Summit on Water Technology & the California Drought:
Leveraging Technology to Build a Drought Resilient California

The Water Energy Nexus: Opportunities to Improve Water and Energy Efficiency Together

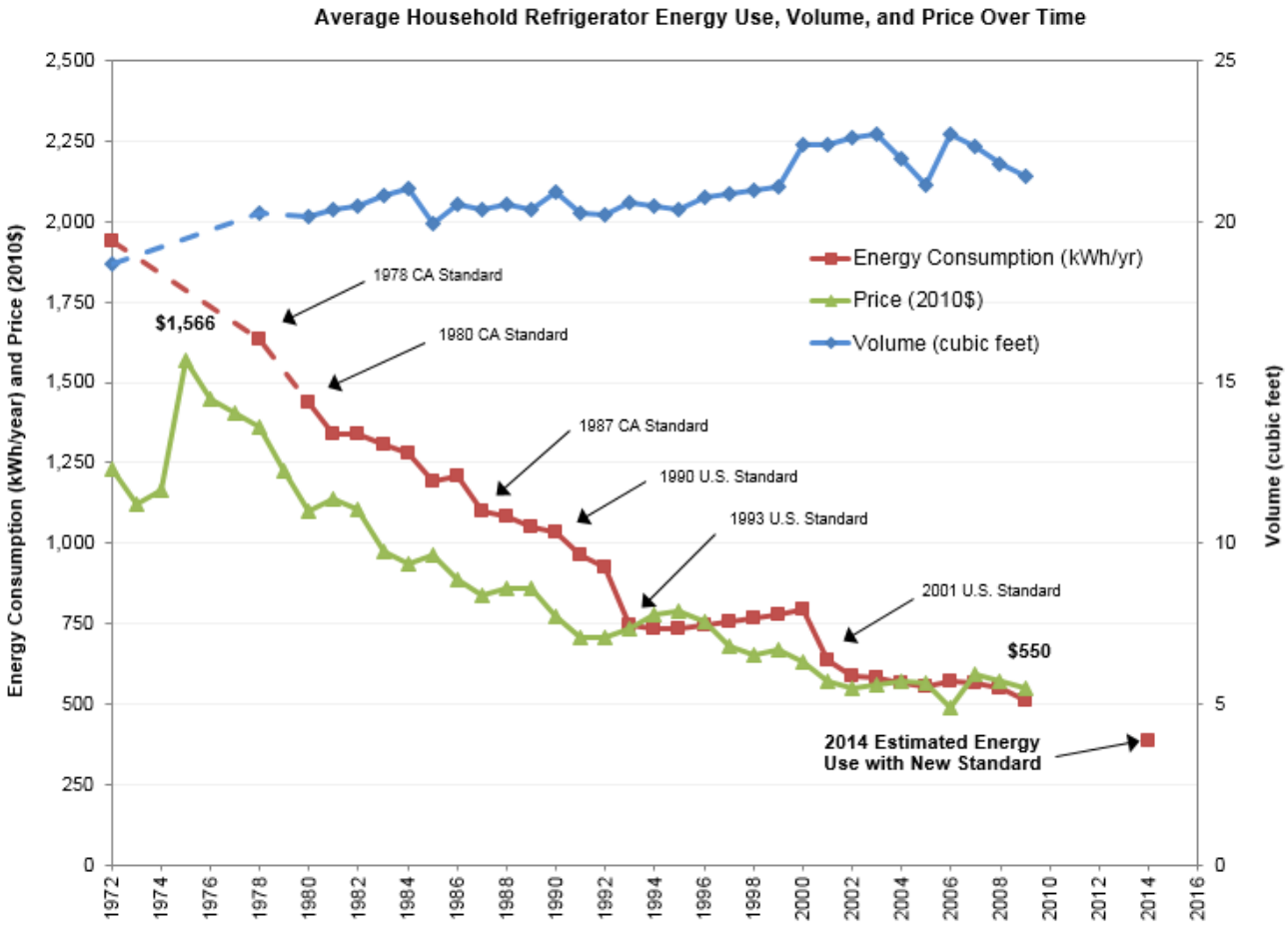
Robert Weisenmiller, Ph.D.
Chair, California Energy Commission
July 10, 2015

Expedited Processing of Applications for Alternate Water for Power Plants

Plant Number	Plant Name	MW	Average Water Use (acre feet/year) (2010 - 2013)	Average Capacity Factor (2010 - 2013)	Primary Water Source	Primary Water Supplier
1	Stanwood	140	8	4%	Recycled	Baker Farming Company (filter backwash water)
2	Olive I	105	26	1%**	Recycled	Burbank, City of
3	Magnolia	328	684	38%**	Recycled	Burbank, City of
4	Malburg	139	497	59%	Recycled	Central Basin Water District
5	TID Almond II	223	33	11%**	Recycled	Ceres, City of
6	Los Medanos	594	2,651	63%	Recycled	Delta Diablo
7	Delta Energy Center	880	3,828	60%	Recycled	Delta Diablo
8	Richmond Refinery	158	Did Not Report	66%**	Recycled	East Bay Municipal Utility District
9	Inland Empire	810	2,736	42%	Recycled	Eastern Municipal Water District
10	Orange Grove	100	22*	7%	Recycled	Fallbrook Public Utility District
11	Russell City	640	Recently Operational	Recently Operational	Recycled	Hayward, City of
12	Etiwanda	688	684	3%	Recycled	Inland Empire Utilities Agency
13	NCPA Geothermal 1	110	4,518	46%	Recycled	Lake County
14	NCPA Geothermal 2	110	4,165	42%	Recycled	Lake County
15	Lodi Energy Center	292	2,043	46%**	Recycled	Lodi, City of
16	Grayson	287	141	7%	Recycled	Los Angeles Department of Water and Power
17	Valley	662	2,382*	20%	Recycled	Los Angeles Department of Water and Power
18	Kern River Cogen	300	78	49%	Recycled	Oil wells (produced water)
19	Midway-Sunset	234	102	72%	Recycled	Oil wells (produced water)
20	Sycamore Cogen	300	56	56%	Recycled	Oil wells (produced water)
21	Canyon Power Plant	200	43	4%	Recycled	Orange County Water District
22	Long Beach	260	<1*	2%	Recycled	Plant dewatering system (degraded groundwater)
23	Mountainview	1,054	4,284	62%	Recycled	Redlands, City of
24	Palomar	559	2,390	61%	Recycled	Rincon del Diablo Municipal Water District
25	MID Ripon	100	41	3%	Recycled	Ripon, City of (degraded groundwater)
26	Riverside	192	11	4%**	Recycled	Riverside, City of
27	Roseville	200	392	25%	Recycled	Roseville, City of
28	Walnut Creek	501	223	8%**	Recycled	Rowland Water District
29	Carson Ice Cogen	125	614	34%	Recycled	Sacramento County
30	Quick Silver #16	120	3,071	37%	Recycled	Santa Rosa, City of and Lake County
31	Lakeview #17	120	3,786	44%	Recycled	Santa Rosa, City of and Lake County
32	Socrates #18	120	3,424	35%	Recycled	Santa Rosa, City of and Lake County
33	Grant #20	120	2,586	31%	Recycled	Santa Rosa, City of and Lake County
34	Sonoma #3	78	3,231	46%	Recycled	Santa Rosa, City of and Lake County
35	Calistoga #19	57	3,659	61%	Recycled	Santa Rosa, City of and Lake County
36	McCabe #5-#6	110	4,776	70%	Recycled	Santa Rosa, City of and Lake County
37	Ridge Line #7-#8	110	4,448	67%	Recycled	Santa Rosa, City of and Lake County
38	Eagle Rock #11	110	3,774	57%	Recycled	Santa Rosa, City of and Lake County
39	Cobb Creek #12	110	2,873	44%	Recycled	Santa Rosa, City of and Lake County
40	Big Geyser #13	55	3,666	56%	Recycled	Santa Rosa, City of and Lake County
41	Sulphur Springs #14	118	2,672	41%	Recycled	Santa Rosa, City of and Lake County
42	Donald Von Raesfeld	147	607	52%	Recycled	South Bay Water Recycling - City of San Jose
43	Metcalf Energy Center	565	1,624	51%	Recycled	South Bay Water Recycling - City of San Jose
44	Los Esteros	320	468	18%**	Recycled	South Bay Water Recycling - City of San Jose
45	Gilroy Cogen	129	204	13%	Recycled	South County Regional Wastewater Authority
46	Gilroy Energy Center	142	33	4%	Recycled	South County Regional Wastewater Authority
47	Walnut Energy Center	250	1,152	63%	Recycled	Turlock, City of
48	El Segundo (Units 5-8 (Dry Cooled)	560	Recently Operational	Recently Operational	Recycled	West Basin Municipal Water District
49	Watson Cogen	470	814	87%	Recycled	West Basin Municipal Water District
50	El Segundo Refinery	183	2	81%**	Recycled	West Basin Municipal Water District
51	Gateway (Dry Cooled)	613	56	56%	Surface	Antioch, City of
52	Marsh Landing	828	Recently Operational	Recently Operational	Surface	Antioch, City of
53	GWF Tracy (Dry Cooled)	337	17	21%**	Surface	Byron Bethany Irrigation District
54	Mariposa Energy	200	14	3%**	Surface	Byron Bethany Irrigation District
55	Martinez Cogen	127	406	71%	Surface	Contra Costa Water District
56	Martinez Refinery	69	<1*	80%	Surface	Contra Costa Water District
57	Crockett Cogen (Dry Cooled)	247	341	75%	Surface	East Bay Municipal Utility District
58	Oakland	224	394*	<1%	Surface	East Bay Municipal Utility District
59	Colusa (Dry Cooled)	662	46	30%	Surface	Glen Colusa Irrigation District
60	Coachella	92	<1*	1%	Surface	Imperial Irrigation District
61	El Centro	358	1,606	30%**	Surface	Imperial Irrigation District
62	Niland Gas Turbine	121	3	0%	Surface	Imperial Irrigation District
63	Second Imperial Geothermal	50	5,796	53%	Surface	Imperial Irrigation District
64	Harbor Cogen	167	21	2%	Surface	Los Angeles Department of Water and Power
65	McClure	112	7	<1%	Surface	Modesto Irrigation District
66	Woodland	185	431	29%**	Surface	Modesto Irrigation District
67	High Desert	885	2,613	49%	Surface	Mojave Water Agency
68	Otay Mesa (Dry Cooled)	609	113	49%	Surface	Otay Water District
69	Redding Power	137	83	5%**	Surface	Redding, City of
70	Campbell Soup (SPA)	174	863*	39%	Surface	Sacramento,City of
71	Procter & Gamble (Sacramento SCA)	193	848*	42%	Surface	Sacramento,City of
72	Cabrillo Power II (Kearny)	127	6	2%	Surface	San Diego, City of
73	Larkspur Energy LLC	90	15	8%	Surface	San Diego, City of
74	Miramar Energy Facility 1 & 2	95	147*	17%	Surface	San Diego, City of
75	Cosumnes	500	2,206	83%	Surface	U.S. Bureau of Reclamation
76	La Paloma	1,200	3,611	44%	Surface	West Kern Water District
77	Sunrise Power	572	1,654	40%	Surface	West Kern Water District
78	Elk Hills Power	567	2,664	72%	Surface	West Kern Water District
79	Henrietta Peaker	98	13	4%	Surface	Westlands Water District
80	Pastoria	778	2,738	61%	Surface	Wheeler Ridge-Maricopa Water Storage District
81	KRCD Malaga Peaker	95	27	12%	Groundwater	Malaga County Water District
82	King City Cogen	130	377	46%	Groundwater	Onsite groundwater wells
83	Humboldt Bay	167	<1*	27%**	Groundwater	Onsite groundwater wells
84	Sentinel	850	Recently Operational	Recently Operational	Groundwater	Onsite groundwater wells
85	Tesoro - Los Angeles Refining	83	2*	65%	Groundwater	Onsite groundwater wells
86	Sutter Energy Center (Dry Cooled)	552	61	26%	Groundwater	Onsite groundwater wells
87	Blythe	591	1,763*	32%	Groundwater	Onsite groundwater wells
88	Indigo	135	18	5%	Groundwater	Onsite groundwater wells
89	Panoche Energy Center	400	203	8%	Groundwater	Onsite groundwater wells
90	SEGS III through VII	171	1,208	26%	Groundwater	Onsite groundwater wells
91	SEGS VIII and IX	127	954	25%	Groundwater	Onsite groundwater wells
92	Ivanpah I through III (Dry Cooled)	392	Recently Operational	Recently Operational	Groundwater	Onsite groundwater wells
93	Abengoa	250	Recently Operational	Recently Operational	Groundwater	Onsite groundwater wells
94	Genesis (Dry Cooled)	250	Recently Operational	Recently Operational	Groundwater	Onsite groundwater wells
95	Coso Power Developers	100	2,821	63%	Groundwater	Onsite groundwater wells (and steam condensate)
96	Coso Finance Partners	102	3,554	59%	Groundwater	Onsite groundwater wells (and steam condensate)
97	Coso Energy Developers	100	2,922	61%	Groundwater	Onsite groundwater wells (and steam condensate)
98	Broadway	75	49*	10%	Groundwater	Onsite groundwater wells (City of Pasadena)
99	Glenarm	155	42	5%**	Groundwater	Onsite groundwater wells (City of Pasadena)
100	Hanford Peaker	92	103	7%	Groundwater	Onsite wells and City of Hanford

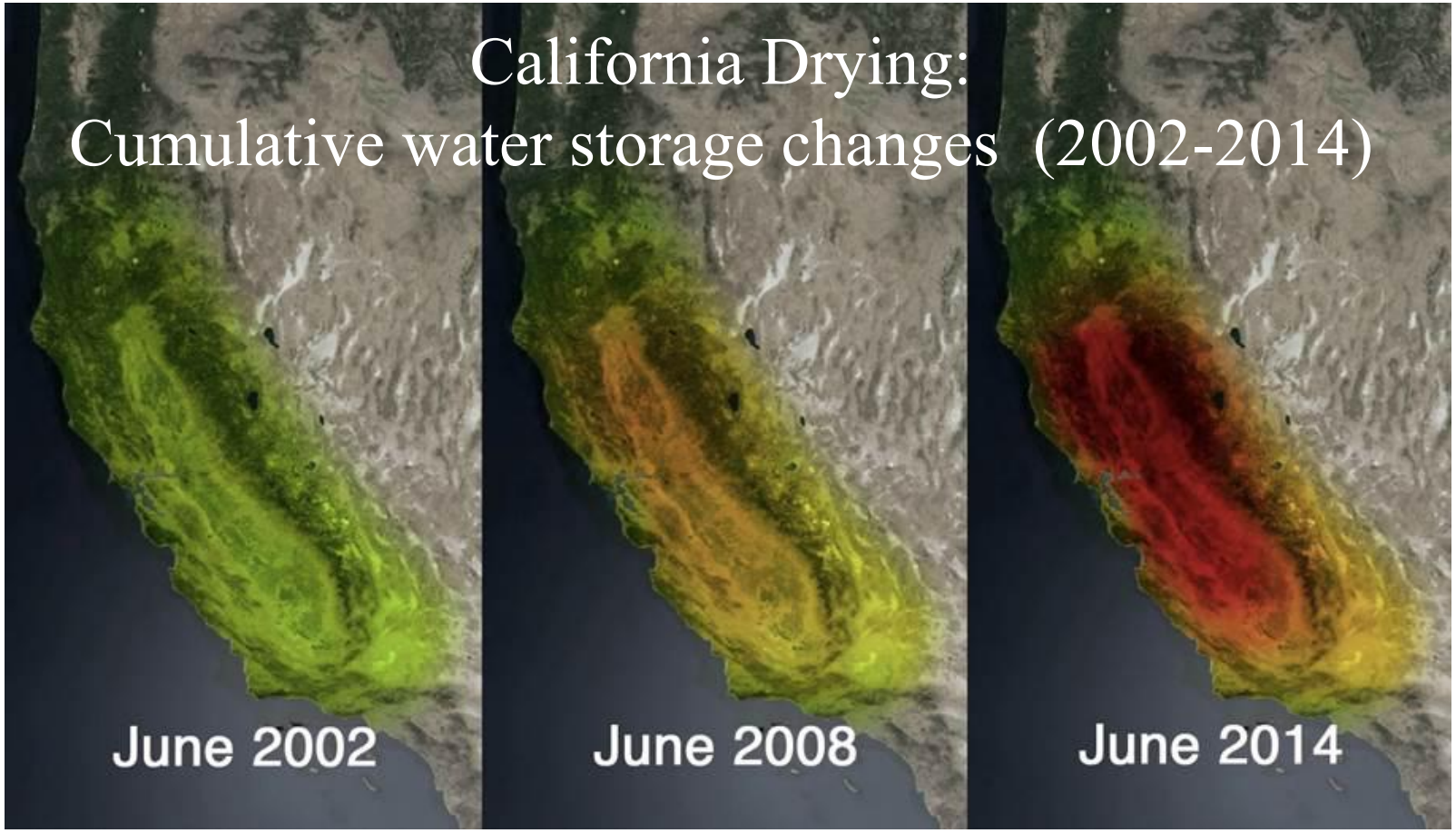
* Available data was used to calculate the average water use when water use data was not available for the 4 year reporting period.
**The plant changed capacity or came on line during the reporting period. In this case the average water use and capacity factor was estimated based on the available data.

Standards Have Spurred Innovation in Energy: What will Advance Innovation in Water?



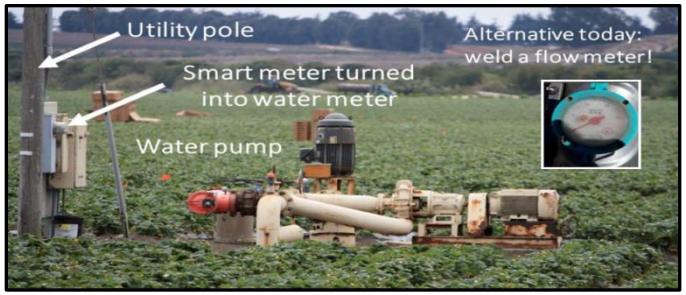
Sources: NRDC, Appliance Standards Awareness Project, Association of Home Appliance Manufacturers, U.S. Census Bureau.

What are the Big Wins to Transform Conveyance, Treatment, and End-Use of Water in California?

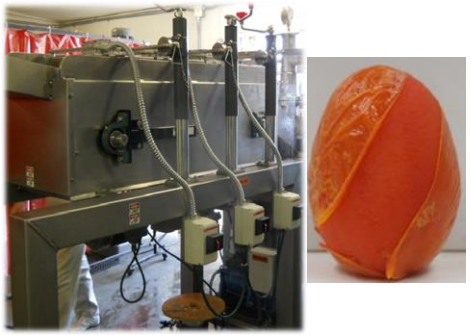


Source: NASA/JPL-Caltech/University of California, Irvine.

Research to Catalyze Water Savings



PowWow Energy's software algorithms use smart power meter data to inform growers of water pumping energy use, leaks and power consumption.



Infrared Tomato Peeling eliminates lye and water usage.

Tersus AA-44-00 Laundry System which uses C02 for washing clean room garments and other textiles. 100% water savings, 50+% energy savings.

Advanced Wok results in more heat transfer and eliminates water used for cooling the surface.

Porifera's forward osmosis/ reverse osmosis membrane system can treat onsite wastewater from food processing/manufacturing for direct on site reuse for manufacturing or local crop irrigation

CALIFORNIA'S DROUGHT TECHNOLOGY PROGRAM

INVESTING IN INNOVATIVE WATER & ENERGY SAVING TECHNOLOGIES

LAUNCHING SUMMER 2015

Accelerating deployment of innovative technologies that meet the following criteria:

- Display significant greenhouse gas emission reductions and water and energy savings.
- Demonstrate actual operation beyond the research and development stage.
- Documented readiness for rapid, large-scale deployment in California. (Not currently being widely deployed).
- Technologies must be commercially available (but not widely used in California).

Proposed Funding from California Climate Investments Program*

Phase 1: $10 million for Agriculture Rebates and Grants

Phase 2: $16 million for Industrial, Commercial & Residential Grants

Phase 3: $3 million Renewable Energy Powered Desalination Grants

Please visit our webpage for more information:
http://www.energy.ca.gov/wet/

* $1 million for technical support and administration