The State of CHP: California

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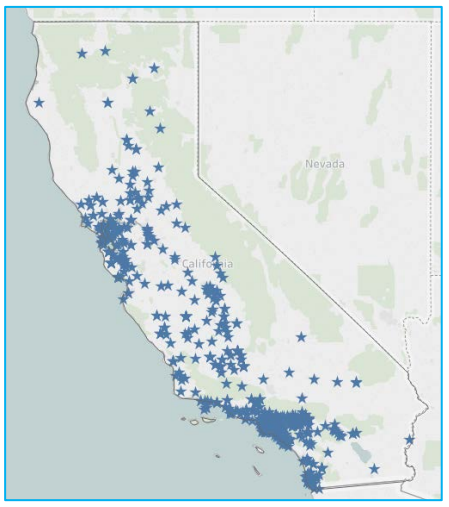
California Installed Base of CHP

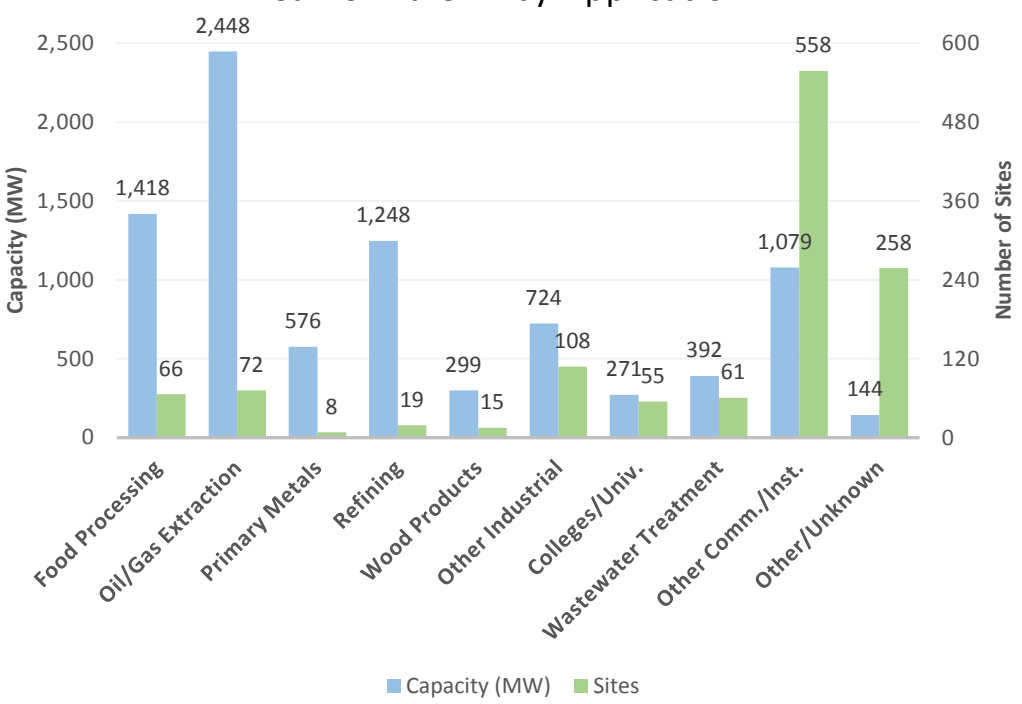
U.S. DOE Combined Heat and Power Installation Database

Sector	*Installations*	*Capacity (MW)*
Industrial	189	4,097
Commercial/Institutional	674	1,732
Other	357	2,761
Total	**1,220**	**8,590**

The Pacific CHP Technical Assistance Partnership has compiled information on certain illustrative CHP projects in California. You can access these by visiting the Department of Energy's CHP Project Profiles Database.

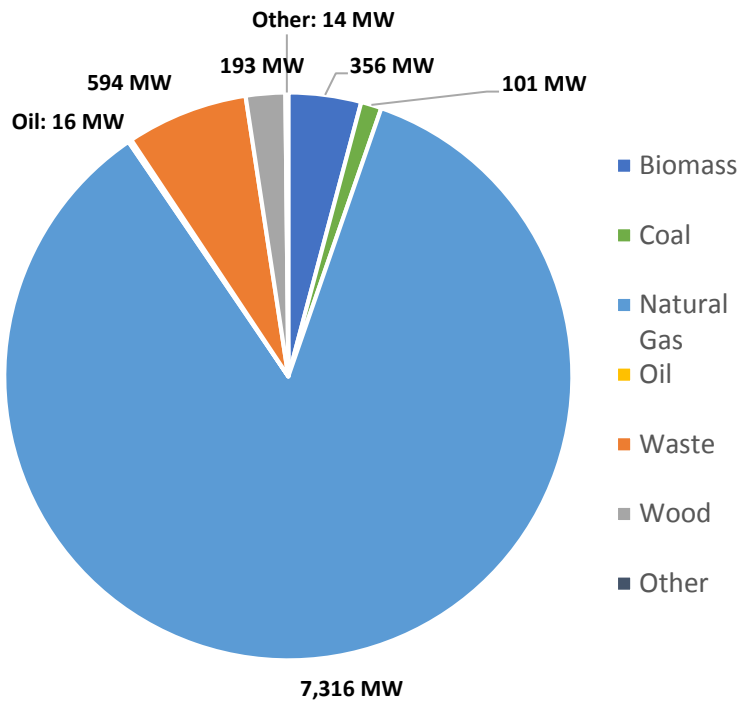


California CHP by Application



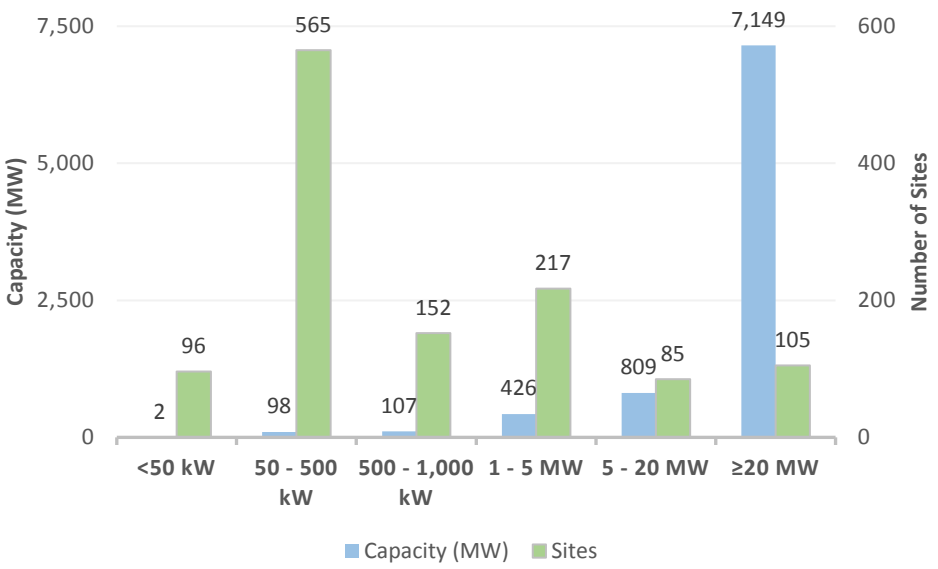
Source: DOE CHP Installation Database (U.S. installations as of Dec. 31, 2016)

California CHP Capacity (MW) by Fuel Type



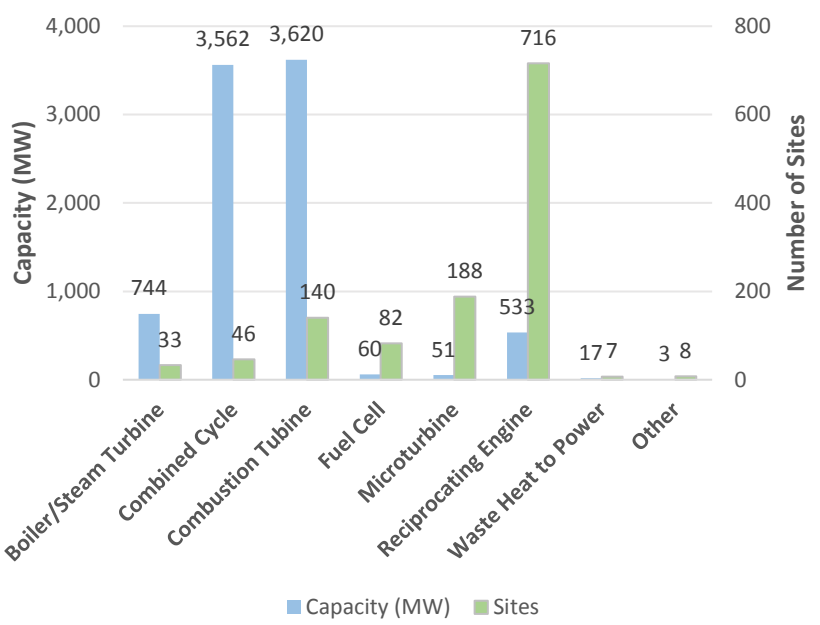
Source: DOE CHP Installation Database (U.S. installations as of Dec. 31, 2016)

California CHP by Size Range



Source: DOE CHP Installation Database (U.S. installations as of Dec. 31, 2016)

California CHP by Technology



Source: DOE CHP Installation Database (U.S. installations as of Dec. 31, 2016)

Combined Heat and Power (CHP) – sometimes referred to as cogeneration – is an efficient and clean approach to generating on-site electric power and useful thermal energy from a single fuel source.

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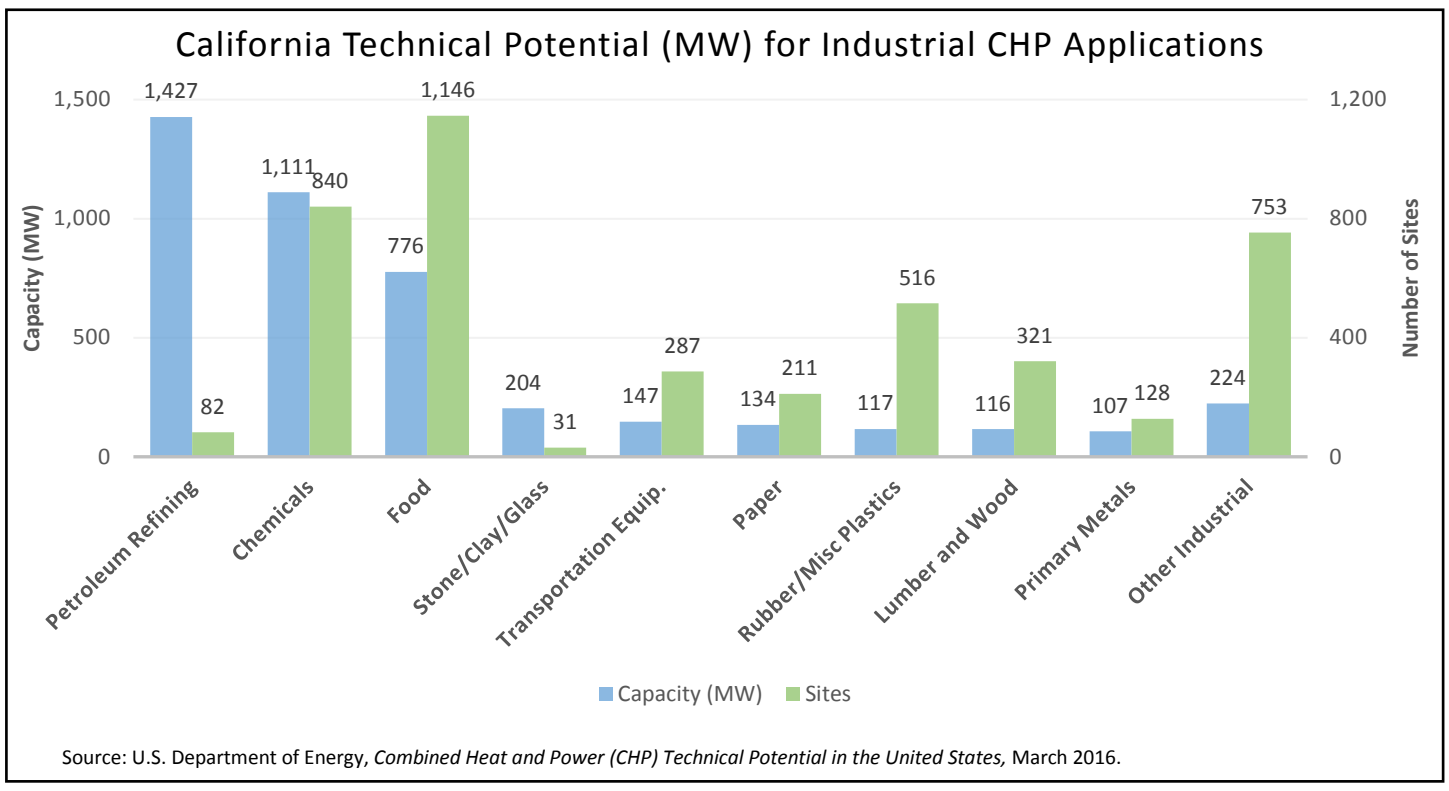
California Technical Potential for New CHP Installations

U.S. DOE Analysis: Combined Heat and Power (CHP) Technical Potential in the United States

Sector	*Potential Sites*	*Potential Capacity (MW)*
Industrial	4,315	4,362
Commercial/Institutional	24,646	7,179
Total	**28,961**	**11,542**

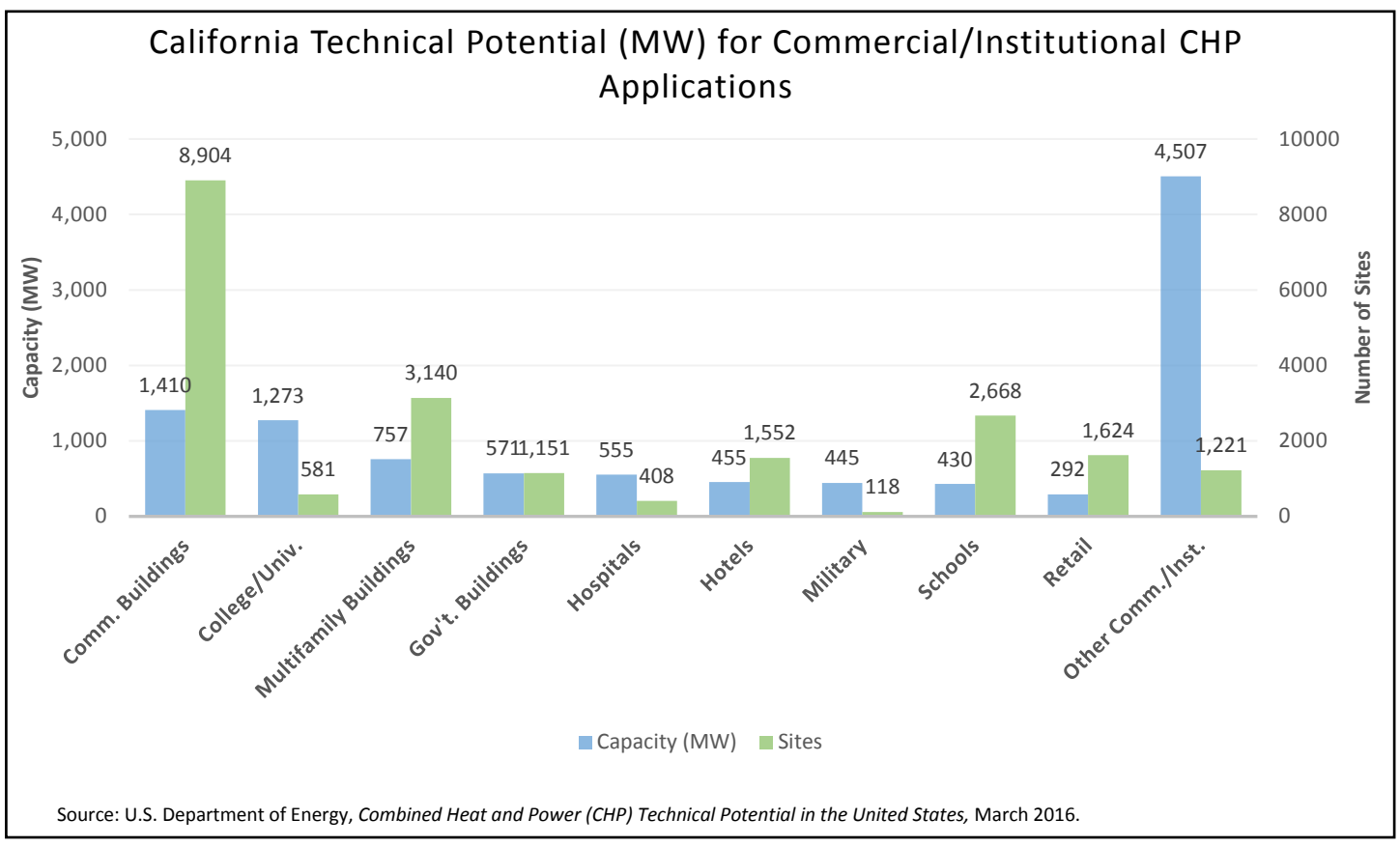


Source: U.S. Department of Energy, *Combined Heat and Power (CHP) Technical Potential in the United States,* March 2016.

Technical Potential by CHP Size Range for Top Five Industrial Sectors

	50-500 kW		0.5 - 1 MW		1 - 5 MW		5 - 20 MW		>20 MW		Total	
Application	**Sites**	**MW**	**Sites**	**MW**	**Sites**	**MW**	**Sites**	**MW**	**Sites**	**MW**	**Total Sites**	**Total MW**
Petroleum Refining	3	1	10	8	42	102	6	48	21	1,268	82	1,427
Chemicals	492	94	123	91	181	430	39	331	5	165	840	1,111
Food	852	155	131	97	132	263	30	240	1	21	1,146	776
Stone/Clay/Glass	2	0.5	1	1	13	48	14	122	1	33	31	204
Transportation Equip.	242	35	21	14	18	45	6	53	0	0	287	147
Other Industrial	1,602	267	178	127	145	267	4	35	0	0	1,929	697
Total	3,193	553	464	338	531	1,155	99	831	28	1,486	4,315	4,362

Source: U.S. Department of Energy, *Combined Heat and Power (CHP) Technical Potential in the United States,* March 2016.



Source: U.S. Department of Energy, *Combined Heat and Power (CHP) Technical Potential in the United States,* March 2016.

Technical Potential by CHP Size Range for Top Five Commercial/Institutional Sectors

	50-500 kW		0.5 - 1 MW		1 - 5 MW		5 - 20 MW		>20 MW		Total	
Application	**Sites**	**MW**	**Sites**	**MW**	**Sites**	**MW**	**Sites**	**MW**	**Sites**	**MW**	**Total Sites**	**Total MW**
Commercial Buildings	6,430	322	1,979	792	495	297	0	0	0	0	8,904	1,410
College/Univ.	336	55	33	20	141	423	63	538	8	236	581	1,273
Multifamily Buildings	2,130	160	825	413	185	185	0	0	0	0	3,140	757
Government Buildings	948	131	85	58	97	189	19	148	2	45	1,151	571
Hospitals	114	32	93	67	192	390	9	66	0	0	408	555
Other Comm./Inst.	9,856	1,356	349	222	199	399	58	448	4	418	10,469	2,842
Total	19,814	2,055	3,364	1,571	1,309	1,883	149	1,201	14	699	24,653	7,409

Source: U.S. Department of Energy, *Combined Heat and Power (CHP) Technical Potential in the United States,* March 2016.

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California CHP Economics

The most important indicators for CHP economics are electricity and gas prices. For most potential CHP installations, natural gas and electricity rates for host facilities will fall within the range of average commercial and industrial prices. Lower energy prices may be possible for large CHP applications.

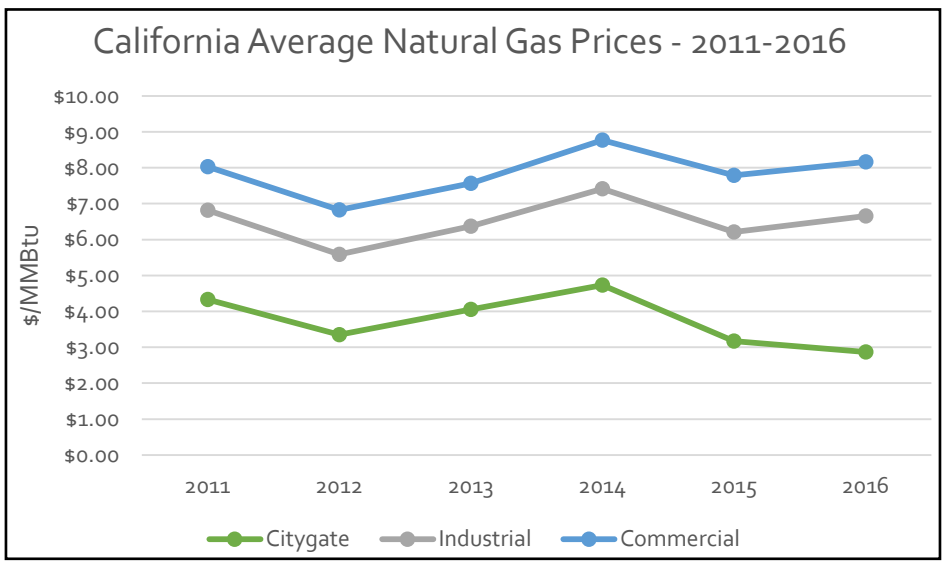
California Natural Gas Prices

California Average Gas Prices - 2016

Sector	*CA Price ($/MMBtu)*	*U.S. Price ($/MMBtu)*
Citygate*	2.87	3.75
Industrial	6.66	3.39
Commercial	8.16	7.22

Source: U.S. Energy Information Administration, "Natural Gas Prices", https://www.eia.gov/dnav/ng/ng_pri_sum_dcu_SCA_a.htm

The EIA industrial natural gas price is a full tariff rate, and most large consumers are purchasing gas commodities from marketers at a lower rate.



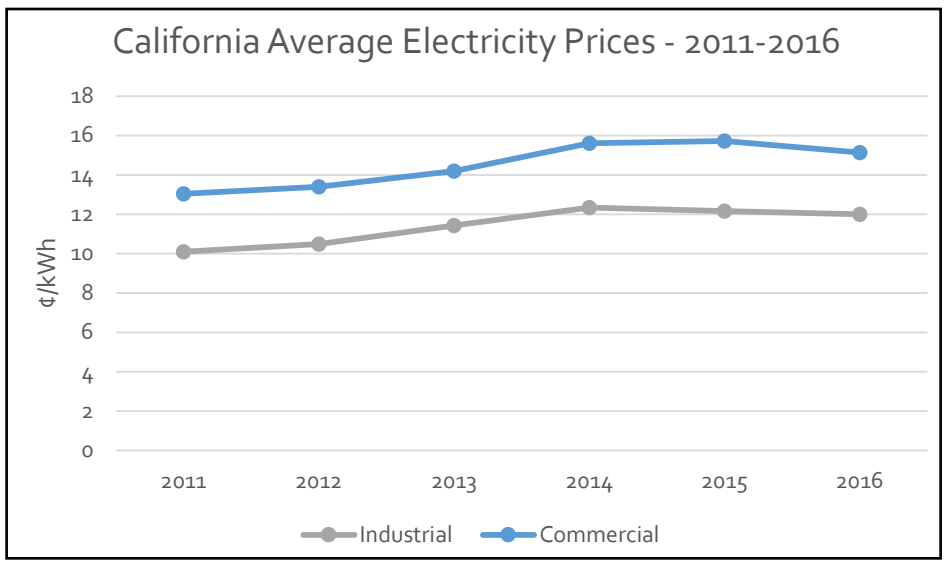
California Electricity Prices

California Average Electricity Prices - 2016

Sector	*CA Price (¢/kWh)*	*U.S. Price (¢/kWh)*
Industrial	12.07	6.75
Commercial	15.15	10.37

Source: U.S. Energy Information Administration, "Electricity Data Browser", https://www.eia.gov/electricity/data.cfm

Electricity rates can vary greatly by utility and facility size range. The rates below from EIA represent general averages; individual facility rates may vary.



California Average Delivered Electricity Prices by Utility

Utility	*Industrial Price (¢/kWh)*	*Commercial Price (¢/kWh)*	*Average Price** (¢/kWh)*
San Diego Gas & Electric	17.60	22.05	19.83
Pacific Gas & Electric	14.53	18.66	16.60
LA Dept of Water & Power	14.16	14.92	15.54
PacificCorp	14.00	15.20	14.60
Southern California Edison	11.87	15.28	13.58
Turlock Irrigation District	12.40	13.59	13.00
Modesto Irrigation District	9.99	14.25	12.12
Imperial Irrigation District	15.06	12.70	13.88
Sacramento Municipal Utility District	10.26	13.09	11.67

Source: U.S. Energy Information Administration, "Annual retail price of electricity by utility", https://www.eia.gov/electricity/data.cfm

California Electricity Prices – Heat Map

Sacramento Munic. Utility District / Imperial Irrigation District
Modesto / Turlock Irrigation Districts
PacificCorp / Southern CA Edison Co / LA Dept of Water & Power
Pacific Gas & Electric
San Diego Gas & Electric

*Citygate is a point or measuring station at which a distributing gas utility receives gas from a NG pipeline company or transmission system.

**Average of commercial and industrial electricity prices as reported by EIA.

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Department of Energy CHP Partnerships

Pacific CHP Technical Assistance Partnership

U.S. Department of Energy
CHP Technical Assistance Partnerships
PACIFIC

Pacific CHP TAP Director: Gene Kogan
Phone: 858-633-8561
Email: gene.kogan@energycenter.org

CHP for Resiliency Accelerator

The U.S. DOE is collaborating with a group of cities, states, and utilities who are actively pursuing CHP as a consideration in resiliency planning for critical infrastructure in their jurisdictions. This has included defining resiliency, identifying critical infrastructure, and assessing CHP opportunities. This process is being documented in a Resiliency Planning Tool. For more information: CHP for Resiliency Accelerator Website.

- Currently, there are no CHP for Resiliency Accelerator partners in California.

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