SONOMA COUNTY COMMUNITY CLIMATE ACTION PLAN

ENERGY SOLUTIONS

APPENDICES (I – XII)

May 2008

APPENDICES

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Appendix I. Portfolio Design Criteria and Assumptions

Design Criteria. The Community Choice electric supply portfolio is designed to meet several screening criteria:

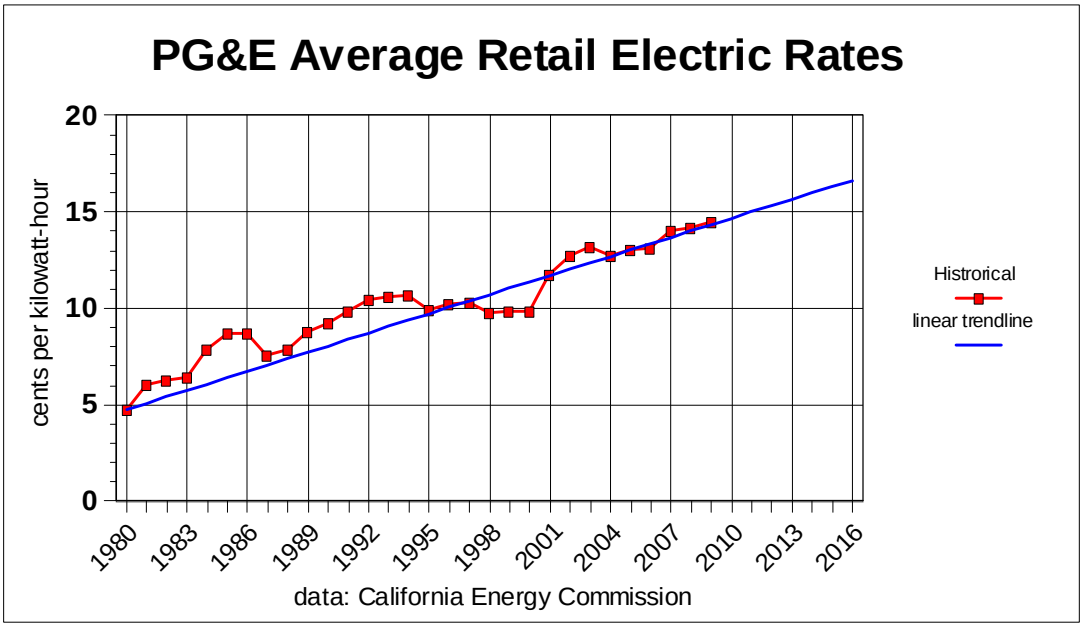
- Reduce greenhouse gases from the electric power sector relative to the expected emissions for Sonoma County if the county elected to remain with PG&E, and in an amount commensurate with Sonoma County's Climate Protection goals,
- Structure the supply portfolio to provide for a range of electrical load services for base load , load following and peak energy needs
- Demonstrate how a CCA clean energy electric supply can be reasonably competitive with PG&E's expected energy costs over the next decades
- Provide a double hedge against the potential for rising or falling natural gas prices
- Prioritize local energy sources first, followed by regional sources. Remote sources and dependence upon long distance transmission are to be minimized
- Favor building actual renewables rather than power contracts with private vendors, or purchasing of offsets, or buying renewable credits from remote facilities
- Accomplish all these goals without relying on nuclear, coal or petroleum as fuels, as well as by minimizing use of natural gas

General Assumptions. It is understood that all of the above are moving targets, and that this report is not intended to be an actual CCA Implementation Plan. Rather, the purpose here is to show "proof of concept," to demonstrate the relative scale of costs and infrastructure required to meet the stated criteria. Changes in actual demand, improved data, changes in relative cost and performance of electric generators, availability of resources, etc., would (and should) affect future decisions and well as timing and scale of deployment of energy supplies.

The following assumptions are made regarding this power supply:

Third Party Developer Average Cost Rate of Money	12%
CCA Bond Finance Interest Rate	5%
Natural Gas Carbon Dioxide Emission Rate	117 lbs/mmbtu
Cost of Carbon Emissions	$8 per ton
Electric Power Demand Growth Rate	1.5% per year
Inservice Timeframe	2012 to 2015

Historical data for PG&E's rates, as well as approved rate increases for the next two years, are shown in the following chart:



The trend of increasing rates has been stable for 30 years. It is noteworthy that the only time PG&E's rates fell below the trend line, due to a state imposed rate freeze between 1998 and 2000, resulted in bankruptcy after underlying energy costs outstripped revenues.

In general, the cost of wholesale energy supply is at least half of the retail price. Local Power projects that wholesale energy supply costs for PG&E in the 2015 timeframe will be, at a minimum, in the range of 8 to 9 cents per kilowatt-hour. This is the target range in which Local Power considers the proposed portfolio to be "competitive," and is similar to the cost assumptions about power supply in PG&E's 2006 Long Term Procurement Plan.

Earlier projections by PG&E and the California Energy Commission assumed that a rate reduction would result from expiration, between 2009 and 2012, of long term power purchase agreements made during the "Energy Crisis" of 2000 to 2001. Power contracts with natural gas generators were for about 7.2 cents per kilowatt-hour, and these were considered greatly overpriced at the time. In the intervening years, however, the price of natural gas has risen dramatically, and along with it the price of generating electricity from natural gas has also risen. This is because the majority of the cost of generating electricity from natural gas is the price of the fuel, particularly for 24/7 "base-load" power supplies.

Today, the market cost of generating base-load electricity from natural gas is very close to the price of the "Energy Crisis" contracts, and new contracts for future supplies are expected to be even more expensive. Thus, it is unlikely that the expiration of the contracts will lower PG&E electric rates. In fact, if historical trends continue, the opposite—increases in PG&E rates due to expiring contracts and construction of newer, more expensive power plants—is highly likely.

Of course, future trends may prove different than those assumed here. Such changes in infrastructure or fuel costs are, with virtual certainty, going to affect PG&E as well as any future Sonoma County CCA. Therefore, these changes are less likely to affect the general conclusions established in this model than might initially be assumed.

One of the key principles of the portfolio design is the "double hedge." This means that a significant amount of energy price protection is built into the energy supply portfolio by design:

1. If natural gas prices go up, then the relatively fixed price of renewable energy supplies that do not require fuel will "lock in" the price of that component of the portfolio. These fuel-free elements constitute about 3/4ths of the energy supply.

2. If natural gas prices go down, then there is about ¼ of the portfolio that relies on natural gas fuel that will respond to this downward price movement and track the decreasing cost of PG&E natural gas power generation prices. This supply is designed to be significantly lower cost than PG&E's average natural gas power generation supply. This is due to two factors a) it is publicly financed, and thus has a lower cost of money and, b) it is derived from cogeneration, also called combined heat and power, which is more frugal in fuel use than PG&E's average supply of electricity.

This natural gas cogeneration is included in the portfolio as more than just a financial hedge. It also supplies critically needed base-load power, and it does so in a way that reduces greenhouse gas emissions. Thus it achieves multiple goals, and is one of the most important parts of the portfolio. Cogeneration is estimated to have greater potential for development than any energy need the county would ever have. While the county's base-load need is estimated to be about 225 megawatts, the California Energy Commission's assessment is that there are thousands of megawatts of remaining potential to build new cogeneration in the state. Thus cogeneration could be a substitute for shortfall in obtaining other base load supplies.

Tables in these Appendices give cost models for the proposed CCA energy supply portfolio. These "levelized costs" consider the full lifecycle costs of a power plant, incorporating the cost of borrowing or profit margins. Though short term market prices may vary, long term costs of energy from these sources cannot be significantly less than the levelized costs without risking the financial viability of the generators.

Often, levelized costs overstate early costs and understate later costs for a particular source of energy. This is mainly because operation & maintenance costs increase over time, but in some cases electric generation is also highest in the early years.

The initial cost of a renewable facility is often given in (at least) two forms: 1) the "instant cost", which is how much it takes to buy all the components of a power plant, and 2) the installed cost, which also includes the amount of money involved in construction. The figures used in this report are meant to reflect the full amount of money required to get the plant up and running. In the real world, this depends on a number of factors, and there is some inevitable degree of variability.

Appendix II. Natural Gas Price Projection

Currently, about half of PG&E's electricity comes from generators that use natural gas. The next most significant source of power is nuclear, which supplies 24% of their energy. Thus, the price of natural gas is significant in terms of it being the largest source of electric generation, as well as in having a determining force for other competing electricity sources.

In California regulatory process, the cost of natural gas electric generation is calculated based upon the price of natural gas, as well as the cost and efficiency of power plants. This cost of electric generation is called the "Market Price Referent," and it is used as the basis for determining the competitiveness of various sources of electricity, such as renewable energy, and eligibility for subsidies called "Supplemental Energy Payments."

The price of natural gas has affected other sources of power as well. An example is hydroelectricity, which provides about 15% of PG&E's electricity supply. New contracts tend to be priced in terms of natural gas rather than the very low cost of the hydroelectric energy itself. For this reason, when the 50 year old contracts expire the new contracts have been priced *six times higher*.

Similarly, the historical cost of electricity from Diablo Canyon nuclear plant was over 11 cents per kilowatt-hour. During the 1990s deregulation this was considered not to be competitive with other sources of power. Thus, the "excess cost" was charged to a separate account, and the price attributed to the nuclear power plant itself was artificially constructed to match the expected future price of electricity from natural gas power plants. Thus, in California, the price of natural gas has actually helped to determine the cost of renewables, hydroelectricity and nuclear power.

Even coal has not been left out. A new law forbids coal plants supplying electricity to the California grid from emitting more carbon dioxide than natural gas plants. This makes natural gas into the environmental standard on top of its role as market standard.

The following table shows the price projections for natural gas developed by the US Department of Energy. Many people consider these projections to be extremely conservative, especially since they assume the price of natural gas to remain essentially the same over three decades when measured in "real dollars" adjusted for inflation. This is not congruent with the historical price trends of natural gas over the last half century, during which nominal prices have on average doubled in each decade— while the general price index doubles only after 30 years in the DOE model. If in the future natural gas follows historical trends, then we would expect it to cost closer to $24 per million btu in 2030 rather than the $11.64 projected. Higher prices of natural gas would favor the CCA's clean energy portfolio.

In calculating power costs for electric generation facilities built between 2012 and 2015, we have used the nominal dollar baseline of $7.50 per mmbtu, although the expected future cost of natural gas over the life of a renewable asset is much higher than that. This is important to keep in mind when evaluating the decision to commit to renewables.

Natural Gas Price Projections to 2030

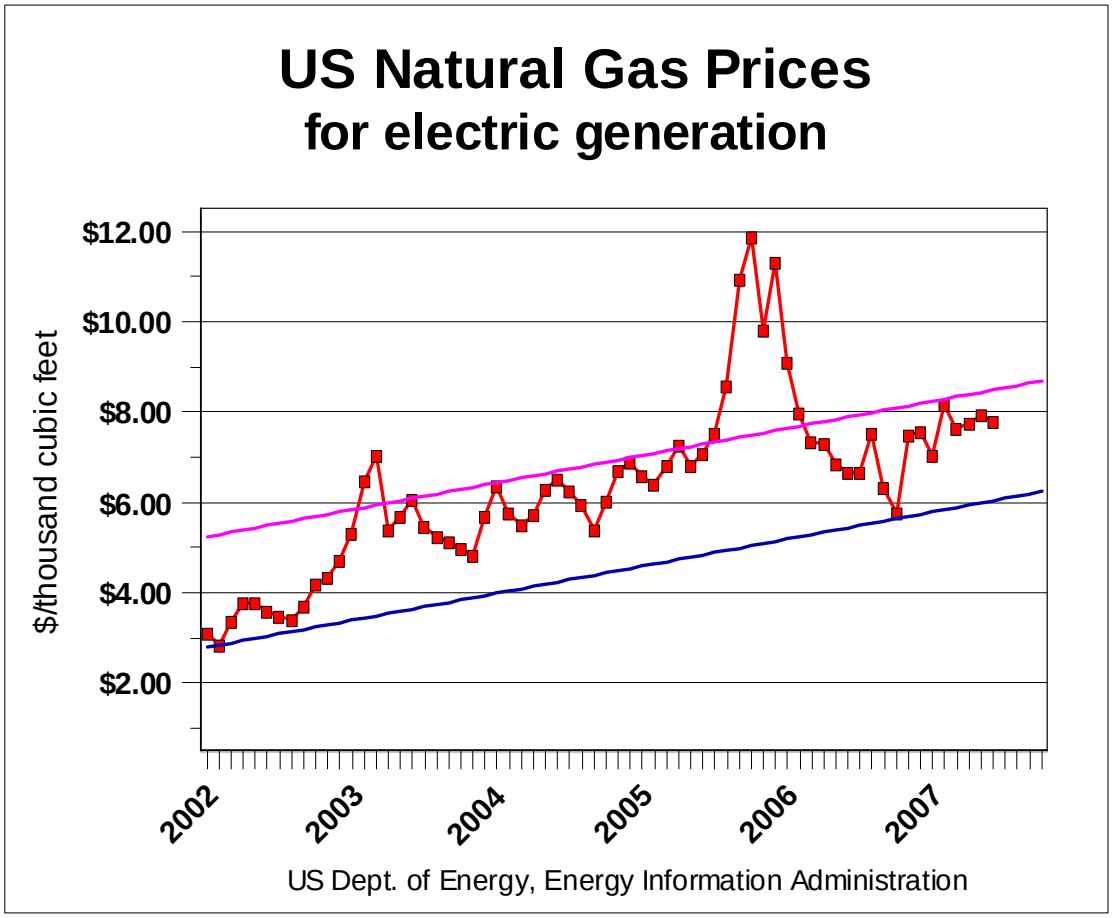
In dollars per million btu
Data: US Department of Energy

	2004	2005	2006	2007	2008	2009	2010	decade avg.
NG for electric power; 2005 dollars	$6.27	$8.42	$7.17	$7.32	$7.27	$6.72	$6.40	
Nominal dollars	$6.11	$8.42	$7.31	$7.61	$7.73	$7.30	$7.11	$7.37
GDP Chain-Type Price Index (2000=1.000)	1.091	1.119	1.141	1.164	1.189	1.216	1.242	
GDP Chain-Type Price Index (2004=1.000)	0.975	1.000	1.020	1.040	1.063	1.087	1.110	

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	decade avg.
NG for electric power; 2005 dollars	$6.00	$5.86	$5.66	$5.70	$5.66	$5.76	$5.96	$5.89	$5.84	$5.93	
Nominal dollars	$6.82	$6.84	$6.77	$6.98	$7.10	$7.39	$7.83	$7.94	$8.07	$8.40	$7.41
GDP Chain-Type Price Index (2000=1.000)	1.273	1.306	1.338	1.370	1.404	1.436	1.471	1.508	1.546	1.584	
GDP Chain-Type Price Index (2004=1.000)	1.137	1.167	1.196	1.225	1.255	1.283	1.314	1.348	1.382	1.416	

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	decade avg.
NG for electric power; 2005 dollars	$5.89	$6.01	$6.12	$6.23	$6.22	$6.24	$6.33	$6.43	$6.50	$6.51	
Nominal dollars	$8.55	$8.93	$9.32	$9.70	$9.91	$10.17	$10.55	$10.97	$11.34	$11.62	$10.11
GDP Chain-Type Price Index (2000=1.000)	1.624	1.663	1.703	1.742	1.783	1.824	1.866	1.909	1.953	1.998	
GDP Chain-Type Price Index (2004=1.000)	1.451	1.487	1.522	1.557	1.593	1.630	1.667	1.706	1.745	1.786	

Report #: DOE/EIA-0383(2007)
Release date full report: February 2007
Next release date full report: February 2008
Table 13. Natural Gas Supply, Disposition, and Prices
Trillion cubic feet, unless otherwise noted



The chart shows the upper and lower 6 year trend lines for the price of natural gas for electric generation. The "breakouts" from this trading range may indicate disruptions in natural gas supply, such as the peak in the latter half of 2005 after hurricane Katrina knocked out much of the infrastructure in Louisiana.

The following tables analyze each of the energy supply options, and then look at the combined portfolio. The Sonoma CCA portfolio will then be compared to projections for the cost and carbon levels that would result if Sonoma County elects to remain with PG&E.

Appendix III. PG&E Natural Gas Baseload

Since the beginning of the decade, 16,000 megawatts of new natural gas electric generation has been built in California. An additional 5000 megawatts, or possibly more, will be built over the next decade. Combined, this will represent about 2/3rds of the state's natural gas power capacity. The cost of these power plants is significantly higher than what has been thought in the past, and the performance in terms of fuel efficiency and capacity utilization considerably worse. Fuel prices have also skyrocketed. While just a few years ago electricity from an older fleet of natural gas power plants cost in the range of 3 cents per kilowatt-hour, long term contracts signed to today are expected to be over 9 cents per kilowatt-hour. The following chart shows the expected prices for base-load natural gas electric generation established by the California Public Utilities Commission as the Market Price Referent. A contract cost for a comparable energy product at or below that level is deemed reasonable.

Adopted 2007 Market Price Referents (Nominal - dollars/kWh)			
Resource Type	**10-Year**	**15-Year**	**20-Year**
2008 Baseload MPR	0.09271	0.09383	0.09572
2009 Baseload MPR	0.09302	0.09475	0.09696
2010 Baseload MPR	0.09357	0.09591	0.09840
2011 Baseload MPR	0.09412	0.09696	0.09969
2012 Baseload MPR	0.09518	0.09844	0.10139
2013 Baseload MPR	0.09605	0.09965	0.10275
2014 Baseload MPR	0.09722	0.10107	0.10430
2015 Baseload MPR	0.09872	0.10274	0.10606
2016 Baseload MPR	0.10053	0.10466	0.10804
2017 Baseload MPR	0.10269	0.10685	0.11143
2018 Baseload MPR	0.10478	0.11016	0.11489
2019 Baseload MPR	0.10818	0.11370	0.11720
2020 Baseload MPR	0.11172	0.11603	0.11954

This MPR table was adopted in CPUC Resolution E-4118 effective October 4, 2007.

Local Power uses assumptions that are more conservative than the Market Price Referent given in the table above in order to establish that the proposed CCA energy portfolio cost comparison is robust under a range of market conditions, including where natural gas prices are significantly lower than what is expected by California regulators for 2015 and beyond.

Natural Gas Combined Cycle		
PG&E Baseload		
Natural Gas to Generate 1 KWh		
natural gas	$7.50	per mmbtu
heat rate	6510	btu/kwh
efficiency	52.5%	
net fuel-cost	**$0.049**	per kwh
Cost of Generation		
cost of plant	$850	per kw
lifecycle	30	years
capacity factor	60%	
interest rate + ROI	12%	
total capital cost	$0.025	per kwh
o&m	$0.007	per kwh
taxes	$0.007	per kwh
Total Gen Costs	**$0.088**	**per kwh**
Carbon Cost		
carbon assessment	$8	per ton
emissions rate	0.762	lbs/kwh
carbon cost rate	$0.003	per kwh
Electric cost with carbon	**$0.091**	**per kwh**

Appendix IV. Cogeneration

A lower cost of energy and lower carbon emission rate can be achieved by replacing conventional base load natural gas power with cogeneration. While some of the power for PG&E comes from cogeneration plants, most of it does not. Thus, there is considerable room for improvement by a CCA. The following table shows cost and performance for a CCA owned and bond financed facility. The heat from this plant would be sold to a collocated facility.

CCA Financed Cogeneration/CHP		
Combined Cycle Natural Gas		
Natural Gas to Generate 1 KWh		
nautral gas	$7.50	per mmbtu
heat rate	6300	btu/kwh
efficiency	54.3%	
net fuel-cost	**$0.047**	per kwh
Thermal Energy		
Residual Energy	2881	btu/kwh
Recovery Rate	60%	
Gross Efficiency	75%	
electric credit payment	$0.010	per kwh
Net Electric fuel cost rate	**$0.037**	**per kwh**
Cost of Generation		
Cost of Equipment	$1,500	per kw
lifecycle	30	years
capacity factor	85%	
Bond Interest	5%	
total capital cost	$0.017	per kwh
o&m	$0.014	per kwh
Total Gen Costs	**$0.067**	**per kwh**
Carbon Cost		
Carbon Assessment	$8	per ton
emissions rate	0.737	lbs/kwh
carbon cost rate	$0.003	per kwh
Electric cost with carbon	**$0.070**	**per kwh**

Appendix V. Geothermal

The following table illustrates the significant savings from low cost municipal bond financing of a major renewable energy source. Even after the production tax credit of 2 cents per kilowatt-hour, the CCA geothermal energy is still 1.6 cents per kilowatt-hour cheaper. In addition, the tax credit expires after the first 10 years, after which time electricity from the 3rd party owned geothermal plant will be 50% more expensive than from the CCA owned plant. This geothermal facility will supply about 1/3 of the CCA's electricity at a much lower cost than an equivalent natural gas plant.

Geothermal Power Plant

'Binary, Closed Loop

	3rd Party Ownership & Finance		CCA Ownership & Finance	
Gross Capacity	125	Mw	125	Mw
Capacity Factor	95%		95%	
Book Life	20	years	20	years
Initial Generation	1,040,250	Mwh	1,040,250	Mwh
Lifecycle Generation	14,511,424	Mwh	14,511,424	Mwh
Cost rate	$3,000	per kw	$3,000	per kw
Installed Cost	$375,000,000		$375,000,000	
Interest Rate + ROI	12%		5%	
Cost of capital	$900,000,000		$375,000,000	
Fixed o&m	$175,000,000		$175,000,000	
Variable o&m	$65,301,409		$65,301,409	
O&M	$240,301,409		$240,301,409	
total cost	$1,515,301,409		$990,301,409	
O&M rate	$0.017	per kwh	$0.017	per kwh
Gross Generation rate	$0.1044	per kwh	$0.0682	per kwh
Production Tax Credit	($0.020)	per kwh	$-0.000	per kwh
Net After PTC	$0.0844	per kwh	$0.0682	per kwh
Levelized COE	**$0.0944**	per kwh	**$0.0682**	per kwh

Appendix VI. Biofuel Cogeneration

The California Energy Commission estimates that electric generation from biofuel in a "fluidized bed" system would cost 12.5 cents/kilowatt-hour from a 3rd party investor/owner. Public financing by a CCA reduces the cost modestly; however fuel is a very significant factor. Recycling the heat in a cogeneration system improves the economics dramatically. Local Power assumes that the cost of biofuel plants will decrease modestly over the next decade, by about 10%.

Biofuel Fluidized Bed		
CCA Ownership & Finance		
Biofuel to Generate 1 KWh		
Cost/mmbtu	$3.00	
conversion to kwh	3419	btu/kwh
fuel-cost/kwh	$0.010	
electric efficiency	15000	btu/kwh
	22.8%	
electricity fuel-cost/kwh	**$0.045**	
Energy Sale		
Residual Energy	11581	btu/kwh
Recovery Rate	72%	
Gross Efficiency	51%	
Net Electric fuel cost rate	**$0.020**	**per kwh**
Cost of Gen Facility		
Biofuel Plant	$3,000	per kw
lifecycle	25	years
capacity factor	85%	
interest rate + ROI	5%	
cost of money	$0.020	per kwh
total capital cost	$0.036	per kwh
o&m	$0.022	per kwh
Total Gen Costs	**$0.079**	**per kwh**

Appendix VII. Solar Thermal

The following table compares a solar thermal power plant supplying electricity to PG&E vs. a CCA-owned facility. The PG&E plant, actually owned by a 3rd party selling power to PG&E, has the advantage of larger scale and access to 20% more sunlight because it is located in the desert. This plant takes a 30% tax credit, because it is financed by a tax-paying entity.

In spite of these advantages, the cost to generate power is less expensive for the CCA.

Concentrating Solar Thermal: Parabolic Trough

	Private Ownership		CCA Ownership	
Capital Cost:				
Installed Cost Rate	$3,000	per kilowatt	$3,250	per kilowatt
Tax Credit	30%		0%	
Net Cost Rate	$2,100	per kilowatt	$3,250	per kilowatt
Capacity	550,000	kilowatts	60,000	kilowatts
Total Cost	$1,155,000,000		$195,000,000	
Finance:				
Cost of Capital	12%		5%	
Term	30	years	30	years
Financing Cost	$4,158,000,000		$292,500,000	
Operation and Maintenance:				
Lifecycle O&M	$599,306,224		$61,632,384	
O&M rate	$0.017	per kwh	$0.016	per kwh
Solar Electric Generation:				
Capacity Factor	24%		20%	
Lifecycle Cost	$5,912,306,224		$549,132,384	
Lifecycle Output	34,342,704,000	kwh	3,122,064,000	kwh
Cost of Solar Electricity	$0.172	per kwh	$0.176	per kwh
Natural Gas Electric Generation:				
Percent from natural gas gen.	0%		17%	
Fuel Cost	$7.50	per mmbtu	$7.50	per mmbtu
Lifecycle electricity output	0	kilowatt-hours	630,720,000	kilowatt-hours
Lifecycle cost of fuel	$0		$63,860,400	
Combined Cost of Solar/Natural Gas Generation				
Generation	34,342,704,000	kwh	3,752,784,000	kwh
Plant Capacity Factor	23.8%		23.8%	
Total Cost	$5,912,306,224		$612,992,784	
Cost of electricity	**$0.172**		**$0.163**	

The CCA plant is proposed for the Central Valley rather than the southern desert. Thus the electricity will be less reliant on long distance transmission. This will result in less transmission losses or congestion, particularly in the summer when the power is desperately needed. Siting problems can also be reduced, since there will be more options.

The PG&E plant saves expense by eliminating backup fuel supply from natural gas or thermal storage, both technologies that are now available. However, this reduces the reliability of the PG&E plant, and actually requires a second power plant for backup. The CCA plant has onsite natural gas backup, thus eliminating the need to build another power plant.

Thus, in multiple ways the CCA plant has competitive advantages over the PG&E plant, advantages that PG&E hides by externalizing the cost onto transmission and other generation resources. Yet, the CCA will benefit through lower costs even if this is not reflected in the economics of the solar thermal plant directly.

The 2006 installed cost of a 64 megawatt solar thermal trough collector power plant is estimated by the California Energy Commission at $4250 per kilowatt. Local Power assumes a 25% cost reduction by 2015, which is more modest than industry and government projections.

Appendix VIII. Pumped Storage

Pumped Storage		
CCA Ownership & Finance		
Initial Cost Rate	$1,500	per kilowatt
Capacity	90	megawatts
Initial Cost	$135,000,000	
Capacity Factor	25%	
Hours per day @ full power	6.0	
Annual generation rate	2190	kwh/kw
Lifecycle	30	years
Lifecycle Generation	5,913,000,000	kwh
Cost of Capital	5%	
Term	30	years
Interest	$202,500,000	
Lifecycle capital cost	$337,500,000	
o&m rate	$0.010	per kwh
Lifecycle o&m	$59,130,000	
Lifecycle All Costs	$396,630,000	
Cost of Electricity		
Pumped Storage	$0.067	per kwh
Input Power	$0.068	per kwh
Efficiency of Storage	75%	
Net Input Cost	$0.091	per kwh
Output Cost of Peak Energy	**$0.158**	**per kwh**
Net Cost of Pumped Storage	$0.090	per kwh

Appendix IX. Wind

Public finance reduces lifecycle costs of a 150 megawatt wind farm by $600 million. Half of the electric output is used to recharge the pumped storage facility at night. The installed cost reflects recent dramatic increases in the price of wind farms, though there is expectation that this trend will reverse in the near future since it far in excess of the increase in material costs.

Wind Power Electric Generation

	3rd Party Ownership & Finance		CCA Ownership & Finance	
Capital Cost:				
Installed Cost Rate	$1,900	per kilowatt	$1,900	per kilowatt
Capacity	150,000	kilowatts	150,000	kilowatts
Net Cost	$285,000,000		$285,000,000	
Utility Finance:				
Avg. Cost of Capital	12%		5.00%	
Term	30	years	30	years
Financing Cost	$1,026,000,000		$427,500,000	
Operation and Maintenance:				
Lifecycle O&M	$142,200,000		$142,200,000	
O&M rate	$0.011		$0.011	
Electric Generation				
Capacity Factor	32%		32%	
Lifecycle Output	12,601,785,600	kwh	12,601,785,600	kwh
Cost of Electricity	**$0.115**	per kwh	**$0.068**	per kwh
Production Tax Credit	$0.020	per kwh	$0.000	per kwh
Net first 10 year cost	$0.095	per kwh	$0.068	per kwh

The levelized cost does not precisely reflect the economics of a wind farm. In early years the operation and maintenance costs are lowest, and they increase over time significantly.

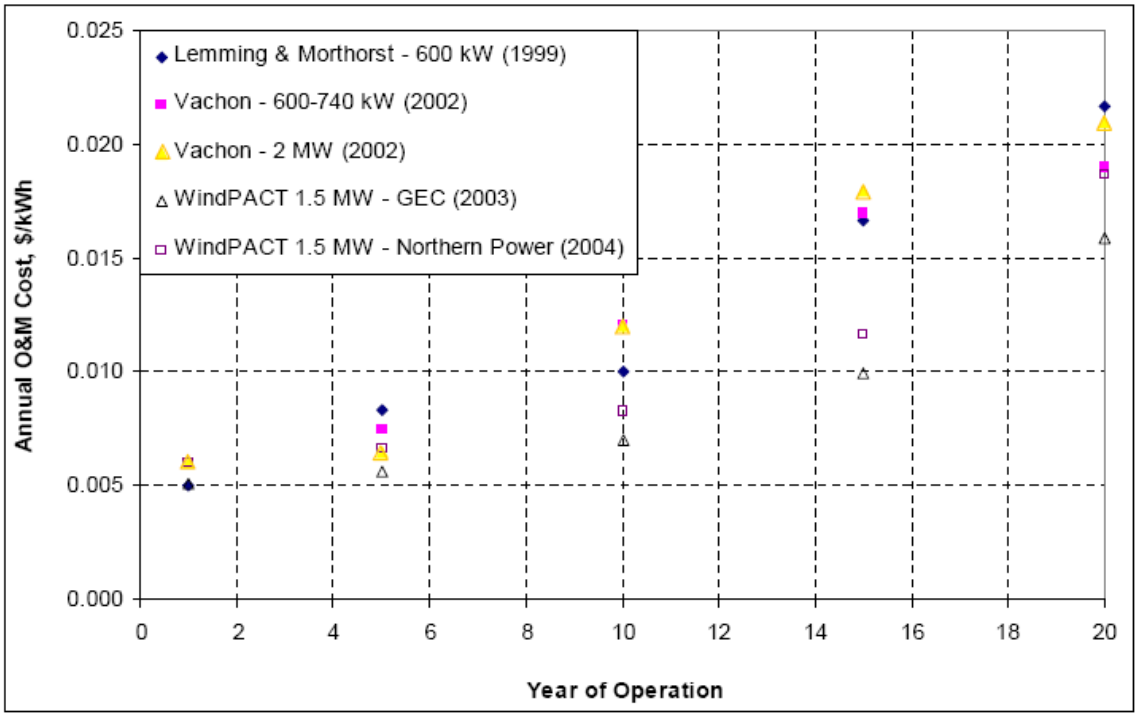


Figure 1. Estimated cost per unit energy production for O&M

Source: SANDIA REPORT, SAND2006-1100, Unlimited Release, Printed March 2006, Wind Turbine Reliability: Understanding and Minimizing Wind Turbine Operation and Maintenance Costs, Christopher A. Walford, Global Energy Concepts, LLC.

A "levelized cost" averages the operation and maintenance cost over the full life of the wind farm, but the reality— as shown in the chart— is that this cost escalates over time. The O&M cost for wind power in this report is 1 cent per kilowatt hour— in the chart this is the average of samples in the 10th year of operation of the wind farm. Newer turbines, the WindPACT models from 2003 and 2004, have significantly lower costs, and don't reach the 1 cent per kilowatt-hour O&M rate until 14 to 15 years.

The effect of this rising O&M cost is that wind energy would ordinarily cost about ½ cent per kilowatt-hour less than the levelized cost in the first years of the wind turbines, and rise to higher than the levelized cost at 15 to 20 years and beyond. This is a fortuitous characteristic, because competing forms of energy also tend to rise in price over time.

Appendix X. Battery Storage

Battery Storage		
CCA Ownership & Finance		
Installed Cost Rate	$2,500	per kilowatt
Capacity	18	megawatts
Installed Cost	$45,000,000	
Capacity Factor	25%	
Hours per day @ full power	6.0	
Annual generation rate	2190	kwh/kw
Lifecycle	20	years
Lifecycle Generation	788,400,000	lwh
Cost of Capital	5%	
Term	20	years
Interest	$45,000,000	
Lifecycle capital cost	$90,000,000	
o&m rate	$0.010	per kwh
Lifecycle o&m	$7,884,000	
Lifecycle All Costs	$97,884,000	
Cost of Electricity		
Battery	$0.124	per kwh
Input Power	$0.068	per kwh
Efficiency of Storage	80%	
Net Input Cost	$0.085	per kwh
Output Cost of Peak Energy	**$0.209**	**per kwh**
Net Cost of Storage	$0.141	per kwh

Appendix XI. Sonoma CCA Portfolio

The aggressive CCA energy efficiency program is assumed to essentially cancel out increases in demand, resulting in significantly less power procurement needs for the county than if PG&E were to continue to provide service. The model assumptions lead to a projection of a Sonoma CCA cost of energy at 8.5 cents per kilowatt-hour. This model uses levelized costs for the renewable facilities, which may tend to overstate early costs. Using similar methodology and input assumptions about natural gas prices and cost of new energy facilities, PG&E's cost of energy would be about 8.8 cents per kilowatt-hour.

CCA Portfolio for Sonoma County 2015

CCA Portfolio 2015	percent	of	generates	cap factor	capacity	ELCC	cost/kwh	total annual cost	carbon rate	total carbon dioxide
		gwh	gwh	est. %	mw	%			lbs per kwh	tons
Nuclear	0%	3,088	0	90%	0	100%	$0.040	$0	0.00	0
Hydro	16%	3,088	494	50%	113	100%	$0.050	$24,704,000	0.00	0
Natural Gas (Cogen)	14%	3,088	432	85%	58	100%	$0.070	$30,398,826	0.61	131,858
Natural Gas Mid Load	3%	3,088	93	12%	88	100%	$0.178	$16,533,434	1.10	50,952
Natural Gas Peaking	1%	3,088	31	3.5%	101	100%	$0.342	$10,564,508	1.20	18,528
Coal	0%	3,088	0	70%	0	100%	$0.035	$0		0
CCA Renewables:										
Geothermal	32%	3,088	988	90%	125	100%	$0.068	$67,434,886	0.00	0
Wind	7%	3,088	216	35%	71	25%	$0.068	$14,660,776	0.00	0
Biofuel Cogen	14%	3,088	432	85%	58	100%	$0.079	$34,032,271	0.00	0
Pumped Storage	7%	3,088	216	27%	91	100%	$0.158	$34,098,006	0.20	21,616
Photovoltaic	0.7%	3,088	22	15%	16	40%	$0.100	$2,161,600	0.00	0
Battery	1.3%	3,088	40	25%	18	100%	$0.209	$8,396,328	0.20	4,014
Solarthermal	4%	3,088	124	24%	59	100%	$0.163	$20,176,186	0.35	21,616
Total Supply	100%		3,088				**$0.085**	$263,160,821	0.16	248,584
RPS	66.0%									

Appendix XII. Carbon Assessment

The following table shows PG&E's projected carbon emissions for 2007 and 2016, under their different planning scenarios. The bottom section shows the percent change over the 10 year period—the red boxes show increase in carbon emissions, while the blue show decrease. The column "Scenario 1" assumes that 10% of PG&E's customers leave to do CCA; this of course greatly reduces PG&E's carbon emissions. In fact, most of the other cases show either increase or very modest decrease in CO2 from PG&E's electric generation sources.

PG&E Greenhouse Gas Emissions 2007 and 2016

millions tons of CO2 per year

2007 Baseline GHG Emissions

line no.		Scenario			
		1	2	3	4
1	Baseline Year 2007	20.1	19.8	19.8	19.8

Candidate Plans GHG Metric

line no.	plan	Scenario 1	2	3	4
		CCA			
1	Basic Procurement	17.0	20.9	19.4	20.2
2	Increased Reliability	17.0	20.9	19.4	20.2
3	Increased Reliability and Preferred Resources	15.4	17.9	17.7	19.1

Change from PG&E's Baseline Year (2007)

line no.	plan	Scenario 1	2	3	4
		CCA			
1	Basic Procurement	-15.4%	5.6%	-2.0%	2.0%
2	Increased Reliability	-15.4%	5.6%	-2.0%	2.0%
3	Increased Reliability and Preferred Resources	-23.4%	-9.6%	-10.6%	-3.5%

For Sonoma County, the CCA emissions for 2015 are shown in the previous appendix as 248,584 tons. Using similar input assumptions for natural gas power plant emission rates, this compares with 664,784 tons worth of Carbon Dioxide emissions for Sonoma County's electricity consumption if they continue to get their electricity from PG&E. Carbon emissions from the CCA portfolio would be 63% lower than the PG&E value for 2015. Local Power's model estimates that the 2007 value is 783,000 tons. Using the current 2007 year baseline, the reduction in CO2 for the electric sector would be nearly 70%.

The emission figures for both the PG&E and CCA portfolios are lower than what would be projected using the ICLEI emission rate for PG&E of 0.73 pounds per kilowatt-hour. The future carbon emission rates used in Local Power's model assume that there will be continued improvement in power plant efficiency over the next decade, and that PG&E will meet its 20% renewable target. The projected emission rate for PG&E in 2015 is 0.37 lbs per kilowatt-hour, versus 0.52 pounds per kilowatt-hour in 2007. PG&E's own projection for 2016 is that its emission rate will be between 0.31 and 0.41 lbs per kilowatt-hour, so our estimate falls within this range.