Cost of Fuel to Generate Electricity

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The Six Main Costs to Price Electricity are:

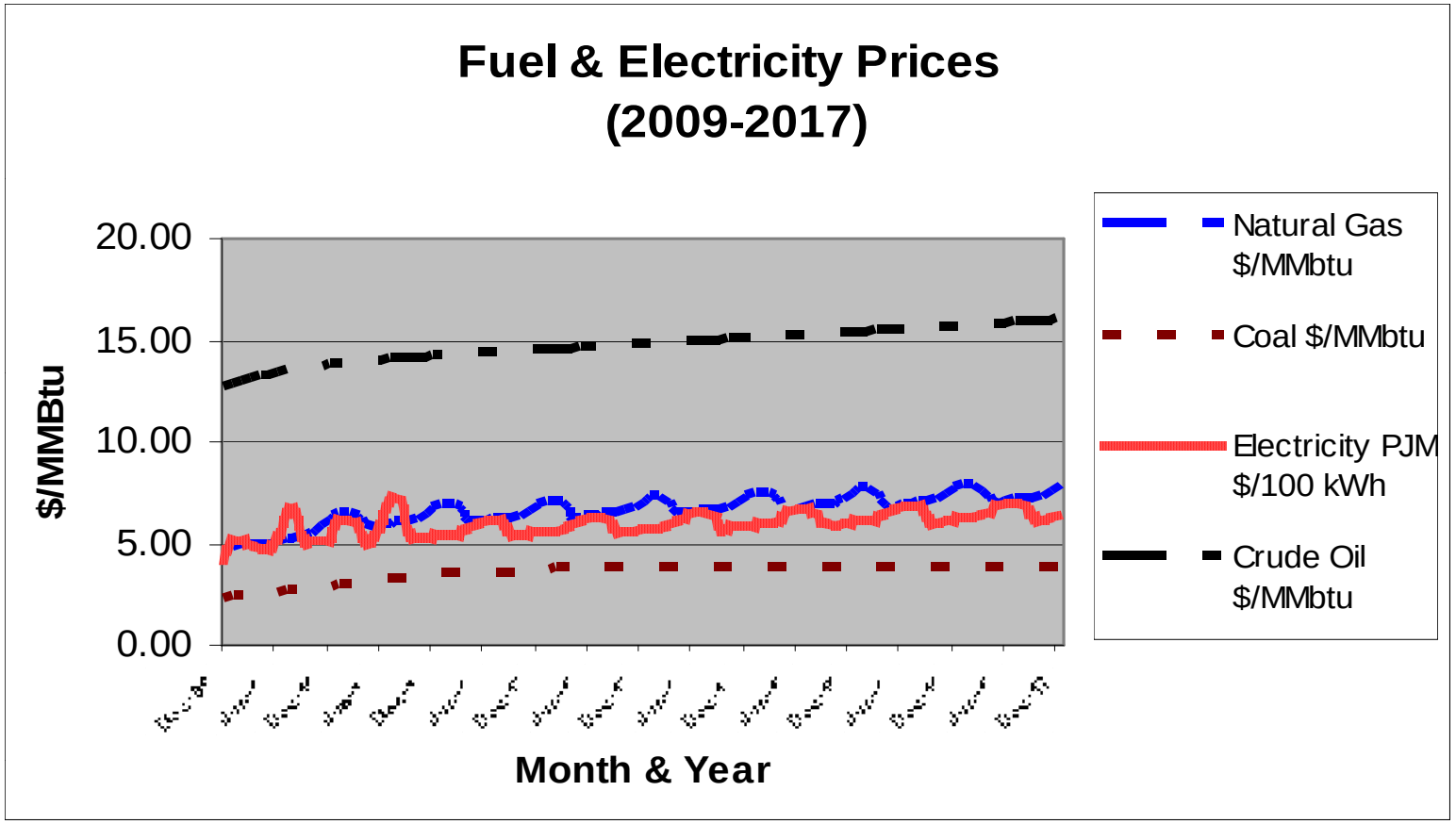
- Capital costs – the cost of capital investment (debt & equity), depreciation, Federal & State income taxes and property taxes
- Fuel costs based on fuel used to generate electricity – hydro, natural gas, coal, fuel oil, wind, solar, photovoltaic, geothermal, biogas
- Operating and maintenance costs
- Transmission costs
- Distribution costs
- Social adder costs – GHG adder, low income adder, regulatory agency adder

Levelized Cost of Electricity by Resource

In-Service Year = 2007 (Nominal 2007 Dollars)	Size	Merchant			IOU			POU		
	MW	Dollars Per kW-Year	Dollars Per MWh	Cents Per kWh	Dollars Per kW-Year	Dollars Per MWh	Cents Per kWh	Dollars Per kW-Year	Dollars Per MWh	Cents Per kWh
Conventional Combined Cycle (CC)	500	505.82	102.19	10.22	466.86	94.47	9.45	428.32	86.84	8.68
Conventional CC - Duct Fired	550	512.39	103.52	10.35	472.4	95.59	9.56	432.97	87.78	8.78
Advanced Combined Cycle	800	476.97	96.36	9.64	438.22	88.68	8.87	399.62	81.02	8.1
Conventional Simple Cycle	100	250.43	599.57	59.96	195.59	468.46	46.85	132.84	318.33	31.83
Small Simple Cycle	50	270.36	647.28	64.73	212.08	507.98	50.8	146.7	351.55	35.15
Advanced Simple Cycle	200	295.96	236.12	23.61	253.22	202.1	20.21	201.13	160.6	16.06
Integrated Gasification Combined Cycle (IGCC)	575	566.58	126.51	12.65	476.15	106.32	10.63	361.52	80.72	8.07
Advanced Nuclear	1000	862.7	118.25	11.83	757.78	103.87	10.39	664.78	91.12	9.11
Biomass - AD Dairy	0.25	924.52	143.61	14.36	826.57	128.39	12.84	800.93	109.77	10.98
Biomass - AD Food	2	450.97	70.05	7	350.3	54.41	5.44	218.82	33.99	3.4
Biomass Combustion - Fluidized Bed Boiler	25	866.25	118.72	11.87	793.99	108.82	10.88	839.92	115.12	11.51
Biomass Combustion - Stoker Boiler	25	810.99	111.15	11.12	745.45	102.17	10.22	799.74	109.61	10.96
Biomass - IGCC	21.25	849.18	123.66	12.37	768.58	111.92	11.19	744.82	108.46	10.85
Biomass - LFG	2	382.5	56.11	5.61	345.95	50.86	5.09	352.73	52.36	5.24
Biomass - WWTP	0.5	514.65	97.34	9.73	466.63	88.84	8.88	366.54	71.78	7.18
Fuel Cell - Molten Carbonate	2	886.11	114.66	11.47	910.6	117.83	11.78	754.94	97.69	9.77
Fuel Cell - Proton Exchange	0.03	1409.6	182.41	18.24	1281.3	165.8	16.58	1025.7	132.72	13.27
Fuel Cell - Solid Oxide	0.25	955.64	123.66	12.37	868.61	112.4	11.24	695.29	89.97	9
Geothermal - Binary	50	477.23	75.85	7.58	396.31	63.53	6.35	394.23	65.55	6.56
Geothermal - Dual Flash	50	453.91	73.66	7.37	379.23	62.07	6.21	384.36	65.26	6.53
Hydro - In Conduit	1	213.72	52.84	5.28	183.96	45.68	4.57	188.71	47.78	4.78
Hydro - Small Scale	10	567.71	138.74	13.87	481.05	118.08	11.81	347.96	87.09	8.71
Ocean Wave (Pilot)	0.75	1239.9	1030.5	103.05	1005.6	837.65	83.76	733.96	617.12	61.71
Solar - Concentrating PV	15	620.48	424.84	42.48	631.79	434	43.4	442.11	308.09	30.81
Solar - Parabolic Trough	63.5	497.33	277.3	27.73	504.17	281.37	28.14	355.71	199.31	19.93
Solar - Photovoltaic (Single Axis)	1	1035.1	704.98	70.5	1019.5	695.59	69.56	681.74	468.87	46.89
Solar - Stirling Dish	15	855.55	518.89	51.89	868.93	527	52.7	648.77	393.47	39.35
Wind - Class 5	50	245.94	84.24	8.42	196.08	67.16	6.72	179.19	61.38	6.14

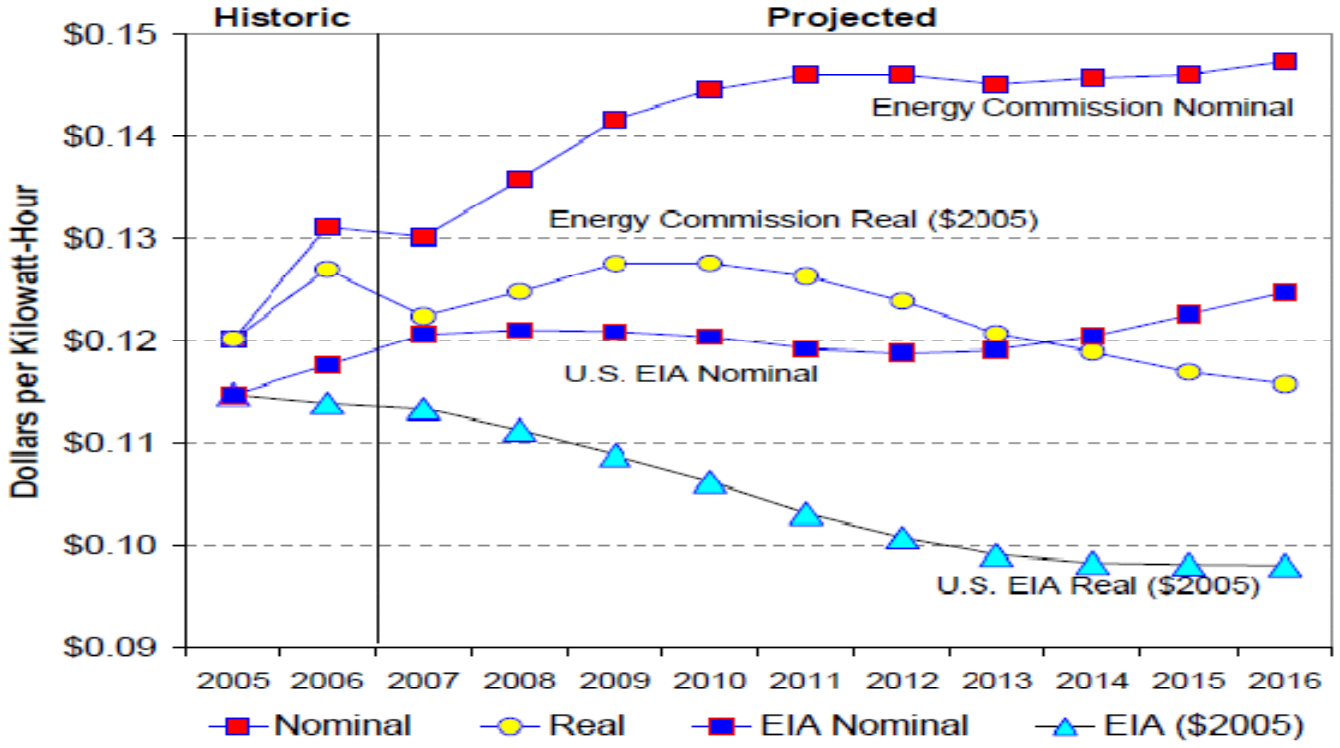
Source: California Energy Commission, Electricity Analysis Office

Electricity Prices are Forecast to Track Natural Gas Prices in the Medium Term. GHG Legislation Poses Competitive Problems for Coal.



California Electricity Price Forecast 2005-2016

Figure 1: California System-Average Retail Electricity Prices, 2005 to 2016



Sources: California Energy Commission and U.S. Energy Information Administration

California Electricity Prices for all Customer Classes are the Highest in the Western US

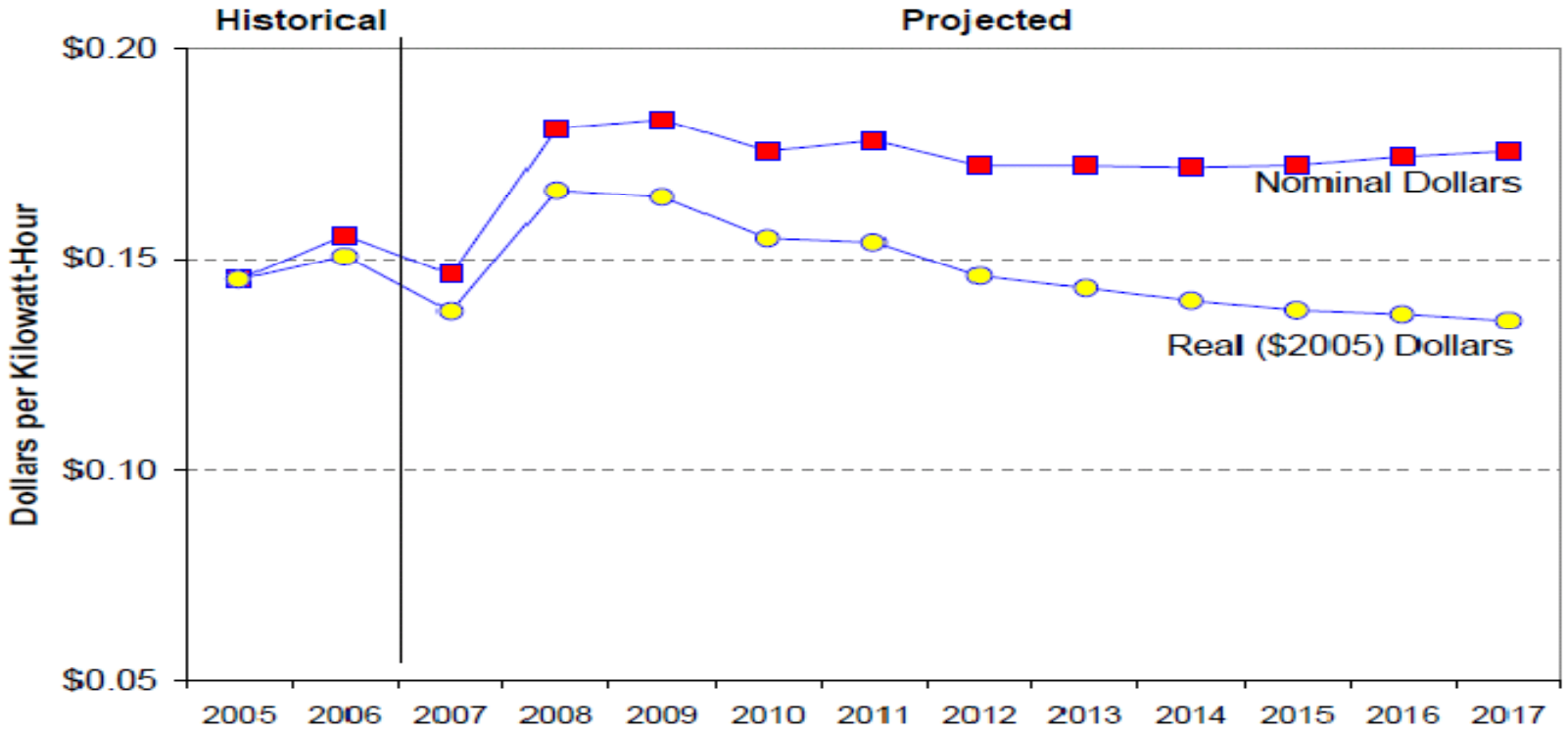
Table 2: Retail Price Comparisons: California and Other Western States

Average Retail Prices in 2005 (cents per kilowatt-hour)				
	Residential	Commercial	Industrial	All Sectors
Arizona	8.86	7.40	5.85	7.79
California	12.51	11.92	9.55	11.63
Colorado	9.06	7.62	5.74	7.64
Idaho	6.29	5.42	3.91	5.12
Montana	8.10	7.43	4.83	6.72
Nevada	10.20	9.48	7.71	9.02
New Mexico	9.13	7.81	5.61	7.51
Oregon	7.25	6.51	4.83	6.34
Utah	7.52	6.07	4.24	5.92
Washington	6.54	6.33	4.27	5.87
Wyoming	7.48	6.17	3.99	5.16
US Average	9.45	8.67	5.73	8.14

Source: U.S. Energy Information Administration

SDG&E's Retail Electricity Prices are Projected to decline in Real $ 2005 over the next 8 Years

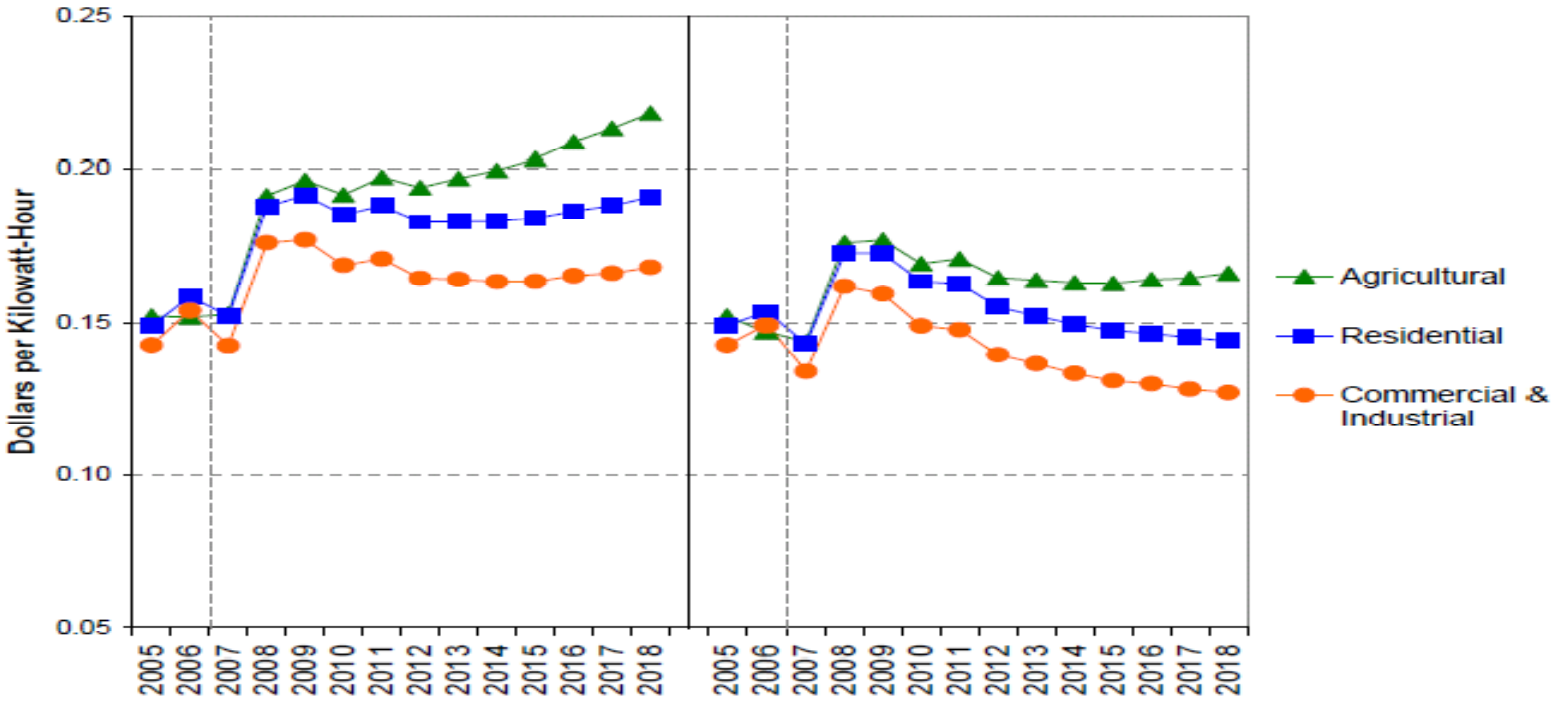
Figure 6: SDG&E's System Average Retail Electricity Prices, 2005 to 2018



Source: California Energy Commission

SDG&E's Real $ Electricity Rates are Forecast to Decline over the next 8_{Years} for all Customer Classes. (Left Nominal $ – Right Real $2005)

Figure 7: SDG&E's Retail Price Forecasts by Customer Class, 2005 to 2018



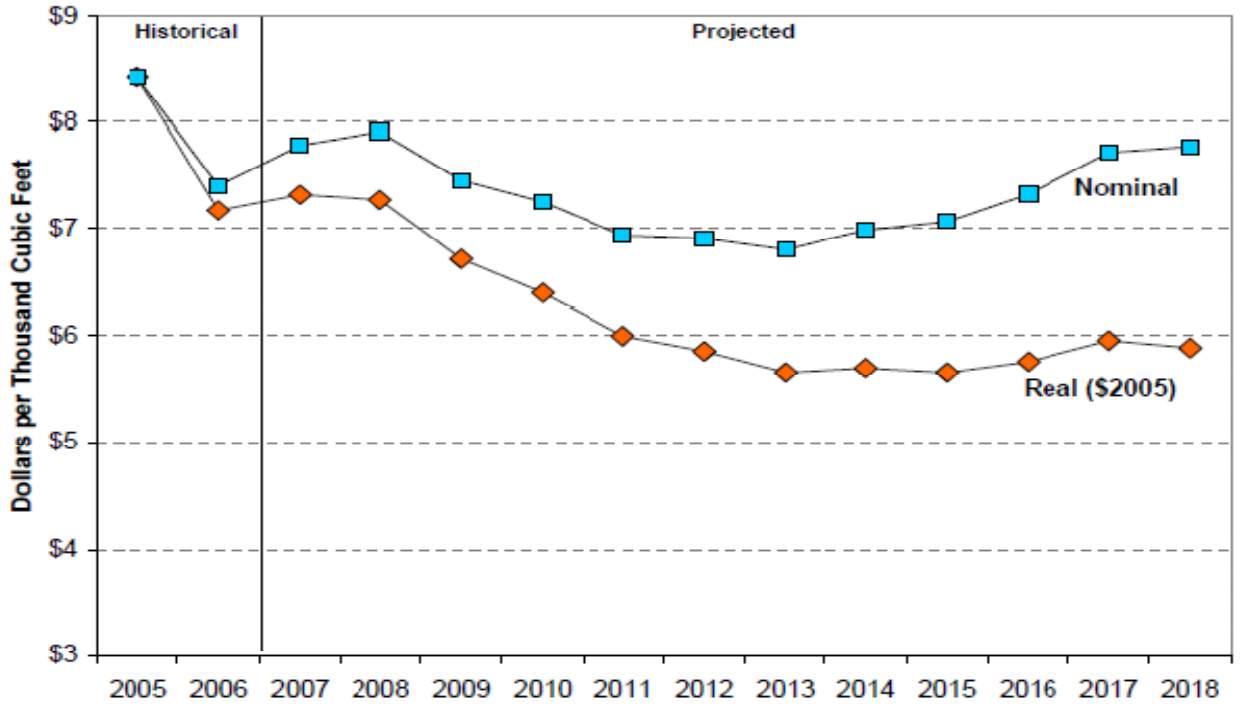
Source: California Energy Commission

SDG&E's Electricity Prices are Forecasted to Decline over the next 8 Years in Real $2005

	Residential	Commercial & Industrial	Agricultural	Other	System Average
	Dollars per kWh (2005 dollars)				
2005	0.149	0.143	0.152	0.102	0.145
2006	0.15	0.15	0.15	0.10	0.15
2007	0.14	0.13	0.14	0.09	0.14
2008	0.17	0.16	0.18	0.12	0.17
2009	0.17	0.16	0.18	0.12	0.16
2010	0.163	0.149	0.169	0.111	0.155
2011	0.163	0.148	0.171	0.111	0.154
2012	0.155	0.139	0.165	0.106	0.146
2013	0.152	0.137	0.164	0.105	0.143
2014	0.149	0.133	0.163	0.104	0.140
2015	0.147	0.131	0.163	0.103	0.138
2016	0.146	0.130	0.164	0.104	0.137
2017	0.145	0.128	0.164	0.103	0.135
2018	0.144	0.127	0.166	0.104	0.135

Nationally, Natural Gas for Power Production is Forecast to Decline in Real $2005 over the next 8 Years

Figure 12: Average U.S. Prices for Natural Gas as a Power Plant Fuel



Source: U.S. Energy Information Administration

Nationally Natural Gas was Used for 21.6% of Power Production in 2007. Coal was still the King with 48.5% and Renewables Accounted for a mere 8.5%. If GHG Targets are to be met, Natural Gas will have to replace Coal.

Table 1.1. Net Generation by Energy Source by Type of Producer, 1996 through 2007 (EIA)

(Thousand Megawatthours)

Period	Coal[1]	Petroleum [2]	Natural Gas	Other Gases[3]	Nuclear	Hydroelectric Conventional[4]	Other Renewables[5]	Hydroelectric Pumped Storage[6]	Other[7]	Total
Total (All Sectors)										
1996	1,795,196	81,411	455,056	14,356	674,729	347,162	75,796	-3,088	3,571	3,444,188
1997	1,845,016	92,555	479,399	13,351	628,644	356,453	77,183	-4,040	3,612	3,492,172
1998	1,873,516	128,800	531,257	13,492	673,702	323,336	77,088	-4,467	3,571	3,620,295
1999	1,881,087	118,061	556,396	14,126	728,254	319,536	79,423	-6,097	4,024	3,694,810
2000	1,966,265	111,221	601,038	13,955	753,893	275,573	80,906	-5,539	4,794	3,802,105
2001	1,903,956	124,880	639,129	9,039	768,826	216,361	70,769	-8,823	11,906	3,736,644
2002	1,933,130	94,567	691,006	11,463	780,064	264,329	79,109	-8,743	13,527	3,858,452
2003	1,973,737	119,406	649,908	15,600	763,733	275,806	79,487	-8,535	14,045	3,883,185
2004	1,978,301[R]	121,145[R]	710,100[R]	15,252[R]	788,528	268,417	83,067[R]	-8,488	14,232[R]	3,970,555
2005	2,012,873[R]	122,225[R]	760,960[R]	13,464[R]	781,986	270,321	87,329[R]	-6,558	12,821[R]	4,055,423
2006	1,990,511[R]	64,166[R]	816,441[R]	14,177[R]	787,219	289,246	96,525[R]	-6,558	12,374[R]	4,064,702
2007	2,016,456	65,739	896,590	13,453	806,425	247,510	105,238	-6,896	12,231	4,156,745
Percent	48.5%	1.6%	21.6%	0.3%	19.4%	6.0%	2.5%	-0.2%	0.3%	100.0%

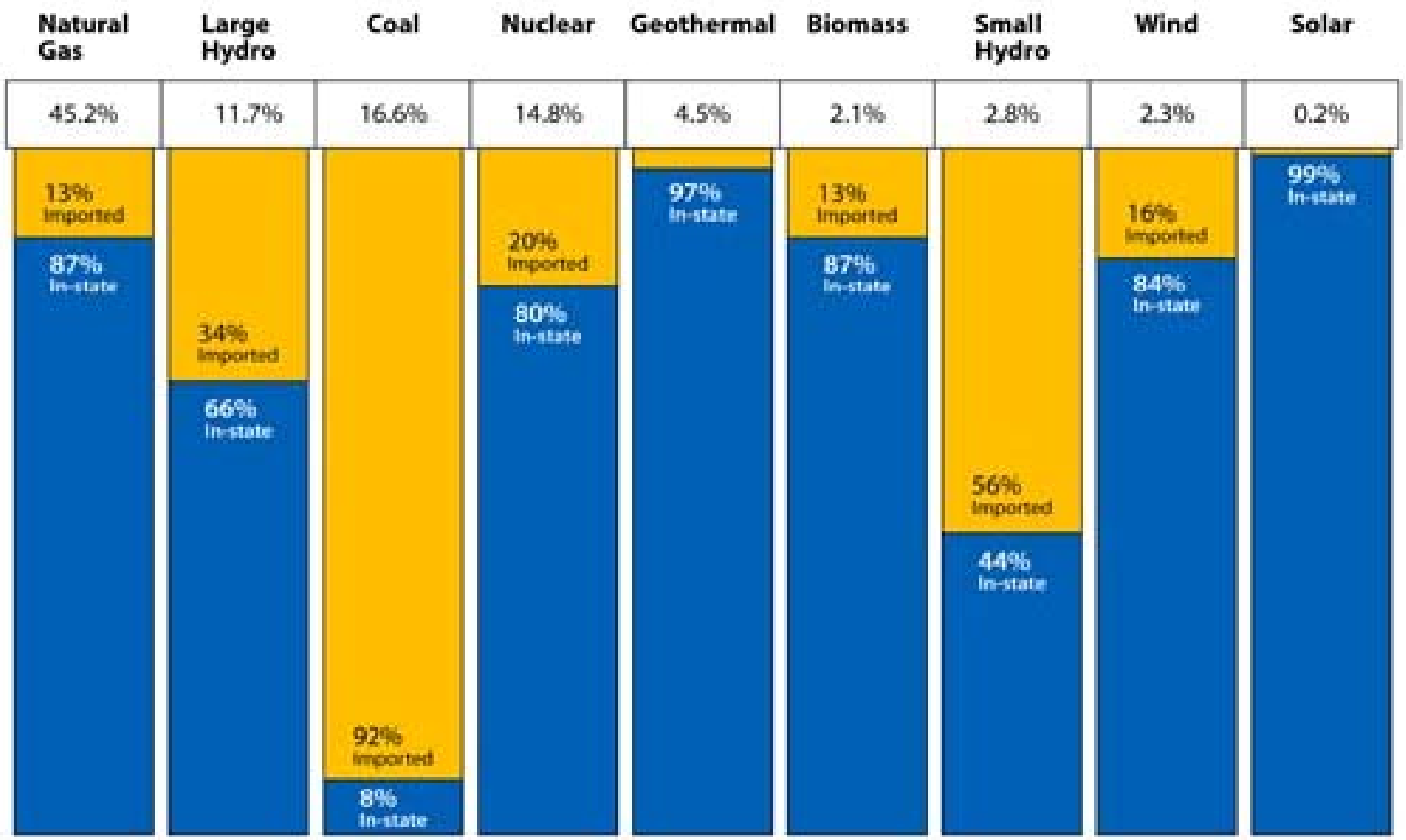
California Utilities are Forecast to be Exposed to Gas Costs for about 20% to 25% of their Power Production

Table 11: Estimated Maximum Exposure to Natural Gas Costs as a Percentage of Total Annual Revenue Requirements

Year	SCE	PG&E[12]	LADWP	SDG&E	SMUD
2007	30		15	30	35
2008	30		16	22	34
2009	28	27	16	21	31
2010	27	24	15	21	28
2011	24	23	16	20	26
2012	24	22	16	20	26
2013	25	22	17	19	26
2014	25	20	17	19	27
2015	26	20	17	18	28
2016	26	20	18	18	29
2017	27		18	18	27
2018	28		17	20	28

Source: California Energy Commission

California's Electricity Mix – 2007



Source: California Energy Commission, *Gross System Power Report 2007*

AB 32 fact Sheet

AB 32 Fact Sheet - California Global Warming Solutions Act of 2006

- Establishes first-in-the-world comprehensive program of regulatory and market mechanisms to achieve real, quantifiable, cost-effective reductions of greenhouse gases (GHG).
- Makes the Air Resources Board (ARB) responsible for monitoring and reducing GHG emissions.
- Authorizes the Governor to invoke a safety valve in the event of extraordinary circumstances, catastrophic events or the threat of significant economic harm, for up to 12 months at a time.

Requires ARB to:

- Establish a statewide GHG emissions cap for 2020, based on 1990 emissions by January 1, 2008.
- Adopt mandatory reporting rules for significant sources of greenhouse gases by January 1, 2008.
- Adopt a plan by January 1, 2009 indicating how emission reductions will be achieved from significant GHG sources via regulations, market mechanisms and other actions.
- Adopt regulations by January 1, 2011 to achieve the maximum technologically feasible and cost-effective reductions in GHGs, including provisions for using both market mechanisms and alternative compliance mechanisms.

Renewable Portfolio Standard Program

- In 2002, California established its Renewable Portfolio Standard Program, with the goal of increasing the percentage of renewable energy in the state's electricity mix to 20 percent by 2017.
- The ***2003 Integrated Energy Policy Report*** recommended accelerating that goal to 20 percent by 2010, and the
- The ***2004 Energy Report Update*** further recommended increasing the target to 33 percent by 2020.
- The state's **Energy Action Plan** supported this goal.

Conclusion and Questions…

- Natural Gas and renewables will play an increasingly significant role in power production in the medium and long term
- To meet GHG reduction goals natural gas is the main cost-effective fuel readily available to help meet the reduction targets
- Adequate supplies of natural gas are available to meet this increased clean fuel-based power generation demand
- New shale, tight sands and LNG-based gas supplies will fill the gap of declining conventional resources
- Over 100 years of natural gas resources are available to meet increased demand for natural gas in power production
- Thank you.