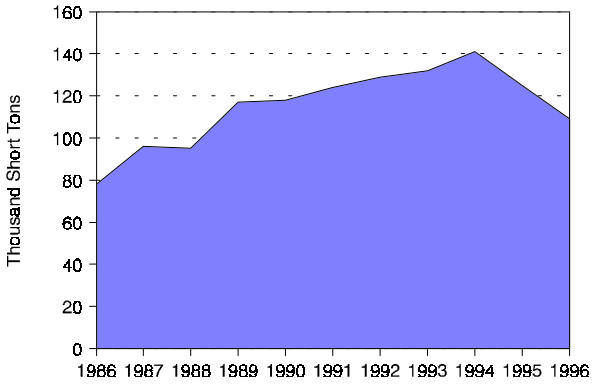

Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

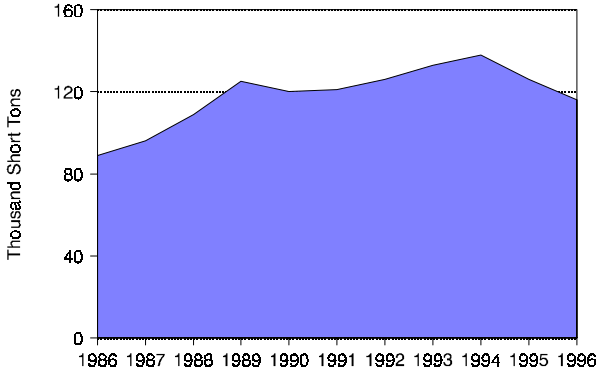

Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

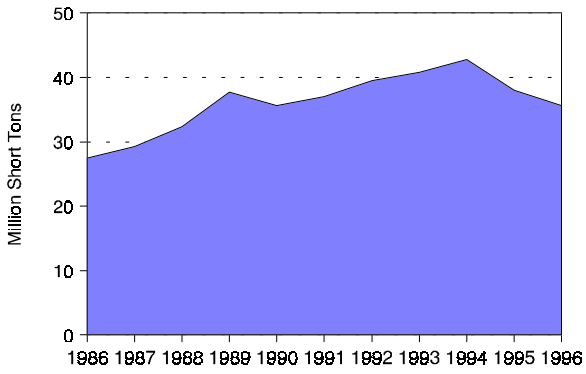

Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

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

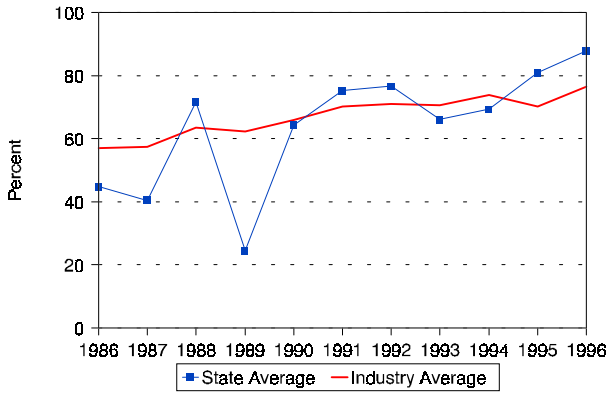

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

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