

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 fortieth nationally in SO₂ emissions, forty-second in NO_x, and forty-first in CO₂. On the other hand, because of its small area, the concentrations per square mile were twenty-fourth, twenty-third, 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.

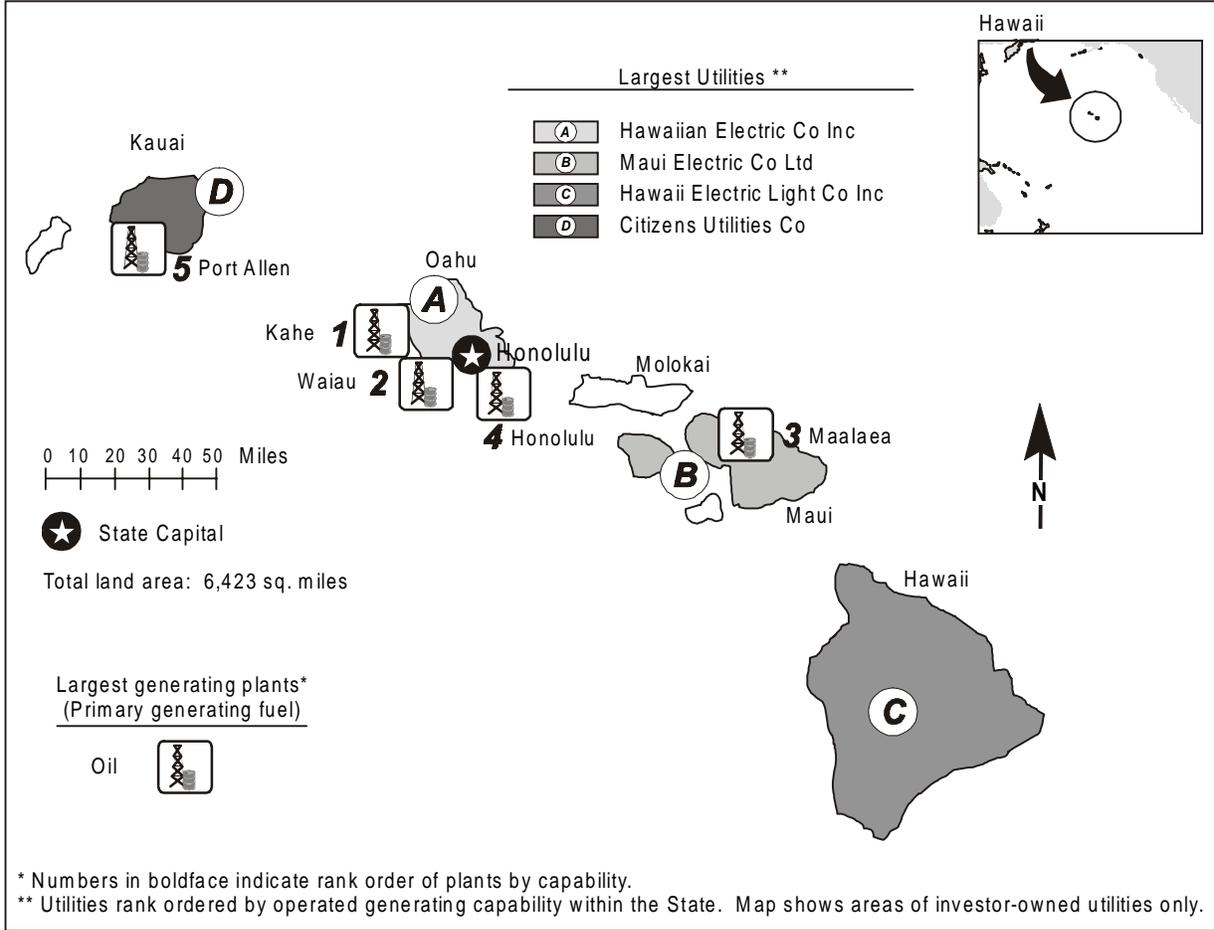


Table 1. 1996 Summary Statistics

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 Hydroelectric Plants	66 years	
Capability/person (KWe/person)	2.00	^b 38	Average Age of Other Plants	--	
Generation/person (MWh/person)	8.98	^b 38	Nonutility^c		
Sulfur Dioxide Emissions (Thousand Short Tons)	32	40	Capability (MWe)	757	20
Nitrogen Oxide Emissions (Thousand Short Tons)	21	42	Percentage Share of Capability	32.0	3
Carbon Dioxide Emissions (Thousand Short Tons)	10,201	41	Generation (MWh)	4,207,911	21
Sulfur Dioxide/sq. mile (Tons)	4.99	24	Percentage Share of Generation	39.6	4
Nitrogen Oxides/sq. mile (Tons)	3.31	23			
Carbon Dioxide/sq. mile (Tons)	1,588.25	15	-- = Not applicable.		

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

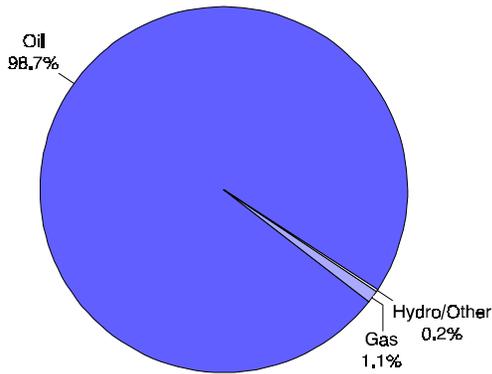


Figure 2. Utility Generation by Primary Energy Source, 1996

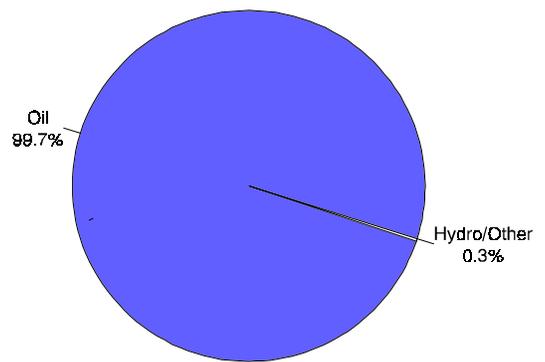


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

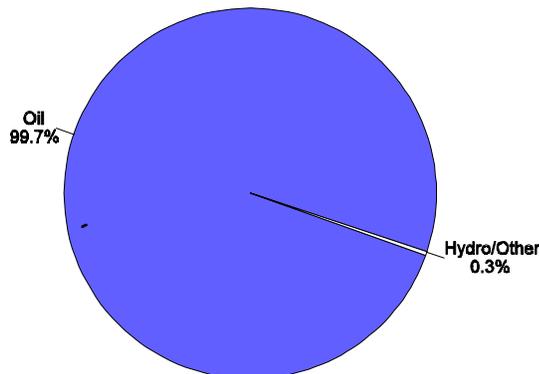


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

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	946,335	1,622,547	4,207,911	12.1	18.1	39.6
Industry	7,804,630	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

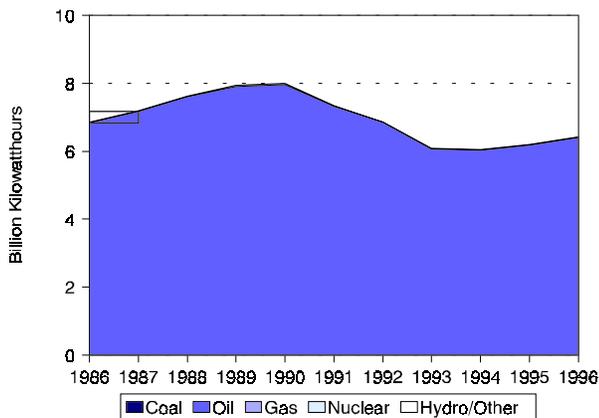


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

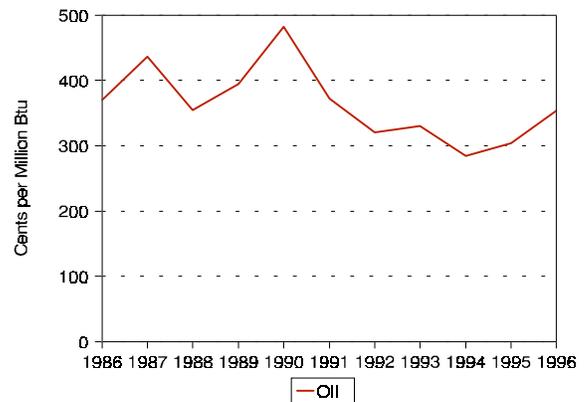


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

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	24	31	32	3.1
Nitrogen Oxides ^d	11	14	21	7.1
Carbon Dioxide ^d	5,857	8,729	10,201	5.7

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

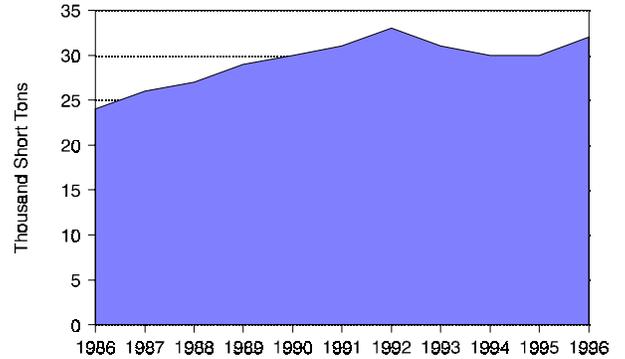


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

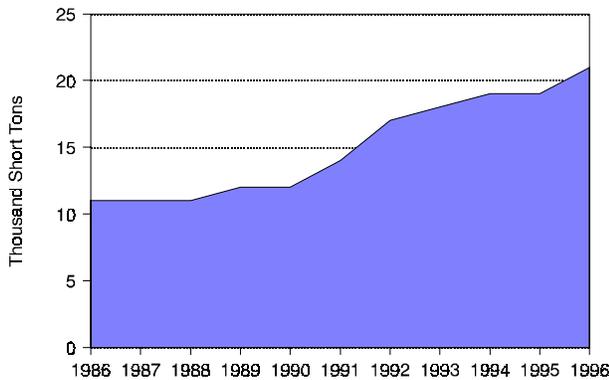


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

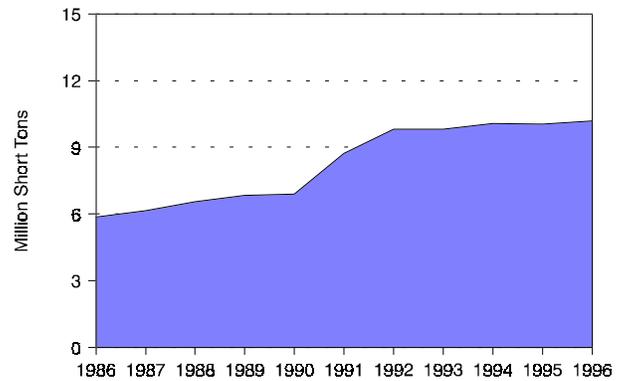


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

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