CITY OF POWAY
ENERGY MANAGEMENT PLAN

CONSULTANT REPORT

Prepared For:

California Energy Commission

Prepared By:

The California Center
for Sustainable Energy
for SANDAG and
San Diego Gas & Electric

SANDAG

Center for Sustainable Energy CALIFORNIA

SDGE
A Sempra Energy utility

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Prepared For:

California Energy Commission

Larry Rillera
Contract Manager

John Sugar
Manager
SPECIAL PROJECTS OFFICE

Mike Smith
Deputy Director
FUELS AND TRANSPORTATION DIVISION

Melissa Jones
Executive Director

CITY OF POWAY ENERGY MANAGEMENT PLAN (PLAN)

PREPARED BY:

CALIFORNIA CENTER FOR SUSTAINABLE ENERGY (CCSE)

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This Plan is part of San Diego Association of Governments (SANDAG) Sustainable Region Program (SRP), a joint effort with CCSE, San Diego Gas & Electric (SDG&E) and the California Energy Commission to work with cities to develop a framework for local governments to identify municipal energy-saving measures and develop energy savings programs.

Center for Sustainable Energy CALIFORNIA

8690 Balboa Avenue, Suite 100
San Diego, CA 92123
Telephone: 858.244.1177
Fax: 858.244.1178
www.energycenter.org

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At the time of this printing, CCSE is working with the City of Poway on re-calculating larger rebates available to the city, that were not available at the time the EMP was developed. This change is due to the California Public Utilities Commission extending the projects deadline under CCSE's Tax Exempt Customer (TEC) program in the SDG&E service territory until the approval of the 2009-2011 CPUC energy efficiency programs, which is expected by December 2009.

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Robin Miller-Management Analyst
Maria Weston-Finance Department Representative
Jeff Beers-Engineering Department
John Walters-Engineering Department
Belinda Romero-Planning Department Representative

SDG&E
Steve Campbell-Account Executive
Risa Baron-Energy Programs Manager

SANDAG
Susan Freedman-Senior Regional Energy Planner

California Energy Commission
Larry Rillera

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I. INTRODUCTION

APPENDIX D: LINK TO TOOLKIT AND ACTION PLAN

Energy use is a major operating cost for government agencies that can be mitigated through LG planning and the creation of standard practices. The City of Poway can achieve lower energy costs without adversely affecting their staff or their ability to serve their constituents by addressing the following policy issues and energy reduction recommendations introduced in this document.

Section II of this document includes results of energy assessments conducted at nine Poway facilities in May, 2008. CCSE conducted audits at facilities to quantify opportunities and prioritize actions to reduce the kilowatt hour (kWh), kilowatt (kW) and thermal units used, and to reduce greenhouse gas (GHG) emissions. A description of each facility is followed by a summary of several recommended energy conservation opportunities (ECOs) for the site. The ECO recommendation contains a brief overview of the technology and its attributes as well as a detailed economic analysis which identifies applicable monetary incentives. ECOs can assist Poway to maximize energy efficiency, demand response and renewable energy options.

Section III of the document provides recommendations for reaching the public through education and outreach methods.

Section IV contains a compilation of relevant California energy and sustainability laws. Each description includes potential implementation ramifications for Poway. It also lists energy and sustainability programs currently available in the SDG&E service territory and finally, climate change and energy efficiency and conservation links.

The Plan was a joint effort with CCSE and SANDAG to work with Poway to identify opportunities for LGs to integrate energy saving measures and GHG reduction measures in planning efforts. It also reflects the responsibilities of all cities within California in the wake of landmark legislation reflecting the government's commitment to making energy efficiency and renewable energy measures "business-as-usual."

Diagram 1: Poway Annual Electric Energy Intensity

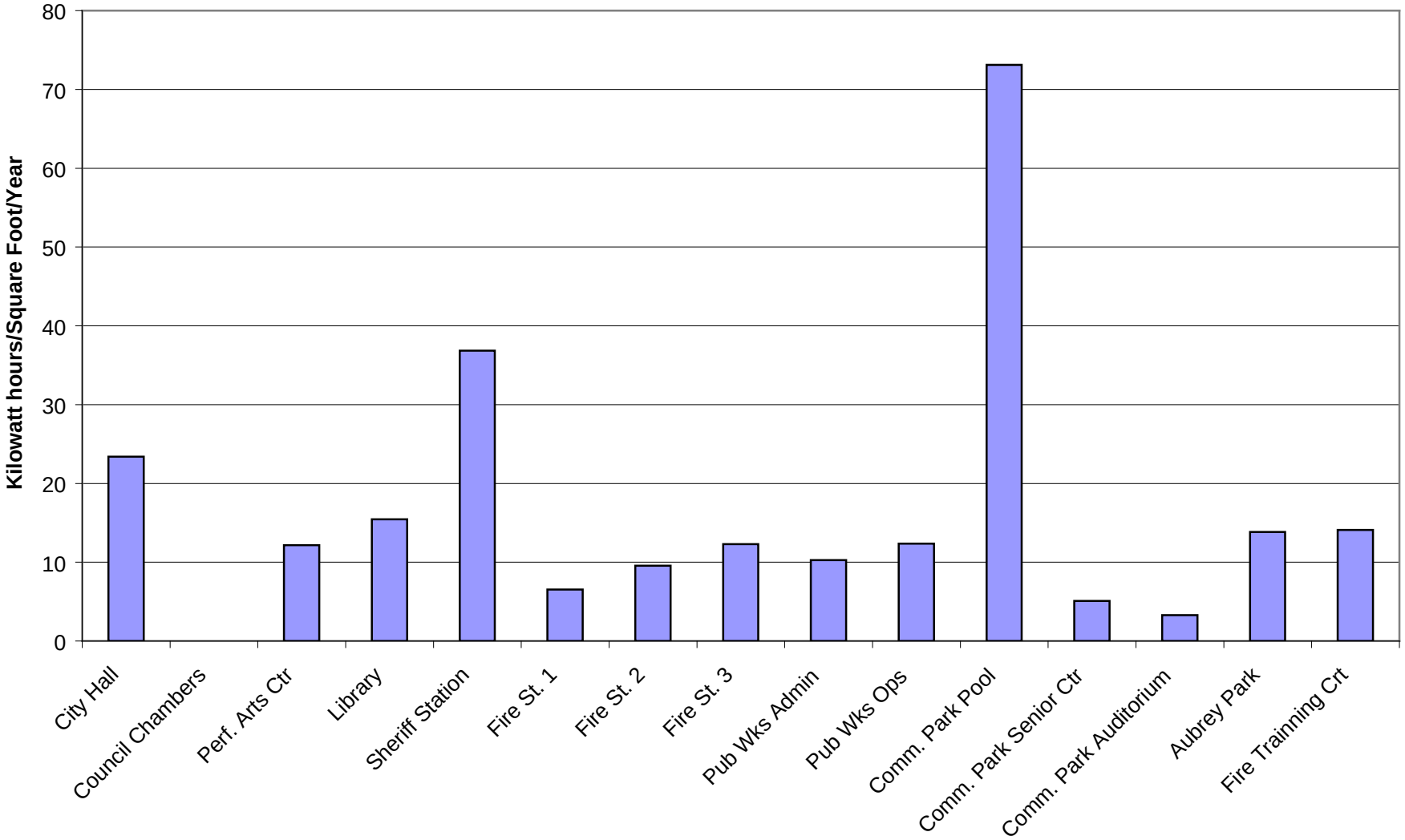


Diagram 2: Poway Annual Demand Intensity

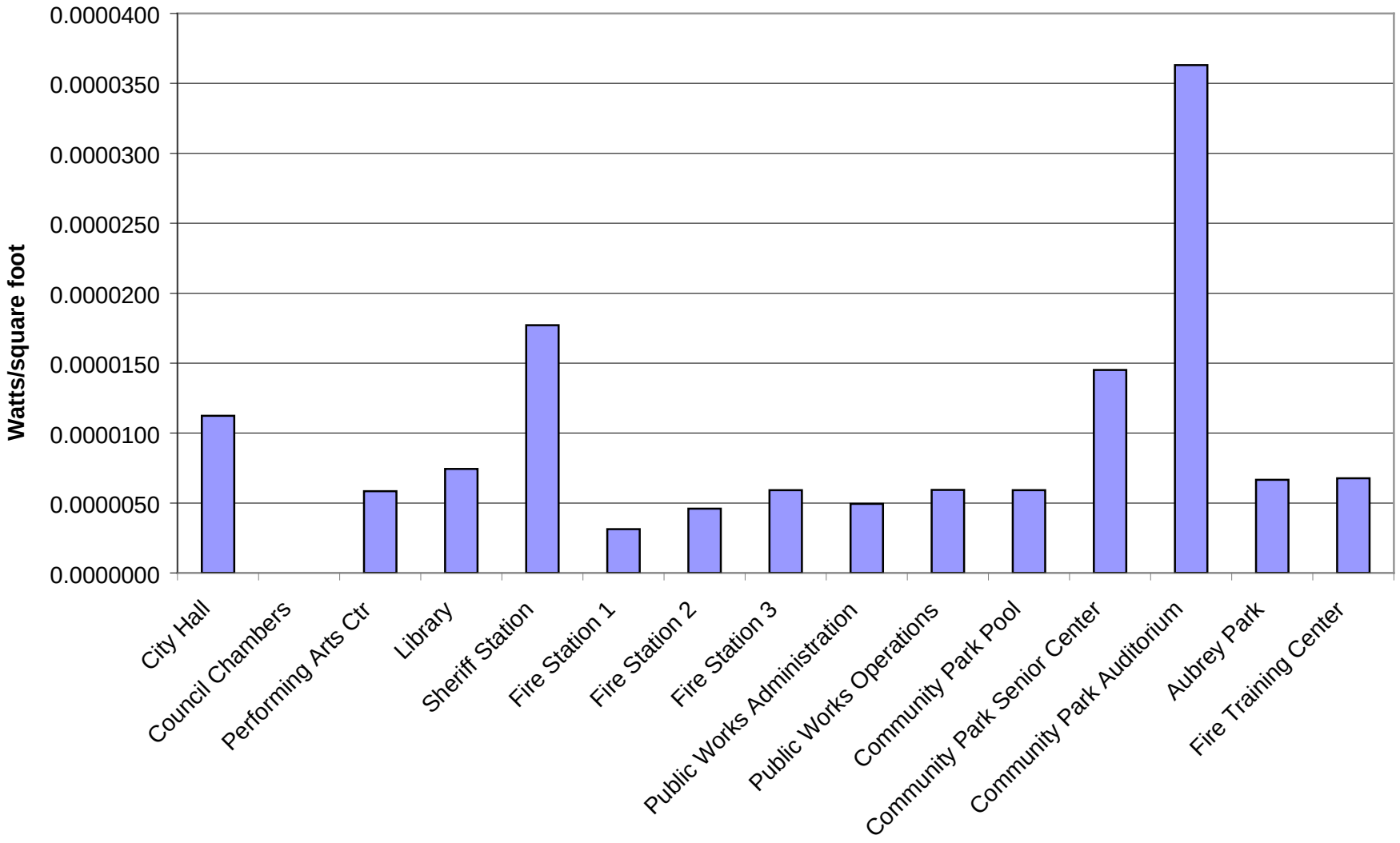
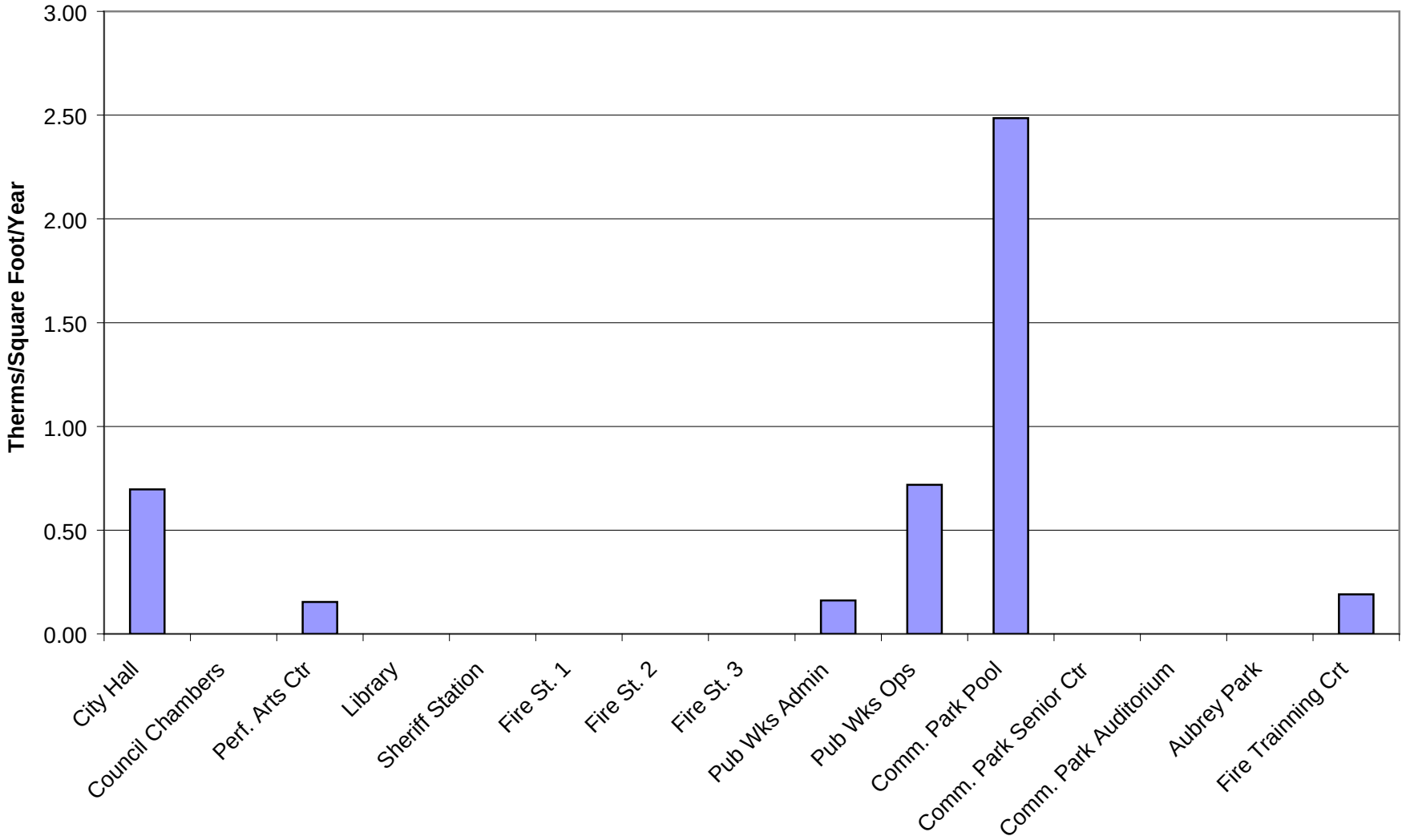


Diagram 3: Poway Annual Thermal Energy Intensity



II. ENERGY ASSESSMENTS

There are 48 ECOs considered in this report. Should these ECOs be implemented, energy reduction can be accomplished without having negative impacts on Poway's operations and quality of life. Excluding the seven PV options listed in the report, an estimated savings of $52,437 may be achieved with an estimated cost of $233,907. This smaller savings and smaller investment would have a payback of 4.5 years or a 22.4% ROI. Including PV options, the total savings are estimated at $311,142 per year with a total implementation cost of $6,836,893 (taking into account SPC incentives, CSI incentives, SWH system rebates, and other rebate/incentives through SDG&E, such as the Express Efficiency Program [EEP]). This equates to a 22-year payback or a 4.6% ROI. The estimated cost savings each site contributes is summarized below.

Note: For2009, the Tax Exempt Customer ([TEC] as part of the Energy Savings Bid [ESB] program was extended until approximately mid-2009. Greater savings than those calculated here can be realized through participation in the TEC program. For more information, contact the CCSE engineering team at 858-244-1177)

Table 1: Contribution to Total Savings by Site

Audit Sites	Estimated Cost Savings		% Savings to Total Savings	
	w/PV	w/o PV	w/PV	w/o PV
Swim Center	$20,816	$32,097	40%	10%
City Hall	$15,514	$171,972	30%	55%
Performing Arts	$7,556	$7,556	14%	2%
Fire Station 1	$2,105	$15,868	4%	5%
Library	$2,105	$2,105	4%	1%
Fire Station 3	$1,659	$23,093	3%	7%
Sheriff's Station	$1,508	$52,808	3%	17%
Auditorium	$648	$2,883	1%	1%
Senior Center	$525	$2,760	1%	1%
Total Savings	**52,436.57**	**311,142.05**		

Table 2: Summary of ECOs

Type of Opportunity		Energy Opportunity	Est. Annual Electrical Savings (kWh)	Est. CO2 equivalent reduction (lbs)	Peak Demand Reduction (kW)	Est Annual Gas Savings (Therms)	Est. Annual Cost Savings ($)	Est. Implementation Cost ($)	SDGE Rebate or Incentive ($)	Final cost after incentive ($)	Simple Payback (Years)	ROI (%)
Poway City Hall												
EEO, CO2	1	Delamp 1 T8 fixture (the lamp on single ballast) in existing 3-Lamp 2'x4' T8 Fixtures	33,651	26,274	11.6	$0	$4,947	$3,745	$1,683	$2,062	0.4	239.8%
EEO, CO2	2	Retrofit 2-Lamp 2'x2' CF40 Fixtures with lower wattage CF Lamps	34,673	27,072	11.9	$0	$5,097	$9,720	$1,734	$7,986	1.6	63.8%
EEO, CO2	3	Delamp hallway lighting fixtures on centers less than 6' apart.	932	728	0.3	$0	$137	$48	$47	$1	0.0	9728.7%
EEO, CO2	4b	Delamp from 6 lamps to 4 lamps on pendant lights in main lobby.	1,864	1,455	0.6	$0	$274	$160	$93	$67	0.2	410.0%
EEO, CO2	5	Installing vending machine controllers on vending machines	1,444	1,127	0.0	$0	$212	$260	$155	$105	0.5	202.2%
EEO, CO2	6	Use Plug load occupancy sensors at computer stations	5,850	4,568	2.3	$0	$860	$4,750	$750	$4,000	4.7	21.5%
EEO, CO2	7	Replace 150W LPS parking lot lights with 85 watt induction lights	13,323	10,402	0.0	$0	$1,958	$15,000	$666	$14,334	7.3	13.7%
EEO, CO2	8	Retrofit emergency generator with heat pump	13,801	10,776	0.0	$0	$2,029	$12,995	$2,015	$10,980	5.4	18.5%
RE, CO2	9a	Install a 675kW photovoltaic system (after energy saving measures)	1,064,340	831,026	0.0	$0	$156,458	$5,400,000	$1,969,029	$3,430,971	21.9	4.6%
Poway Community Swim Center												
EEO, C, CO2	1	Adjust turnover rates in offseason to 8 hour turn-over rate (4 months)	4,029	3,146	0	0	$600	$2,256	$322	$1,934	3.2	31.0%
RE,CO2	2	Install a solar pool heater.	0	197,596	0	16,877	$16,645	$128,000	$13,502	$114,498	6.9	14.5%
RE,CO2	3	Install a solar hot water heater for domestic hot water	0	4,915	0	420	$416	$6,000	$1,500	$4,500	10.8	9.2%
EEO, CO2	4	Replace 500 watt pool lamps with LED	10,845	8,468	7.2	0	$1,616	$2,250	$542	$1,708	1.1	94.6%
EEO, CO2	5	Replace 250 watt pole lights	6,183	4,828	0	0	$921	$10,000	$309	$9,691	10.5	9.5%
EEO, CO2	6	Install occupancy sensor in storage room	378	295	0	0	$56	$200	$84	$117	2.1	48.3%
EEO, CO2	7	Replace Lifeguard room light	35	28	0	0	$5	$48	$12	$36	6.8	14.6%
EEO, CO2	8	Install vending controls	2,808	2,192	0	0	$418	$440	$310	$130	0.3	321.8%
EEO, CO2	9	Replace old refrigerator	929	725	0	0	$138	$400	$275	$125	0.9	110.7%
RE,CO2	10	Install a 50kW PV system	74,708	58,331	0	0	$11,281	$400,000	$27,642	$372,358	33.0	3.0%
Poway Community Senior Center												
EEO,CO2	1	Install vending controls on vending machines	2,321	1812	0	0	$346	$260	$155	$105	0.3	329.4%
EEO,CO2	2	Replace 2 old refrigerators	1,200	937	0.1	0	$179	$1,119	$550	$569	3.2	31.4%
RE,CO2	3	Install a 10kW PV system	15,000	11,712	0	0	$2,235	$80,000	$5,550	$74,450	33.3	3.0%
Poway Community Park Auditorium												
EEO, CO2	1	Retrofit outdoor downlights	1,722	1,345	0.4	0	$257	$240	$86	$154	0.6	166.7%
EEO, CO2	2	Retrofit incandescent exit signs with photoluminescent ones	2,628	2,052	0.3	0	$392	$3,000	$675	$2,325	5.9	16.8%
RE, CO2	3	Install a 10kW PV system	15,000	11,712	0	0	$2,235	$80,000	$5,550	$74,450	33.3	3.0%
Poway Center for the Performing Arts												
EEO, CO2	1	Replace 90 watt par 38's	27,955	21,827	9.6	0	$4,724	$10,500	$1,398	$9,102	1.9	51.9%
EEO, CO3	2	Install ceiling mounted occupancy sensor in backstage area	2,590	2,022	0	0	$438	$1,000	$167	$833	1.9	52.5%
EEO, CO4	3	Replace 40w incandescet lights in Restrooms	8,576	6,696	2.9	0	$1,449	$1,425	$990	$435	0.3	333.2%
EEO, CO5	4	Replace 25w incandescent lights in dressing rooms	5,591	4,365	6.4	0	$945	$6,000	$4,400	$1,600	1.7	59.1%

Table 2 Continued: Summary of ECOs

Type of Opportunity		Energy Opportunity	Est. Annual Electrical Savings (kWh)	Est. CO2 equivalent reduction (lbs)	Peak Demand Reduction (kW)	Est Annual Gas Savings (Therms)	Est. Annual Cost Savings ($)	Est. Implementation Cost ($)	SDGE Rebate or Incentive ($)	Final cost after incentive ($)	Simple Payback (Years)	ROI (%)
EEO, CO2	1	Install occupancy sensors in all private offices	480	375	0.2	0	$73	$675	$418	$258	3.5	28.2%
EEO, CO2	2	Replace 70W LPS perimeter wall pack lights with 32 watt CFL flood lights	1,058	826	0.3	0	$160	$900	$477	$423	2.6	37.8%
EEO, CO2	3	Replace Gas Pack HVAC units	10,985	8,577	13.7	0	$1,659	$19,800	$1,538	$18,262	11.0	9.1%
RE, CO2	4	Install a solar hot water system	0	2,107	0.3	180.0	$214	$6,000	$1,500	$4,500	21.0	4.8%
RE, CO2	5	Install a 61kW PV system	91,144	71,164	0	0	$13,763	$488,000	$33,723	$454,277	33.0	3.0%
Poway Fire Station #3												
C, CO2,RE	1	Install a solar hot water system	0	3,512	0.3	300.0	$357	$8,000	$1,500	$6,500	18.2	5.5%
EEO, CO2	2	Retrofit emergency generator with heat pump	8,620	6,730	0	0	$1,302	$11,000	$1,258	$9,742	7.5	13.4%
RE, CO2	3	Install a 95kW PV system	141,946	110,830	0	0	$21,434	$760,000	$52,520	$707,480	33.0	3.0%
Poway Library												
EEO, CO2	1	Retrofit pendant Par 38s	3,458	2,700	1.0	0	$588	$380	$173	$207	0.4	283.9%
EEO, CO2	2	Install Occupancy sensors in private offices	1,985	1,549	0	0	$337	$600	$251	$350	1.0	96.5%
EEO, CO2	3	Replace MR-16 spot lights	2,363	1,845	0.7	0	$402	$1,425	$118	$1,307	3.3	30.7%
EEO, CO2	4	Retrofit 2'x2' fixtures	1,001	782	0.3	0	$170	$1,210	$50	$1,160	6.8	14.7%
EEO, CO2	5	Turn off wall washers	2,205	1,722	0.6	0	$375	$200	$110	$90	0.2	417.7%
EEO, CO2	6	Retrofit 3 lamps 27 cell louvered fixtures with lenses and 2 lamps.	1,372	1,071	0.4	0	$233	$1,540	$155	$1,385	5.9	16.8%
Poway Sheriff's Station												
C, CO2	1	Turn off uplights	1,887	1,473	0.6	0	$323	$100	$94	$6	0.0	5709.8%
C, CO2	2	Install Occupancy sensors in private offices	2,595	2,026	0	0	$444	$1,800	$752	$1,049	2.4	42.3%
EEO, CO2	3	Retrofit 3 T8 lamp fixtures to 2 T8s	1,835	1,432	0.6	0	$314	$1,260	$92	$1,168	3.7	26.9%
EEO, O, CO2	4	Install vending controls	2,500	1,952	0.3	0	$428	$260	$155	$105	0.2	407.1%
RE, CO2	5	Install a 200kW PV system	300,000	234,237	0	0	$51,300	$1,600,000	$111,000	$1,489,000	29.0	3.4%
		Totals (EEO only, No PV)	**225,670**	**384,332**	**73.1**	**17,777**	**$52,437**	**$274,966**	**$41,059**	**$233,907**	**4.5**	**22.4%**
		Totals (All)	**1,927,808**	**1,713,345**	**73.1**	**17,777**	**$311,142**	**$9,082,966**	**$2,246,073**	**$6,836,893**	**22.0**	**4.6%**

KEY TO TYPE OF OPPORTUNITY

EEO	Energy efficiency opportunities
DR	Demand response opportunities
C	Conservation opportunities
RE	Renewable energy opportunities
DG	Non-renewable DG opportunities
CO2	CO2 reducing opportunities (I see this as any energy-saving measure or shift from fossil to renewable fuels)
GB	Green building opportunities
Misc	Miscellaneous opportunities (if needed)

Table 3: Summary of EE only

Energy Opportunity	Est. Annual Electrical Savings (kWh)	Est. CO2 equivalent reduction (lbs)	Peak Demand Reduction (kW)	Est. Annual Cost Savings ($)	Est. Implementation Cost ($)	SDGE Rebate or Incentive ($)	Final cost after incentive ($)	Simple Payback (Years)	ROI (%)
Poway City Hall									
Delamp 1 T8 fixture (the lamp on single ballast) in existing 3-Lamp 2'x4' T8 Fixtures	33,651	48,121	11.6	$4,947	$3,745	$1,683	$2,062	0.4	239.8%
Retrofit 2-Lamp 2'x2' CF40 Fixtures with lower wattage CF Lamps	34,673	49,583	11.9	$5,097	$9,720	$1,734	$7,986	1.6	63.8%
Delamp hallway lighting fixtures on centers less than 6' apart.	932	1,333	0.3	$137	$48	$47	$1	0.0	9728.7%
Delamp from 6 lamps to 4 lamps on pendant lights in main lobby.	1,864	2,665	0.6	$274	$160	$93	$67	0.2	410.0%
Installing vending machine controllers on vending machines	1,444	2,065	0.0	$212	$260	$155	$105	0.5	202.2%
Use Plug load occupancy sensors at computer stations	5,850	8,366	2.3	$860	$4,750	$750	$4,000	4.7	21.5%
Replace 150W LPS parking lot lights with 85 watt induction lights	13,323	19,051	0.0	$1,958	$15,000	$666	$14,334	7.3	13.7%
Retrofit emergency generator with heat pump	13,801	19,736	0.0	$2,029	$12,995	$2,015	$10,980	5.4	18.5%
Subtotals:	**105,538**	**150,919**	**26.7**	**$15,514**	**$46,678**	**$7,142**	**$ 39,536**	**2.5**	**39.2%**
Poway Community Swim Center									
Adjust turnover rates in offseason to 8 hour turn-over rate (4 months)	4,029	5,762	0	$600	$2,256	$322	$1,934	3.2	31.0%
Replace 500 watt pool lamps with LED	10,845	15,508	7.2	$1,616	$2,250	$542	$1,708	1.1	94.6%
Replace 250 watt pole lights	6,183	8,842	0	$921	$10,000	$309	$9,691	10.5	9.5%
Install occupancy sensor in storage room	378	540	0	$56	$200	$84	$117	2.1	48.3%
Replace Lifeguard room light	35	51	0	$5	$48	$12	$36	6.8	14.6%
Install vending controls	2,808	4,015	0	$418	$440	$310	$130	0.3	321.8%
Replace old refrigerator	929	1,328	0	$138	$400	$275	$125	0.9	110.7%
Subtotals:	**25,207**	**36,046**	**7.2**	**$3,756**	**$15,594**	**$1,854**	**$ 13,740**	**3.7**	**27.3%**
Poway Community Senior Center									
Install vending controls on vending machines	2,321	3319	0	$346	$260	$155	$105	0.3	329.4%
Replace 2 old refrigerators	1,200	1716	0.1	$179	$1,119	$550	$569	3.2	31.4%
Subtotals:	**3,521**	**5,035**	**0**	**$525**	**$1,379**	**$705**	**$ 674**	**1.3**	**77.8%**
Poway Community Park Auditorium									
Retrofit outdoor downlights	1,722	2,462	0.4	$257	$240	$86	$154	0.6	166.7%
Retrofit incandescent exit signs with photoluminescent ones	2,628	3,758	0.3	$392	$3,000	$675	$2,325	5.9	16.8%
Subtotals:	**4,350**	**6,221**	**0.7**	**$648**	**$3,240**	**$761**	**$ 2,479**	**3.8**	**26.1%**
Poway Center for the Performing Arts									
Replace 90 watt par 38's	27,955	39,976	9.6	$4,724	$10,500	$1,398	$9,102	1.9	51.9%
Install ceiling mounted occupancy sensor in backstage area	2,590	3,703	0	$438	$1,000	$167	$833	1.9	52.5%
Replace 40w incandescet lights in Restrooms	8,576	12,263	2.9	$1,449	$1,425	$990	$435	0.3	333.2%
Replace 25w incandescent lights in dressing rooms	5,591	7,995	6.4	$945	$6,000	$4,400	$1,600	1.7	59.1%
Subtotals:	**44,712**	**63,938**	**18.9**	**$7,556**	**$18,925**	**$6,955**	**$ 11,970**	**1.6**	**63.1%**

Table 3 Continued: Summary of EE only

Energy Opportunity	Est. Annual Electrical Savings (kWh)	Est. CO2 equivalent reduction (lbs)	Peak Demand Reduction (kW)	Est. Annual Cost Savings ($)	Est. Implementation Cost ($)	SDGE Rebate or Incentive ($)	Final cost after incentive ($)	Simple Payback (Years)	ROI (%)
Poway Fire Station #1									
Install occupancy sensors in all private offices	480	687	0.2	$73	$675	$418	$258	3.5	28.2%
Replace 70W LPS perimeter wall pack lights with 32 watt CFL flood lights	1,058	1,513	0.3	$160	$900	$477	$423	2.6	37.8%
Replace Gas Pack HVAC units	10,985	15,709	13.7	$1,659	$19,800	$1,538	$18,262	11.0	9.1%
Subtotals:	**12,523**	**17,908**	**14.2**	**$1,891**	**$21,375**	**$2,432**	**$ 18,943**	**10.0**	**10.0%**
Poway Fire Station #3									
Retrofit emergency generator with heat pump	8,620	12,326	0	$1,302	$11,000	$1,258	$9,742	7.5	13.4%
Subtotals:	**8,620**	**12,326**	**0**	**$1,302**	**$11,000**	**$1,258**	**$ 9,742**	**7.5**	**13.4%**
Poway Library									
Retrofit pendant Par 38s	3,458	4,945	1.0	$588	$380	$173	$207	0.4	283.9%
Install Occupancy sensors in private offices	1,985	2,838	0	$337	$600	$251	$350	1.0	96.5%
Replace MR-16 spot lights	2,363	3,378	0.7	$402	$1,425	$118	$1,307	3.3	30.7%
Retrofit 2'x2' fixtures	1,001	1,431	0.3	$170	$1,210	$50	$1,160	6.8	14.7%
Turn off wall washers	2,205	3,153	0.6	$375	$200	$110	$90	0.2	417.7%
Retrofit 3 lamps 27 cell louvered fixtures with lenses and 2 lamps.	1,372	1,962	0.4	$233	$1,540	$155	$1,385	5.9	16.8%
Subtotals:	**12,383**	**17,708**	**3.0**	**$2,105**	**$5,355**	**$857**	**$ 4,498**	**2.1**	**46.8%**
Poway Sheriff's Station									
Turn off uplights	1,887	2,698	0.6	$323	$100	$94	$6	0.0	5709.8%
Install Occupancy sensors in private offices	2,595	3,710	0	$444	$1,800	$752	$1,049	2.4	42.3%
Retrofit 3 T8 lamp fixtures to 2 T8s	1,835	2,623	0.6	$314	$1,260	$92	$1,168	3.7	26.9%
Install vending controls	2,500	3,575	0.3	$428	$260	$155	$105	0.2	407.1%
Subtotals:	**8,816**	**12,607**	**1.6**	**$1,508**	**$3,420**	**$1,093**	**$ 2,327**	**1.5**	**64.8%**
Totals for Energy Efficiency:	**225,670**	**322,708**	**72**	**$34,804**	**$126,966**	**$23,058**	**$103,908**	**11.2**	**9.0%**

Table 4: ECOs by Payback Period

Energy Opportunity	Location	Est. Annual Electrical Savings (kWh)	Est. CO2 equivalent reduction (lbs)	Peak Demand Reduction (kW)	Est Annual Gas Savings (Therms)	Est. Annual Cost Savings ($)	Est. Implementation Cost ($)	SDGE Rebate or Incentive ($)	Final cost after incentive ($)	**Simple Payback (Years)**	ROI (%)
Simple Payback Period of 0 to 5 Years											
Delamp hallway lighting fixtures on centers less than 6' apart.	City Hall	932	1,333	0.3	0	$137	$48	$47	$1	0.0	9728.7%
Turn off uplights	Sheriff's Station	1,887	2,698	0.6	0	$323	$100	$94	$6	0.0	5709.8%
Turn off wall washers	Library	2,205	3,153	0.6	0	$375	$200	$110	$90	0.2	417.7%
Delamp from 6 lamps to 4 lamps on pendant lights in main lobby.	City Hall	1,864	2,665	0.6	0	$274	$160	$93	$67	0.2	410.0%
Install vending controls	Sheriff's Station	2,500	3,575	0.3	0	$428	$260	$155	$105	0.2	407.1%
Replace 40w incandescent lights in Restrooms	Center for the Performing Arts	8,576	12,263	2.9	0	$1,449	$1,425	$990	$435	0.3	333.2%
Install vending controls on vending machines	Community Senior Center	2,321	3319	0	0	$346	$260	$155	$105	0.3	329.4%
Install vending controls	Community Swim Center	2,808	4,015	0	0	$418	$440	$310	$130	0.3	321.8%
Retrofit pendant Par 38s	Library	3,458	4,945	1.0	0	$588	$380	$173	$207	0.4	283.9%
Delamp 1 T8 fixture (the lamp on single ballast) in existing 3-Lamp 2'x4' T8 Fixtures	City Hall	33,651	48,121	11.6	0	$4,947	$3,745	$1,683	$2,062	0.4	239.8%
Installing vending machine controllers on vending machines	City Hall	1,444	2,065	0.0	0	$212	$260	$155	$105	0.5	202.2%
Retrofit outdoor downlights	Community Park Auditorium	1,722	2,462	0.4	0	$257	$240	$86	$154	0.6	166.7%
Replace old refrigerator	Community Swim Center	929	1,328	0	0	$138	$400	$275	$125	0.9	110.7%
Install Occupancy sensors in private offices	Library	1,985	2,838	0	0	$337	$600	$251	$350	1.0	96.5%
Replace 500 watt pool lamps with LED	Community Swim Center	10,845	15,508	7.2	0	$1,616	$2,250	$542	$1,708	1.1	94.6%
Retrofit 2-Lamp 2'x2' CF40 Fixtures with lower wattage CF Lamps	City Hall	34,673	49,583	11.9	0	$5,097	$9,720	$1,734	$7,986	1.6	63.8%
Replace 25w incandescent lights in dressing rooms	Center for the Performing Arts	5,591	7,995	6.4	0	$945	$6,000	$4,400	$1,600	1.7	59.1%
Install ceiling mounted occupancy sensor in backstage area	Center for the Performing Arts	2,590	3,703	0	0	$438	$1,000	$167	$833	1.9	52.5%
Replace 90 watt par 38's	Center for the Performing Arts	27,955	39,976	9.6	0	$4,724	$10,500	$1,398	$9,102	1.9	51.9%
Install occupancy sensor in storage room	Community Swim Center	378	540	0	0	$56	$200	$84	$117	2.1	48.3%
Install Occupancy sensors in private offices	Sheriff's Station	2,595	3,710	0	0	$444	$1,800	$752	$1,049	2.4	42.3%
Replace 70W LPS perimeter wall pack lights with 32 watt CFL flood lights	Fire Station #1	1,058	1,513	0.3	0	$160	$900	$477	$423	2.6	37.8%
Replace 2 old refrigerators	Community Senior Center	1,200	1716	0.1	0	$179	$1,119	$550	$569	3.2	31.4%
Adjust turnover rates in offseason to 8 hour turn-over rate (4 months)	Community Swim Center	4,029	5,762	0	0	$600	$2,256	$322	$1,934	3.2	31.0%
Replace MR-16 spot lights	Library	2,363	3,378	0.7	0	$402	$1,425	$118	$1,307	3.3	30.7%
Install occupancy sensors in all private offices	Fire Station #1	480	687	0.2	0	$73	$675	$418	$258	3.5	28.2%
Retrofit 3 T8 lamp fixtures to 2 T8s	Sheriff's Station	1,835	2,623	0.6	0	$314	$1,260	$92	$1,168	3.7	26.9%
Use Plug load occupancy sensors at computer stations	City Hall	5,850	8,366	2.3	0	$860	$4,750	$750	$4,000	4.7	21.5%
Subtotal (0 to 5 Years)		**167,722**	**239,842**	**58**	**0**	**$26,135**	**$52,373**	**$16,379**	**$35,994**	**1.4**	**72.6%**

Table 4 Continued: ECOs by Payback Period

Energy Opportunity	Location	Est. Annual Electrical Savings (kWh)	Est. CO2 equivalent reduction (lbs)	Peak Demand Reduction (kW)	Est Annual Gas Savings (Therms)	Est. Annual Cost Savings ($)	Est. Implementation Cost ($)	SDGE Rebate or Incentive ($)	Final cost after incentive ($)	**Simple Payback (Years)**	ROI (%)
Simple Payback Period of 5 to 10 Years											
Retrofit emergency generator with heat pump	City Hall	13,801	19,736	0.0	0	$2,029	$12,995	$2,015	$10,980	5.4	18.5%
Retrofit incandescent exit signs with photoluminescent ones	Community Park Auditorium	2,628	3,758	0.3	0	$392	$3,000	$675	$2,325	5.9	16.8%
Retrofit 3 lamps 27 cell louvered fixtures with lenses and 2 lamps.	Library	1,372	1,962	0.4	0	$233	$1,540	$155	$1,385	5.9	16.8%
Retrofit 2'x2' fixtures	Library	1,001	1,431	0.3	0	$170	$1,210	$50	$1,160	6.8	14.7%
Replace Lifeguard room light	Community Swim Center	35	51	0	0	$5	$48	$12	$36	6.8	14.6%
Install a solar pool heater.	Community Swim Center	0	197,596	0	16,877	$16,645	$128,000	$13,502	$114,498	6.9	14.5%
Replace 150W LPS parking lot lights with 85 watt induction lights	City Hall	13,323	19,051	0.0	0	$1,958	$15,000	$666	$14,334	7.3	13.7%
Retrofit emergency generator with heat pump	Fire Station #3	8,620	12,326	0	0	$1,302	$11,000	$1,258	$9,742	7.5	13.4%
Subtotal (5 to 10 Years)		**40,780**	**255,912**	**1**	**16,877**	**$22,734**	**$172,793**	**$18,333**	**$154,460**	**6.8**	**14.7%**
Simple Payback Period Greater than 10 Years											
Replace 250 watt pole lights	Community Swim Center	6,183	8,842	0	0	$921	$10,000	$309	$9,691	10.5	9.5%
Install a solar hot water heater for domestic hot water	Community Swim Center	0	4,915	0	420	$416	$6,000	$1,500	$4,500	10.8	9.2%
Replace Gas Pack HVAC units	Fire Station #1	10,985	15,709	13.7	0	$1,659	$19,800	$1,538	$18,262	11.0	9.1%
Install a solar hot water system	Fire Station #3	0	3,512	0.3	300	$357	$8,000	$1,500	$6,500	18.2	5.5%
Install a solar hot water system	Fire Station #1	0	2,107	0.3	180	$214	$6,000	$1,500	$4,500	21.0	4.8%
Install a 675kW photovoltaic system (after energy saving measures)	City Hall	1,064,340	1,522,006	0.0	0	$156,458	$5,400,000	$1,969,029	$3,430,971	21.9	4.6%
Install a 200kW PV system	Sheriff's Station	300,000	429,000	0	0	$51,300	$1,600,000	$111,000	$1,489,000	29.0	3.4%
Install a 95kW PV system	Fire Station #3	141,946	202,983	0	0	$21,434	$760,000	$52,520	$707,480	33.0	3.0%
Install a 61kW PV system	Fire Station #1	91,144	130,336	0	0	$13,763	$488,000	$33,723	$454,277	33.0	3.0%
Install a 50kW PV system	Community Swim Center	74,708	106,832	0	0	$11,281	$400,000	$27,642	$372,358	33.0	3.0%
Install a 10kW PV system	Community Senior Center	15,000	21,450	0	0	$2,235	$80,000	$5,550	$74,450	33.3	3.0%
Install a 10kW PV system	Community Park Auditorium	15,000	21,450	0	0	$2,235	$80,000	$5,550	$74,450	33.3	3.0%

Table 5: ECOs by Cost

Energy Opportunity	Location	Est. Annual Electrical Savings (kWh)	Est. CO2 equivalent reduction (lbs)	Peak Demand Reduction (kW)	Est Annual Gas Savings (Therms)	Est. Annual Cost Savings ($)	Est. Implementation Cost ($)	SDGE Rebate or Incentive ($)	**Final cost after incentive ($)**	Simple Payback (Years)	ROI (%)
Opportunities Less than $10,000 Each											
Delamp hallway lighting fixtures on centers less than 6' apart.	City Hall	932	1,333	0.3	0	$137	$48	$47	$1	0.0	9728.7%
Turn off uplights	Sheriff's Station	1,887	2,698	0.6	0	$323	$100	$94	$6	0.0	5709.8%
Replace Lifeguard room light	Community Swim Center	35	51	0	0	$5	$48	$12	$36	6.8	14.6%
Delamp from 6 lamps to 4 lamps on pendant lights in main lobby.	City Hall	1,864	2,665	0.6	0	$274	$160	$93	$67	0.2	410.0%
Turn off wall washers	Library	2,205	3,153	0.6	0	$375	$200	$110	$90	0.2	417.7%
Installing vending machine controllers on vending machines	City Hall	1,444	2,065	0.0	0	$212	$260	$155	$105	0.5	202.2%
Install vending controls on vending machines	Community Senior Center	2,321	3319	0	0	$346	$260	$155	$105	0.3	329.4%
Install vending controls	Sheriff's Station	2,500	3,575	0.3	0	$428	$260	$155	$105	0.2	407.1%
Install occupancy sensor in storage room	Community Swim Center	378	540	0	0	$56	$200	$84	$117	2.1	48.3%
Replace old refrigerator	Community Swim Center	929	1,328	0	0	$138	$400	$275	$125	0.9	110.7%
Install vending controls	Community Swim Center	2,808	4,015	0	0	$418	$440	$310	$130	0.3	321.8%
Retrofit outdoor downlights	Community Park Auditorium	1,722	2,462	0.4	0	$257	$240	$86	$154	0.6	166.7%
Retrofit pendant Par 38s	Library	3,458	4,945	1.0	0	$588	$380	$173	$207	0.4	283.9%
Install occupancy sensors in all private offices	Fire Station #1	480	687	0.2	0	$73	$675	$418	$258	3.5	28.2%
Install Occupancy sensors in private offices	Library	1,985	2,838	0	0	$337	$600	$251	$350	1.0	96.5%
Replace 70W LPS perimeter wall pack lights with 32 watt CFL flood lights	Fire Station #1	1,058	1,513	0.3	0	$160	$900	$477	$423	2.6	37.8%
Replace 40w incandescent lights in Restrooms	Center for the Performing Arts	8,576	12,263	2.9	0	$1,449	$1,425	$990	$435	0.3	333.2%
Replace 2 old refrigerators	Community Senior Center	1,200	1716	0.1	0	$179	$1,119	$550	$569	3.2	31.4%
Install ceiling mounted occupancy sensor in backstage area	Center for the Performing Arts	2,590	3,703	0	0	$438	$1,000	$167	$833	1.9	52.5%
Install Occupancy sensors in private offices	Sheriff's Station	2,595	3,710	0	0	$444	$1,800	$752	$1,049	2.4	42.3%
Retrofit 2'x2' fixtures	Library	1,001	1,431	0.3	0	$170	$1,210	$50	$1,160	6.8	14.7%
Retrofit 3 T8 lamp fixtures to 2 T8s	Sheriff's Station	1,835	2,623	0.6	0	$314	$1,260	$92	$1,168	3.7	26.9%
Replace MR-16 spot lights	Library	2,363	3,378	0.7	0	$402	$1,425	$118	$1,307	3.3	30.7%
Retrofit 3 lamps 27 cell louvered fixtures with lenses and 2 lamps.	Library	1,372	1,962	0.4	0	$233	$1,540	$155	$1,385	5.9	16.8%
Replace 25w incandescent lights in dressing rooms	Center for the Performing Arts	5,591	7,995	6.4	0	$945	$6,000	$4,400	$1,600	1.7	59.1%
Replace 500 watt pool lamps with LED	Community Swim Center	10,845	15,508	7.2	0	$1,616	$2,250	$542	$1,708	1.1	94.6%
Adjust turnover rates in offseason to 8 hour turn-over rate (4 months)	Community Swim Center	4,029	5,762	0	0	$600	$2,256	$322	$1,934	3.2	31.0%
Delamp 1 T8 fixture (the lamp on single ballast) in existing 3-Lamp 2'x4' T8 Fixtures	City Hall	33,651	48,121	11.6	0	$4,947	$3,745	$1,683	$2,062	0.4	239.8%
Retrofit incandescent exit signs with photoluminescent ones	Community Park Auditorium	2,628	3,758	0.3	0	$392	$3,000	$675	$2,325	5.9	16.8%
Use Plug load occupancy sensors at computer stations	City Hall	5,850	8,366	2.3	0	$860	$4,750	$750	$4,000	4.7	21.5%
Install a solar hot water heater for domestic hot water	Community Swim Center	0	4,915	0	420	$416	$6,000	$1,500	$4,500	10.8	9.2%
Install a solar hot water system	Fire Station #1	0	2,107	0.3	180	$214	$6,000	$1,500	$4,500	21.0	4.8%
Install a solar hot water system	Fire Station #3	0	3,512	0.3	300	$357	$8,000	$1,500	$6,500	18.2	5.5%
Retrofit 2-Lamp 2'x2' CF40 Fixtures with lower wattage CF Lamps	City Hall	34,673	49,583	11.9	0	$5,097	$9,720	$1,734	$7,986	1.6	63.8%
Replace 90 watt par 38's	Center for the Performing Arts	27,955	39,976	9.6	0	$4,724	$10,500	$1,398	$9,102	1.9	51.9%
Replace 250 watt pole lights	Community Swim Center	6,183	8,842	0	0	$921	$10,000	$309	$9,691	10.5	9.5%
Retrofit emergency generator with heat pump	Fire Station #3	8,620	12,326	0	0	$1,302	$11,000	$1,258	$9,742	7.5	13.4%
Subtotal		**187,561**	**278,747**	**59**	**900**	**$30,146**	**$99,171**	**$23,338**	**$75,833**	**2.5**	**39.8%**

Table 5 Continued: ECOs by Cost

Energy Opportunity	Location	Est. Annual Electrical Savings (kWh)	Est. CO2 equivalent reduction (lbs)	Peak Demand Reduction (kW)	Est Annual Gas Savings (Therms)	Est. Annual Cost Savings ($)	Est. Implementation Cost ($)	SDGE Rebate or Incentive ($)	**Final cost after incentive ($)**	Simple Payback (Years)	ROI (%)
Opportunities Less than $50,000 Each											
Retrofit emergency generator with heat pump	City Hall	13,801	19,736	0.0	0	$2,029	$12,995	$2,015	$10,980	5.4	18.5%
Replace 150W LPS parking lot lights with 85 watt induction lights	City Hall	13,323	19,051	0.0	0	$1,958	$15,000	$666	$14,334	7.3	13.7%
Replace Gas Pack HVAC units	Fire Station #1	10,985	15,709	13.7	0	$1,659	$19,800	$1,538	$18,262	11.0	9.1%
Subtotal		**38,109**	**54,496**	**14**	**0**	**5,646**	**$47,795**	**$4,219**	**$43,576**	**7.7**	**13.0%**
Opportunities More than $50,000 Each											
Install a 10kW PV system	Community Senior Center	15,000	21,450	0	0	$2,235	$80,000	$5,550	$74,450	33.3	3.0%
Install a 10kW PV system	Community Park Auditorium	15,000	21,450	0	0	$2,235	$80,000	$5,550	$74,450	33.3	3.0%
Install a solar pool heater.	Community Swim Center	0	197,596	0	16877	$16,645	$128,000	$13,502	$114,498	6.9	14.5%
Install a 50kW PV system	Community Swim Center	74,708	106,832	0	0	$11,281	$400,000	$27,642	$372,358	33.0	3.0%
Install a 61kW PV system	Fire Station #1	91,144	130,336	0	0	$13,763	$488,000	$33,723	$454,277	33.0	3.0%
Install a 95kW PV system	Fire Station #3	141,946	202,983	0	0	$21,434	$760,000	$52,520	$707,480	33.0	3.0%
Install a 200kW PV system	Sheriff's Station	300,000	429,000	0	0	$51,300	$1,600,000	$111,000	$1,489,000	29.0	3.4%
Install a 675kW photovoltaic system (after energy saving measures)	City Hall	1,064,340	1,522,006	0.0	0	$156,458	$5,400,000	$1,969,029	$3,430,971	21.9	4.6%

Table 6: ECOs by Cost Savings

Energy Opportunity	Location	Est. Annual Electrical Savings (kWh)	Est. CO2 equivalent reduction (lbs)	Peak Demand Reduction (kW)	Est Annual Gas Savings (Therms)	**Est. Annual Cost Savings ($)**	Est. Implementation Cost ($)	SDGE Rebate or Incentive ($)	Final cost after incentive ($)	Simple Payback (Years)	ROI (%)
Install a 675kW photovoltaic system (after energy saving measures)	City Hall	1,064,340	1,522,006	0.0	0	$156,458	$5,400,000	$1,969,029	$3,430,971	21.9	4.6%
Install a 200kW PV system	Sheriff's Station	300,000	429,000	0	0	$51,300	$1,600,000	$111,000	$1,489,000	29.0	3.4%
Install a 95kW PV system	Fire Station #3	141,946	202,983	0	0	$21,434	$760,000	$52,520	$707,480	33.0	3.0%
Install a solar pool heater.	Community Swim Center	0	197,596	0	16877	$16,645	$128,000	$13,502	$114,498	6.9	14.5%
Install a 61kW PV system	Fire Station #1	91,144	130,336	0	0	$13,763	$488,000	$33,723	$454,277	33.0	3.0%
Install a 50kW PV system	Community Swim Center	74,708	106,832	0	0	$11,281	$400,000	$27,642	$372,358	33.0	3.0%
Retrofit 2-Lamp 2'x2' CF40 Fixtures with lower wattage CF Lamps	City Hall	34,673	49,583	11.9	0	$5,097	$9,720	$1,734	$7,986	1.6	63.8%
Delamp 1 T8 fixture (the lamp on single ballast) in existing 3-Lamp 2'x4' T8 Fixtures	City Hall	33,651	48,121	11.6	0	$4,947	$3,745	$1,683	$2,062	0.4	239.8%
Replace 90 watt par 38's	Center for the Performing Arts	27,955	39,976	9.6	0	$4,724	$10,500	$1,398	$9,102	1.9	51.9%
Install a 10kW PV system	Community Senior Center	15,000	21,450	0	0	$2,235	$80,000	$5,550	$74,450	33.3	3.0%
Install a 10kW PV system	Community Park Auditorium	15,000	21,450	0	0	$2,235	$80,000	$5,550	$74,450	33.3	3.0%
Retrofit emergency generator with heat pump	City Hall	13,801	19,736	0.0	0	$2,029	$12,995	$2,015	$10,980	5.4	18.5%
Replace 150W LPS parking lot lights with 85 watt induction lights	City Hall	13,323	19,051	0.0	0	$1,958	$15,000	$666	$14,334	7.3	13.7%
Replace Gas Pack HVAC units	Fire Station #1	10,985	15,709	13.7	0	$1,659	$19,800	$1,538	$18,262	11.0	9.1%
Replace 500 watt pool lamps with LED	Community Swim Center	10,845	15,508	7.2	0	$1,616	$2,250	$542	$1,708	1.1	94.6%
Replace 40w incandescent lights in Restrooms	Center for the Performing Arts	8,576	12,263	2.9	0	$1,449	$1,425	$990	$435	0.3	333.2%
Retrofit emergency generator with heat pump	Fire Station #3	8,620	12,326	0	0	$1,302	$11,000	$1,258	$9,742	7.5	13.4%
Replace 25w incandescent lights in dressing rooms	Center for the Performing Arts	5,591	7,995	6.4	0	$945	$6,000	$4,400	$1,600	1.7	59.1%
Replace 250 watt pole lights	Community Swim Center	6,183	8,842	0	0	$921	$10,000	$309	$9,691	10.5	9.5%
Use Plug load occupancy sensors at computer stations	City Hall	5,850	8,366	2.3	0	$860	$4,750	$750	$4,000	4.7	21.5%
Adjust turnover rates in offseason to 8 hour turn-over rate (4 months)	Community Swim Center	4,029	5,762	0	0	$600	$2,256	$322	$1,934	3.2	31.0%
Retrofit pendant Par 38s	Library	3,458	4,945	1.0	0	$588	$380	$173	$207	0.4	283.9%

Table 6 Continued: ECOs by Cost Savings

Energy Opportunity	Location	Est. Annual Electrical Savings (kWh)	Est. CO2 equivalent reduction (lbs)	Peak Demand Reduction (kW)	Est Annual Gas Savings (Therms)	**Est. Annual Cost Savings ($)**	Est. Implementation Cost ($)	SDGE Rebate or Incentive ($)	Final cost after incentive ($)	Simple Payback (Years)	ROI (%)
Install Occupancy sensors in private offices	Sheriff's Station	2,595	3,710	0	0	$444	$1,800	$752	$1,049	2.4	42.3%
Install ceiling mounted occupancy sensor in backstage area	Center for the Performing Arts	2,590	3,703	0	0	$438	$1,000	$167	$833	1.9	52.5%
Install vending controls	Sheriff's Station	2,500	3,575	0.3	0	$428	$260	$155	$105	0.2	407.1%
Install vending controls	Community Swim Center	2,808	4,015	0	0	$418	$440	$310	$130	0.3	321.8%
Install a solar hot water heater for domestic hot water	Community Swim Center	0	4,915	0	420	$416	$6,000	$1,500	$4,500	10.8	9.2%
Replace MR-16 spot lights	Library	2,363	3,378	0.7	0	$402	$1,425	$118	$1,307	3.3	30.7%
Retrofit incandescent exit signs with photoluminescent ones	Community Park Auditorium	2,628	3,758	0.3	0	$392	$3,000	$675	$2,325	5.9	16.8%
Turn off wall washers	Library	2,205	3,153	0.6	0	$375	$200	$110	$90	0.2	417.7%
Install a solar hot water system	Fire Station #3	0	3,512	0.3	300	$357	$8,000	$1,500	$6,500	18.2	5.5%
Install vending controls on vending machines	Community Senior Center	2,321	3319	0	0	$346	$260	$155	$105	0.3	329.4%
Install Occupancy sensors in private offices	Library	1,985	2,838	0	0	$337	$600	$251	$350	1.0	96.5%
Turn off uplights	Sheriff's Station	1,887	2,698	0.6	0	$323	$100	$94	$6	0.0	5709.8%
Retrofit 3 T8 lamp fixtures to 2 T8s	Sheriff's Station	1,835	2,623	0.6	0	$314	$1,260	$92	$1,168	3.7	26.9%
Delamp from 6 lamps to 4 lamps on pendant lights in main lobby.	City Hall	1,864	2,665	0.6	0	$274	$160	$93	$67	0.2	410.0%
Retrofit outdoor downlights	Community Park Auditorium	1,722	2,462	0.4	0	$257	$240	$86	$154	0.6	166.7%
Retrofit 3 lamps 27 cell louvered fixtures with lenses and 2 lamps.	Library	1,372	1,962	0.4	0	$233	$1,540	$155	$1,385	5.9	16.8%
Install a solar hot water system	Fire Station #1	0	2,107	0.3	180	$214	$6,000	$1,500	$4,500	21.0	4.8%
Installing vending machine controllers on vending machines	City Hall	1,444	2,065	0.0	0	$212	$260	$155	$105	0.5	202.2%
Replace 2 old refrigerators	Community Senior Center	1,200	1716	0.1	0	$179	$1,119	$550	$569	3.2	31.4%
Retrofit 2'x2' fixtures	Library	1,001	1,431	0.3	0	$170	$1,210	$50	$1,160	6.8	14.7%
Replace 70W LPS perimeter wall pack lights with 32 watt CFL flood lights	Fire Station #1	1,058	1,513	0.3	0	$160	$900	$477	$423	2.6	37.8%
Replace old refrigerator	Community Swim Center	929	1,328	0	0	$138	$400	$275	$125	0.9	110.7%
Delamp hallway lighting fixtures on centers less than 6' apart.	City Hall	932	1,333	0.3	0	$137	$48	$47	$1	0.0	9728.7%
Install occupancy sensors in all private offices	Fire Station #1	480	687	0.2	0	$73	$675	$418	$258	3.5	28.2%
Install occupancy sensor in storage room	Community Swim Center	378	540	0	0	$56	$200	$84	$117	2.1	48.3%
Replace Lifeguard room light	Community Swim Center	35	51	0	0	$5	$48	$12	$36	6.8	14.6%

1.0 POWAY CITY HALL

Summary for City Hall

Opportunities 1 through 8 (excludes PV):

Estimated Energy Savings	=	91,131 kWh/yr
Equivalent CO_2 Reduction	=	82,403 pounds/year
Estimated Demand Savings	=	26 kW
Estimated Energy Cost Savings	=	$ 13,396 /yr
Estimated Implementation Cost	=	$ 29,386 (after incentives)
Simple Payback Period	=	2.2 years
ROI	=	46%
Current Energy Consumption	=	1,178,568 kWh
Percent Savings with ECOs	=	7.7%

Opportunities 1 through 9 (includes PV):

Estimated Energy Savings	=	1,155,471 kWh/yr
Equivalent CO_2 Reduction	=	913,429 pounds/year
Estimated Demand Savings	=	26 kW
Estimated Energy Cost Savings	=	$ 169,854/yr
Estimated Implementation Cost	=	$ 3,460,357(after incentives)
Simple Payback Period	=	20.4 years
ROI	=	5.0%
Current Energy Consumption	=	1,178,568kWh
Percent Savings with ECOs	=	98%

ECO No. 1

DELAMP T8 FIXTURE

Figure 1 Fixture with Three Lamps

Recommended Action

Delamp one T8 fixture (the lamp on single ballast) in existing three-lamp 2'x4' T8 fixtures.

Estimated Energy Savings	= 33,651 kWh/yr
Estimated Demand Savings	= 11.6 kW
Estimated Energy Cost Savings	**= $4,947/yr**
Estimated Implementation Cost	= $2,062 (after incentives)
Simple Payback Period	= 5 months
ROI	= 240%

Background

The office area lighting in City Hall exceeds standard foot-candle levels. The level measured in most locations at approximately 60 foot-candles, and the recommended level for this environment is usually 20 to 40 foot-candles. The fixtures are a three-lamp fixture, and these may have the capability of operating on two lamps instead of three. To guarantee the savings and to be eligible for incentives to offset the cost, one of those lamps could be removed. Another option is to provide bi-level switching in all areas, and encourage employees to only use the lower level if it is sufficient lighting for their tasks.

Another energy-saving option is to use a low-factor ballast. This would save 2-3W or more per lamp, and it is a good solution for energy savings when the lighting requirements have already been met.

ECO No. 2
RETROFIT CF40 FIXTURES WITH LOWER WATTAGE LAMPS

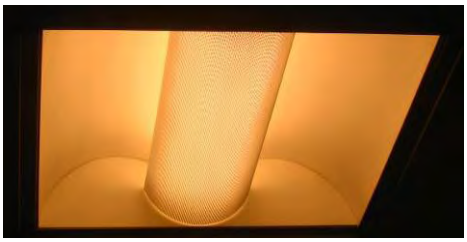


Figure 2 CF 40 Fixture with 26W Lamps

Recommended Action

Retrofit the CF40 fixtures that have 26W lamps with an 18W or lower lamp.

Estimated Energy Savings	= 34,673 kWh/yr
Estimated Demand Savings	= 11.9 kW
Estimated Energy Cost Savings	**= $ 5,097/yr**
Estimated Implementation Cost	= $ 7,986 (after incentives)
Simple Payback Period	= 1.6 years
ROI	= 64%

Background

The City Hall building has approximately 243 two-lamp 2' x 2' CF40 fluorescent fixtures in hallway and office areas. The lamps are 26W each, and the areas are typically overlit. The lamps could be replaced with an 18W lamp, or possibly even a 13W lamp (especially in hallway lighting). Both sizes should be evaluated and a footcandle reading could be taken to determine which one provides adequate light. The savings shown above were done only with 18W lamps, so the actual savings would be higher if some or all 13W lamps were used.

ECO No. 3
DELAMP HALLWAY FIXTURES

Figure 3 Hallway Lighting

Recommended Action

Delamp half of the hallway lights in the southwest corner of the building.

Estimated Energy Savings	= 932 kWh/yr
Estimated Demand Savings	= .3 kW
Estimated Energy Cost Savings	**= $ 137/year**
Estimated Implementation Cost	= $ 1 (after incentives)
Simple Payback Period	= .01 years
ROI	= 9729%

Background

One hallway in the southwest side of City Hall has two-foot fixtures on six-foot centers (see Figure 3). The hallway is overlit per standard requirements, and it was observed that other hallways with the similar fixtures were on eight-foot to 10-foot centers. The fixtures contain two 40W biax lamps. One lamp can be removed from each fixture and still provide adequate lighting.

ECO No. 4a
RETROFIT LOBBY PENDANT LIGHTS

Figure 4 Main Lobby Fixtures with Biax Lamps

Recommended Action

Retrofit 40W Biax lamps in pendant lights in main lobby with 31W lamps.

Estimated Energy Savings	= 1,258 kWh/yr
Estimated Demand Savings	= .4 kW
Estimated Energy Cost Savings	**= $ 185 /yr**
Estimated Implementation Cost	= $ 897 (after incentives)
Simple Payback Period	= 4.9 years
ROI	= 21%

Background

There are eight pendant lighting fixtures in the City Hall main lobby, each fixture with six 40W biax lamps. As the fixtures are primarily decorative and supported by natural daylighting, the 40W lamps could be replaced with 31W lamps, showing significant savings with only a slightly reduced lighting amount.

ECO No. 4b
DELAMP LOBBY PENDANT LIGHTS

Recommended Action

Delamp from six lamps to four lamps on lobby pendant fixtures.

Estimated Energy Savings	= 1,864kWh/yr
Estimated Demand Savings	=.6 kW
Estimated Energy Cost Savings	**= $ 274 /year**
Estimated Implementation Cost	= $ 67 (after incentives)
Simple Payback Period	= .2 years
ROI	= 410%

Background

There are eight pendant lighting fixtures in the City Hall's main lobby, each fixture with six 40W biax lamps. As the fixtures are primarily decorative and supported by natural daylighting, the six lamps could be reduced to four lamps, reducing the lighting by 1/3 but securing a savings of $274 per year.

ECO No. 5
Install Vending Machine Controllers

Figure 5 Vending Machine Controller

Recommended Action

Install a vending machine controller on the soda and snack machines.

Estimated Energy Savings	= 2,045 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Energy Cost Savings	**= $ 212 /yr**
Estimated Implementation Cost	= $ 105 (after rebate)
Simple Payback Period	= 6 months
ROI	= 202%

Background

There is one soda machine and one snack machine that can be fitted with vending machine controllers. The "VendingMiser" control device powers down a machine when the area surrounding it is unoccupied and automatically repowers the vending machine when the area is reoccupied. The intelligent controller uses fuzzy logic to learn from the habits of the occupants and modifies the time-out period accordingly. Additionally, the controllers monitor the ambient temperature while the vending machine is powered down. Using this information, the control automatically powers up the vending machine at appropriate intervals, independent of occupancy, to ensure that the vended product stays cold. VendingMiser has been tested by The Coca-Cola Company and The Pepsi-Cola Company and they have concluded that the VendingMiser has no impact on product quality or on the vending machine. For more information, visit http://www.bayviewtech.com/.

Based on a study done by Rutgers University, the average savings per soda machine is about 1,300 to 1,900 kWh/yr (about 46% saving).

ECO No. 6
Install Plug Load Occupancy Sensors

Figure 6 Plug Load Occupancy Sensor

Recommended Action

Install plug load occupancy sensors at computer stations, work stations, and/or desks.

Estimated Energy Savings	= 5,850 kWh/yr
Estimated Demand Savings	= 2.3 kW
Estimated Energy Cost Savings	**= $ 860 /yr**
Estimated Implementation Cost	= $ 4,000 (after rebate)
Simple Payback Period	= 4.7 years
ROI	= 22%

Background

The City Hall building has approximately 50 computer stations that can use plug load occupancy sensors. Plug load occupancy sensors turn equipment off when there is not an occupant near enough to use them. Any electrical “plugged in” item that can be off when the occupant is absent and powered back up without difficulty or damage is a candidate for plug load occupancy sensors. Some items that can be put on plug load occupancy sensors include computer monitors, speakers, and task lights. Personal computers are not usually put on the controlled outlets, and some sensors have one or more “uncontrolled” outlets that will not be shut off. Most plug load occupancy sensors use infrared technology to detect the presence or absence of the occupant.

ECO No. 7
REPLACE PARKING LOT LIGHTS

Figure 7 Pole Lamps in Parking Lot

Figure 8 Cobra Head Induction Light

Recommended Action

Replace 150W low pressure sodium pole lamps in parking lots with 85W cobra head induction lights.

Estimated Energy Savings	= 13,323 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Energy Cost Savings	**= $ 1,958 /yr**
Estimated Implementation Cost	= $ 14,334 (after incentives)
Simple Payback Period	= 7.3 years
ROI	= 14%

Background

The City Hall parking lot area is illuminated by 25 150W low pressure sodium pole lamps. These lights can be replaced with high efficiency 85W induction cobra head fixtures. Induction lights have a life rating of over 50,000 hours, making them especially useful in reducing maintenance time and costs in overhead applications.

ECO No. 8
RETROFIT EMERGENCY GENERATOR WITH HEAT PUMP

Recommended Action

Install Heat Pump to warm diesel generators rather than use existing strip heaters.

Energy Savings (produced)	= 13,801 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Total Cost Savings	**= $2,029 / year**
Estimated Implementation Cost	= $10,980 (after incentive)
Simple Payback Period	= 5.4 years (after incentive)
ROI	= 18.5%

Background

Most emergency power systems include diesel generators as a back-up power supply. An essential requirement to reduce the chance of failure is that the diesel generators need to be heated at all times. Traditionally this source of heating is provided by electric resistance heaters that operate at a Coefficient of Performance (COP) of 1.0; in other words, one unit of electricity equals one unit of heat. The resistance heaters are enabled at all times and operate at least 60% of the time. In addition, if the heater fails there is no redundancy or back-up heater. The engine is maintained at between 90ºF and 110ºF.

It is recommended that City Hall install a heat pump to provide the primary heating for maintaining the engine at the desired temperature. The strip heater should be maintained as a back-up heater and for those days when the outside air temperature is too cold for the heat pump to maintain an adequate temperature. The heat pump will operate at a COP of greater than 4.0, which will lead to approximately four times less energy being used for the same task.

Figure 9 Example of Heat Pump (On Right) For Back-Up Generator

ECO No. 9
Install a PV System

Figure 10 PV System

Recommended Action

Install a PV system for self-generation of electricity.

Estimated Energy Savings	= 1,064,340 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Energy Cost Savings	**= $ 156,458/ year**
Estimated Implementation Cost	= $ 3,430,971 (after rebate)
Simple Payback Period	= 21.9 years
ROI	= 4.6%

Background

The City Hall building and surrounding areas may be suitable for a PV system. It may also be possible to utilize a parking structure array system, which acts as a generator while providing shade for the vehicles in the parking lot. A formal PV analysis by CCSE through its EAS program is recommended. A simple economic analysis, like the one above, for PV systems also yields higher payback periods than more detailed versions. For example, no consideration was given to increased utility rates over a 20-year period, which is a likely and widely accepted idea. The cost of a PV system varies widely, from as low as $6/W to $12/W or higher for similar commercial applications. Some of the factors that affect this cost are panel selection, available space, system size and many other design issues that can be evaluated by a professional PV designer and/or installer. It is also possible that detailed energy consumption analysis would yield a faster payback on a smaller system designed to reduce peak loads, and new “solar friendly” rates such as the DG-R option may also help reduce payback periods.

For more information regarding the California Solar Initiative (CSI) and a list of registered installers, visit
http://www.energycenter.org/ContentPage.asp?ContentID=370&SectionID=407

ADDITIONAL MEASURES

Additional Measure 1: Install a Cool Roof

Figure 11 Before and After Cool Roof

A “cool roof” reflects and emits the sun's heat back to the sky instead of transferring it to the building below. Cool roofs enable building operators to:

- Save on annual electricity bills by reducing summer air conditioning costs
- Save peak electricity demand costs (if using time-of-use metering)
- Reduce roof maintenance and replacement expenses by extending roof life
- Increase indoor comfort in summer by reflecting heat from the roof surface
- Reduce the heat island effect in cities and suburbs
- Reduce air pollution and smog formation
- Reduce roofing waste added to landfills

City Hall has a gravel roof that could be improved with a cool roof. The savings estimate for cooling is approximately 5,750 kWh per year and contributes to a reduction of over 8,000 pounds of GHG emissions, but the payback period using the full estimated replacement cost of $44,000 is over 50 years. Once the existing roof is ready to be replaced, an incremental payback period for a cool roof versus the existing roof may be significantly lower. For more information, visit http://www.coolroofs.org/

Additional Measure 2: Perform a Demand-Response Audit

City Hall may be able to reduce charges on its electrical bill by participating in one or several of SDG&E’s DR programs, such as Demand Bidding Program and creative rate structures like the Critical Peak Pricing structure. To find out more about these options, visit: http://www.sdge.com/esc/largemain.shtml

Comparison: Energy Conservation v. PV Generation

For comparison only, the cost of a PV system that meets the current demands of the facility was prepared in addition to the cost for a system after energy saving measures are taken. Electrical consumption at City Hall is approximately 1,179,000 kWh/yr. Opportunities 1 through 8 provide an estimated reduction of 91,130 kWh at a cost of less than $30,000. Without taking any energy saving measures, a 700kW PV system would cost approximately $3,560,000 and would meet most of the annual electrical consumption. After energy saving measures are taken, a system of 675kW would be sufficient to meet the annual electrical

consumption. The cost difference between the 700kW system and the 675kW system is over $127,000, or more than four times the cost of implementing the eight energy saving measures. As general practice, the CCSE strongly recommends taking all reasonable energy saving measures before sizing the PV system as the most cost-effective approach.

2.0 POWAY COMMUNITY SWIM CENTER

Summary for Poway Community Swim Center

Opportunities 1 through 9 (excludes PV):

Estimated Energy Savings	= 25,207 kWh/yr (Electrical)
	= 17,297 therms/yr (Gas)
Equivalent CO_2 Reduction	= 222,193 pounds/ year
Estimated Demand Savings	= 7.0 kW
Estimated Energy Cost Savings	**= $ 20,816 / yr**
Estimated Implementation Cost	= $ 132,738 (after incentives)
Simple Payback Period	= 6.4 years
ROI	= 16%
Current Energy Consumption	= 453,000 kWh/yr (Electrical)
	= 67,638 therms/yr (Gas)
Percent Cost Savings with ECOs	**= 17 %**

Opportunities 1 through 10 (includes PV):

Estimated Energy Savings	= 99,915 kWh/yr , 10566 therms/yr
Equivalent CO_2 Reduction	= 280,524 pounds/ year
Estimated Demand Savings	= 7 kW
Estimated Energy Cost Savings	**= $ 32,097 /yr**
Estimated Implementation Cost	= $ 505,096 (after incentives)
Simple Payback Period	= 15.7 years
ROI	= 6%
Current Energy Consumption	= 453,000 kWh/yr, 67,638 therms/yr
Percent Cost Savings with ECOs	**= 25%**

ECO No. 1
ADJUST TURNOVER RATES IN OFF-SEASON

Recommended Action

Adjust swimming pool filter turnover rates in off-season to an eight-hour turnover rate instead of six hours (four months) during unoccupied hours.

Estimated Energy Savings	=	4,029 kWh/yr
Estimated Demand Savings	=	0.0 kW
Estimated Energy Cost Savings	**=**	**$ 322/ year**
Estimated Implementation Cost	=	$ 1,934 (after rebate)
Simple Payback Period	=	3.2 years
ROI	=	31%

Background

The requirement for turnover is six hours during occupied hours. It may be possible to reduce this turnover rate to eight hours during unoccupied hours (approximately 1750 gallons/ minute [gpm] from 2000 gpm), and only during the off-season. Feedback from pool water quality personnel indicated that it may not be possible to reduce the rate during unoccupied hours during peak season and maintain water quality standards. The off-season adjustment (approximately 500 hours per year) shows significant savings and may not affect water quality during unoccupied hours.

ECO No. 2
Install a Solar Pool Heater

Figure 12 Example of Commercial Pool SWH installation

Recommended Action

Install a solar pool heater

Estimated Energy Savings	=	16,877 therms
Estimated Energy Cost Savings	**=**	**$ 16,645/ year**
Estimated Implementation Cost	=	$ 114,498 (after rebate)
Simple Payback Period	=	6.9 years
ROI	=	14.5%

Background

The pool water at swim center is heated year-round to 82 degrees. Solar pool heating is one of the most cost effective uses of solar energy and solar pool heaters can usually be added to the existing system. Pool water is pumped through the filter and then through the solar collectors, where it is heated before it is returned to the pool. A preliminary estimate indicates a requirement of approximately 128 panels (48 sqft. each) for over 6,000 sqft. in collector size. A formal estimate by a professional and reputable designer and/or installer or a formal analysis through the CCSE's Energy Advisory Service (EAS) program is recommended.

ECO No. 3
Install A SWH System for Domestic Hot Water

Recommended Action

Install a SWH system for domestic hot water use.

Estimated Energy Savings	=	420 therms/ year
Estimated Energy Cost Savings	**=**	**$ 416 / yr**
Estimated Implementation Cost	=	$ 4,500 (after incentives)
Simple Payback Period	=	10.8 years
ROI	=	9.2%

Background

The swimming center has one 115-gallon gas water heater that consumes approximately 700 therms/ year. A SWH application may be designed to reduce the energy consumption by 70% or more for domestic hot water heating. The estimate provided here is based upon typical load reductions and the assumption of eligibility for one full rebate of $1500. A more thorough load evaluation could not be made from the metering information available, and such an analysis could yield a faster payback and higher annual savings. A formal estimate by a professional and reputable designer and/or installer (preferably a CCSE-approved installer) or further analysis through CCSE's SWH Pilot Program is recommended. For more information regarding CCSE's SWH Pilot Program, visit http://www.energycenter.org/ContentPage.asp?ContentID=409&SectionID=440. The current deadline for applications for this program is December 31, 2009. For a list of CCSE approved contractors, go to: http://www.energycenter.org/survey.asp.

ECO No. 4
REPLACE POOL LIGHTS WITH Light-Emitting Diode (LED) Lighting

Figure 13 Typical 500W Pool Lamp

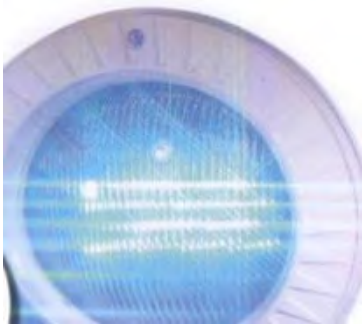


Figure 14 White LED Pool Light

Recommended Action

Replace the 500W underwater pool lights with 18W LED pool lights.

Estimated Energy Savings	= 10,845 kWh/yr
Estimated Demand Savings	= 7.2 kW
Estimated Energy Cost Savings	**= $ 1,616/ year**
Estimated Implementation Cost	= $ 1,708 (after rebate)
Simple Payback Period	= 1.1 years
ROI	= 94.6%

Background

The swimming pool lights are a standard 500W underwater light fixture. There are a number of LED options available to replace these high wattage fixtures. A commercial pool supplier or commercial lighting supplier should be consulted to verify that the swimming pool is a good candidate for these replacements.

ECO No. 5
REPLACE POLE LIGHTS

Recommended Action

Replace 250W high pressure sodium pole lamps with 85W cobra head induction lights.

Estimated Energy Savings	= 6,183 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Energy Cost Savings	**= $ 921 /yr**
Estimated Implementation Cost	= $ 9,691 (after incentives)
Simple Payback Period	= 10.5 years
ROI	= 9.5%

Figure 15 Induction Cobra Head Fixture

Background

The swimming pool area is illuminated by twenty 250W high pressure sodium fixtures (four fixtures on five light poles). These lights can be replaced with high efficiency 85W induction cobra head fixtures. Induction lights have a life rating of over 50,000 hours, making them especially useful in reducing maintenance time and costs in overhead applications.

ECO No. 6
INSTALL OCCUPANCY SENSOR

Recommended Action

Install an occupancy sensor in the facility's storage room.

Estimated Energy Savings	=	378 kWh/yr
Estimated Demand Savings	=	0.0 kW
Estimated Energy Cost Savings	**=**	**$ 56 /yr**
Estimated Implementation Cost	=	$ 117 (after incentives)
Simple Payback Period	=	2.1 years
ROI	=	48.3%

Background

The storage room at the swimming pool has a manual light switch. This could be replaced with an occupancy sensor to prevent lights from being left on when the area is unoccupied. Most storage areas have recurring problems with lights being left on because employees are often carrying something out of the storage room as they leave and are physically unable to turn the light off at that time. The use of occupancy sensors often result in energy savings of approximately 25%.

ECO No. 7
REPLACE T12 FIXTURES

Recommended Action

Replace the T12 fixture in the lifeguard room with 800 series T8 high efficiency lamps.

Estimated Energy Savings	= 35 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Energy Cost Savings	**= $ 5 /yr**
Estimated Implementation Cost	= $ 36 (after incentives)
Simple Payback Period	= 6.8 years
ROI	= 14.6%

Background

An outdated T12 fixture was identified in the lifeguard room. Rebates are available to replace and/or remove T12 fixtures. The recommended replacement at this location is a high efficiency T8 (800 series) fixture with an electronic instant start ballast. The life cycle costs for this replacement will also be cost-effective as the costs of T12 lamps rise above the costs of the now more common T8 lamps.

ECO No. 8
Install Vending Machine Controllers

Recommended Action

Install a vending machine controller on the soda and snack machines.

Estimated Energy Savings	= 2,808 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Energy Cost Savings	**= $ 418 /yr**
Estimated Implementation Cost	= $ 130 (after rebate)
Simple Payback Period	= 4 months
ROI	= 321.8%

Figure 16 Vending Machine Controller

Background

There are two beverage machines and one snack machine that can be fitted with vending machine controllers. The “VendingMiser” control device powers down a machine when the area surrounding it is unoccupied and automatically repowers the vending machine when the area is reoccupied. The intelligent controllers use fuzzy logic to learn from the habits of the occupants, and modify the time-out period accordingly. Additionally, the controllers monitor the ambient temperature while the vending machine is powered down. Using this information, the controls automatically power up the vending machines at appropriate intervals, independent of occupancy, to ensure that the vended products stay cold. VendingMiser has been tested by The Coca-Cola Company and The Pepsi-Cola Company and they have concluded that the VendingMiser has no impact on product quality or on the vending machine. For more information, visit http://www.bayviewtech.com/.

Based on a study done by Rutgers University the average savings per soda machine is about 1,300 to 1,900 kWh/yr (about 46% saving).

ECO No. 9
Replace Old Refrigerator

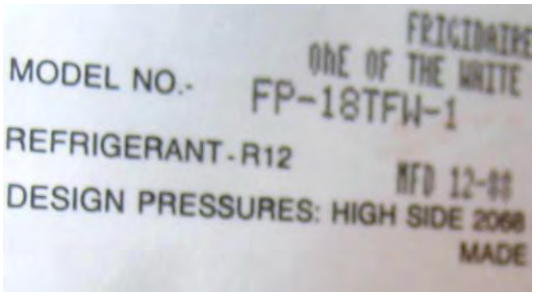


Figure 17 Refrigerator Plate in Lifeguard Room

Recommended Action

Replace the refrigerator in the lifeguard room.

Estimated Energy Savings	= 929 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Energy Cost Savings	**= $ 138 /yr**
Estimated Implementation Cost	= $ 125 (after rebate)
Simple Payback Period	= .9 years
ROI	= 110.7%

Background

The refrigerator in the lifeguard room has a manufacturing date of 1988. This refrigerator can be replaced with an Energy Star rated refrigerator of similar size for about $400. SDG&E offers a “refrigerator early retirement” rebate of $275 through EEP if an Energy Star rated refrigerator is purchased to replace the old one. With this replacement, even if the old refrigerator is still functional, the payback in utility bill savings will be less than one year.

ECO No. 10
Install a PV System

Figure 18 PV System

Recommended Action

Install a PV system for self-generation of electricity.

Estimated Energy Savings	= 74,708 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Energy Cost Savings	**= $ 11,281/ year**
Estimated Implementation Cost	= $ 372,358 (after rebate)
Simple Payback Period	= 33 years
ROI	= 3.0%

Background

The swim center and surrounding areas may be suitable for a PV system. A formal PV analysis by CCSE through its EAS program is recommended. A simple economic analysis like the one above for PV systems also yields higher payback periods than more detailed versions. For example, no consideration was given to increased utility rates over a 20-year period, which is a likely and widely accepted idea. The cost of a PV system varies widely, from as low as $6/W to $12/W or higher for similar commercial applications. Some of the factors that affect this cost are panel selection, available space, system size, and many other design issues that can be evaluated by a professional PV designer and/or installer. It is also possible that detailed energy consumption analysis would yield a faster payback on a smaller system designed to reduce peak loads, and new “solar friendly” rates such as DG-R may also help reduce payback periods.For more information regarding the CSI and a list of registered installers visit http://www.energycenter.org/ContentPage.asp?ContentID=370&SectionID=407

ADDITIONAL MEASURES

Additional Measure 1: Take Advantage of Natural Daylighting in Locker Rooms

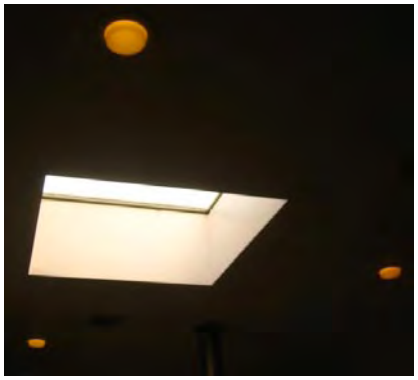


Figure 19 Skylights and Light fixtures in Locker Rooms

The locker rooms at the pool have skylights that may provide adequate lighting on most days. The natural daylighting is bright enough that any contribution of the lighting fixtures is hardly noticeable (See Figure 19). Photocell sensors could be used to turn the lights on and off for cloudy/overcast days or nights, or staff can try to keep the lights turned off manually.

3.0 POWAY COMMUNITY SENIOR CENTER

Summary for Poway Community Senior Center

Opportunities 1 and 2 (excludes PV):

Estimated Energy Savings	=	3,521 kWh/yr
Equivalent CO_2 Reduction	=	2,749 pounds/ year
Estimated Demand Savings	=	0.1 kW
Estimated Energy Cost Savings	**=**	**$ 525 / yr**
Estimated Implementation Cost	=	$ 674 (after incentives)
Simple Payback Period	=	1.3 years
ROI	=	78%
Current Energy Consumption	=	76,240 kWh/yr
Percent Savings with ECOs	**=**	**4.6 %**

Opportunities 1 through 3 (includes PV):

Estimated Energy Savings	=	18,521 kWh/yr
Equivalent CO_2 Reduction	=	14,461 pounds/ year
Estimated Demand Savings	=	.1 kW
Estimated Energy Cost Savings	**=**	**$ 2,760 /yr**
Estimated Implementation Cost	=	$ 75,124 (after incentives)
Simple Payback Period	=	27.2 years
ROI	=	4%
Current Energy Consumption	=	76,240 kWh/yr
Percent Savings with ECOs	**=**	**24%**

ECO No. 1
Install Vending Machine Controllers

Recommended Action

Install a vending machine controller on the soda and snack machines.

Estimated Energy Savings	= 2,321 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Energy Cost Savings	**= $ 346 /yr**
Estimated Implementation Cost	= $ 105 (after rebate)
Simple Payback Period	= 4 months
ROI	= 329.4%

Figure 20 Vending Machine Controller

Background

There is one beverage machine and one snack machine that can be fitted with vending machine controllers. The "VendingMiser" control device powers down a machine when the area surrounding it is unoccupied and automatically repowers the vending machine when the area is reoccupied. The intelligent controllers use fuzzy logic to learn from the habits of the occupants, and modify the time-out period accordingly. Additionally, the controllers monitor the ambient temperature while the vending machines are powered down. Using this information, the controls automatically power up the vending machines at appropriate intervals, independent of occupancy, to ensure that the vended products stay cold. VendingMiser has been tested by The Coca-Cola Company and The Pepsi-Cola Company and they have concluded that the VendingMiser has no impact on product quality or on the vending machine. For more information, visit http://www.bayviewtech.com/.

Based on a study done by Rutgers University the average savings per soda machine is about 1,300 to 1,900 kWh/yr (about 46% saving).

ECO No. 2
Replace Old Refrigerators

Figure 21 Old Refrigerators Eligible for Early Retirement

Recommended Action

Replace the old refrigerators in the kitchen area.

Estimated Energy Savings	= 1,200 kWh/yr
Estimated Demand Savings	= 0.1 kW
Estimated Energy Cost Savings	**= $ 179 /yr**
Estimated Implementation Cost	= $ 569 (after rebate)
Simple Payback Period	= 3.2 years
ROI	= 31.4%

Background

The two refrigerators in the kitchen area have manufacturing dates of 1989 and 1991. These refrigerators can be replaced with Energy Star rated refrigerators of similar size for about $1,119 combined. SDG&E offers a “refrigerator early retirement” rebate of $275 through EEP if an Energy Star rated refrigerator is purchased to replace the old one. With this replacement, even if the old refrigerator is still functional, the payback in utility bill savings is approximately three years, and the final cost is reduced to only $569.

ECO No. 3
Install a PV System

Figure 22 PV System

Recommended Action

Install a 10-kW PV system for self-generation of electricity.

Estimated Energy Savings	= 15,000 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Energy Cost Savings	**= $ 2,235/ year**
Estimated Implementation Cost	= $ 74,450 (after rebate)
Simple Payback Period	= 33 years
ROI	= 3%

Background

The senior center and surrounding areas may be suitable for a PV system. A formal PV analysis by CCSE through its EAS program is recommended. A simple economic analysis like the one above for PV systems also yields higher payback periods than more detailed versions. For example, no consideration was given to increased utility rates over a 20-year period, which is a likely and widely accepted idea. The cost of a PV system varies widely, from as low as $6/W to $12/W or higher for similar commercial applications. Some of the factors that affect this cost are panel selection, available space, system size, and many other design issues that can be evaluated by a professional PV designer and/or installer. It is also possible that detailed energy consumption analysis would yield a faster payback on a smaller system designed to reduce peak loads, and new “solar friendly” rates such as DG-R may also help reduce payback periods. For more information regarding the CSI and a list of registered installers, visit
http://www.energycenter.org/ContentPage.asp?ContentID=370&SectionID=407

ADDITIONAL MEASURES

Additional Measure 1: Install MELINK controls on the kitchen hood.

Figure 23 Existing Kitchen Hood

Install an energy controller on exhaust fans above stoves in kitchen. The control system adjusts the speed of the fan based upon temperature feedback, speeding up at higher temperatures and slowing down for lower temperatures, instead of running 100% all of the time. The control will improve the hood efficiency by up to 50%. Typical annual operating savings are $1500-$3000 per hood, with a payback of 1-3 years. They also improve kitchen comfort, indoor air quality, and fire safety. For more information, visit: http://www.melinkcorp.com/products.html

4.0 POWAY COMMUNITY PARK AUDITORIUM

Summary for Poway Community Center Auditorium

Opportunities 1 and 2 (excludes PV):

Estimated Energy Savings	= 4,350 kWh/yr
Equivalent CO_2 Reduction	= 3,396 pounds/ year
Estimated Demand Savings	= 1 kW
Estimated Energy Cost Savings	**= $ 648 / yr**
Estimated Implementation Cost	= $ 2,479 (after incentives)
Simple Payback Period	= 3.8 years
ROI	= 26%
Current Energy Consumption	= 19,790 kWh/yr
Percent Savings with ECOs	**= 22 %**

Opportunities 1 through 3 (includes PV):

Estimated Energy Savings	= 19,350 kWh/yr
Equivalent CO_2 Reduction	= 15,108 pounds/ year
Estimated Demand Savings	= 1 kW
Estimated Energy Cost Savings	**= $ 2,883 /yr**
Estimated Implementation Cost	= $ 76,929 (after incentives)
Simple Payback Period	= 26.7 years
ROI	= 4%
Current Energy Consumption	= 19,790 kWh/yr
Percent Savings with ECOs	**= 98%**

ECO No. 1
Retrofit Outdoor Down Lights

Figure 24 Existing Lighting

Recommended Action

Retrofit 50W outdoor metal halide down lights with 15W CFL down lights.

Estimated Energy Savings	= 1,722 kWh/yr
Estimated Demand Savings	= 0.4 kW
Estimated Energy Cost Savings	**= $ 257 /yr**
Estimated Implementation Cost	= $ 154 (after rebate)
Simple Payback Period	= 7 months
ROI	= 166.7%

Background

There are twelve 50W-metal halide down lights illuminating the exterior of the auditorium. The existing lamp in each fixture may be a candidate for direct replacement with a 15W CFL lamp.

ECO No. 2
Retrofit Incandescent Exit Signs

Recommended Action

Retrofit incandescent exit signs with photo-luminescent signs where eligible.

Estimated Energy Savings	= 2,628 kWh/yr
Estimated Demand Savings	= 0.3 kW
Estimated Energy Cost Savings	**= $ 392 /yr**
Estimated Implementation Cost	= $ 2,325 (after rebate)
Simple Payback Period	= 5.9 years
ROI	= 16.8%

Background

There are 15 incandescent exit signs that are good candidates for replacement with photo-luminescent signs. Photo-luminescent exit signs use “glow-in-the-dark” technology. These signs absorb nearby light and then glow during an emergency blackout condition. They are non-electrical, non-radioactive, non-toxic and have no disposal regulations. Though units do not consume power, they must be placed near an artificial light source that is illuminated while the area is occupied otherwise the sign will not glow properly. Photo-luminescent exit signs have a minimum foot-candle requirement from the nearest light source. Check with local codes and the manufacturer of choice to verify the exact foot-candle requirements for the exit sign purchased.

Figure 25 Photo-luminescent Exit Sign

ECO No. 3
Install a PV System

Figure 26 PV System

Recommended Action

Install a 10-kW PV system for self-generation of electricity.

Estimated Energy Savings	= 15,000 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Energy Cost Savings	**= $ 2,235/ year**
Estimated Implementation Cost	= $ 74,450 (after rebate)
Simple Payback Period	= 33 years
ROI	= 3.0%

Background

The Poway Community Center Auditorium and surrounding areas may be suitable for a PV system. A formal PV analysis by CCSE through its EAS program is recommended. A simple economic analysis, like the one above, for PV systems also yields higher payback periods than more detailed versions. For example, no consideration was given to increased utility rates over a 20-year period, which is a likely and widely accepted idea. The cost of a PV system varies widely, from as low as $6/W to $12/W or higher for similar commercial applications. Some of the factors that affect this cost are panel selection, available space, system size, and many other design issues that can be evaluated by a professional PV designer and/or installer. It is also possible that detailed energy consumption analysis would yield a faster payback on a smaller system designed to reduce peak loads, and new “solar friendly” rates such as DGR may also help reduce payback periods.

For more information regarding the CSI and a list of registered installers, visit http://www.energycenter.org/ContentPage.asp?ContentID=370&SectionID=407

5.0 POWAY CENTER FOR THE PERFORMING ARTS

Summary for Poway Center for Performing Arts

Opportunities 1 through 4:

Estimated Energy Savings	=	44,712 kWh/yr
Equivalent CO_2 Reduction	=	34,911 pounds/ year
Estimated Demand Savings	=	19 kW
Estimated Energy Cost Savings	**=**	**$ 7,556 / yr**
Estimated Implementation Cost	=	$ 11,970 (after incentives)
Simple Payback Period	=	1.6 years
ROI	=	63%
Current Energy Consumption	=	693,701 kWh/yr
Percent Savings with ECOs	**=**	**6 %**

ECO No. 1
Replace 90W Par 38 Lamps

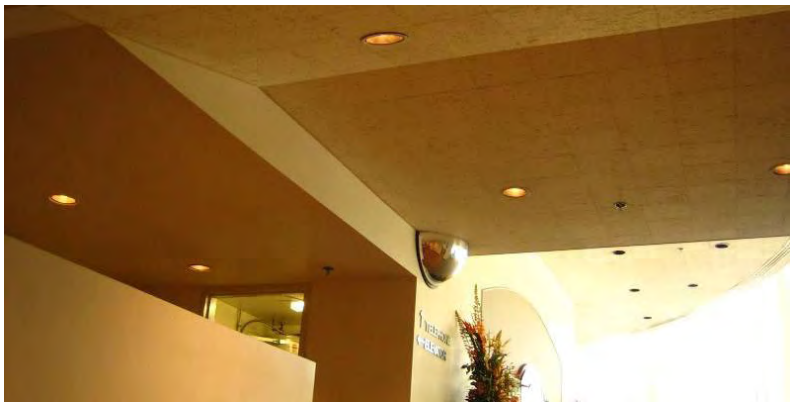


Figure 27 Recessed Can Lights with Par 38 Lamps

Figure 28: 26W PL CFL

Recommended Action

Replace the 90W Par 38 lamps with a 26W PL CFL.

Estimated Energy Savings	= 27,955 kWh/yr
Estimated Demand Savings	= 9.6 kW
Estimated Energy Cost Savings	**= $ 4,724 /yr**
Estimated Implementation Cost	= $ 9,102 (after rebate)
Simple Payback Period	= 1.9 years
ROI	= 52%

Background

About 150 90W Par 38 lamps are used in the facility for indirect lighting. These should be replaced with an equally bright 26W “PL” CFL.

ECO No. 2
INSTALL OCCUPANCY SENSOR

Figure 29 Lights at Back Stage/ Loading Dock

Recommended Action

Install ceiling mounted occupancy sensor in backstage area.

Estimated Energy Savings	= 2,590 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Energy Cost Savings	**= $ 438 /yr**
Estimated Implementation Cost	= $ 833 (after incentives)
Simple Payback Period	= 1.9 years
ROI	= 53 %

Background

An occupancy sensor for the high bay fixtures at the back stage loading area is recommended. Lights were on during the audit and the area was unoccupied. Most storage areas have recurring problems with lights being left on because employees are often carrying something out of the storage area as they leave and are physically unable to turn the light off at that time. The use of occupancy sensors often result in energy savings of approximately 25%.

ECO No. 3
Replace Incandescent Lights in Restrooms

Figure 30 Restroom with 42 Lamps around Mirrors

Recommended Action

Replace all 40W incandescent lamps in restrooms with 9W CFLs.

Estimated Energy Savings	=	8,576 kWh/yr
Estimated Demand Savings	=	2.9 kW
Estimated Energy Cost Savings	**=**	**$1,449 / yr**
Estimated Implementation Cost	=	$ 435 (after incentives)
Simple Payback Period	=	4 Months
ROI	=	333%

Background

All large restroom mirrors were lit by incandescent lamps. There are approximately 95 lamps through the 4 restroom observed. These could be directly replaced with 9W CFLs. An additional savings is accrued but not shown, because of the longer life of CFLs over incandescents.

Figure 31 Sample Decorative CFL

ECO No. 4
Replace Incandescent Lights in Dressing Rooms

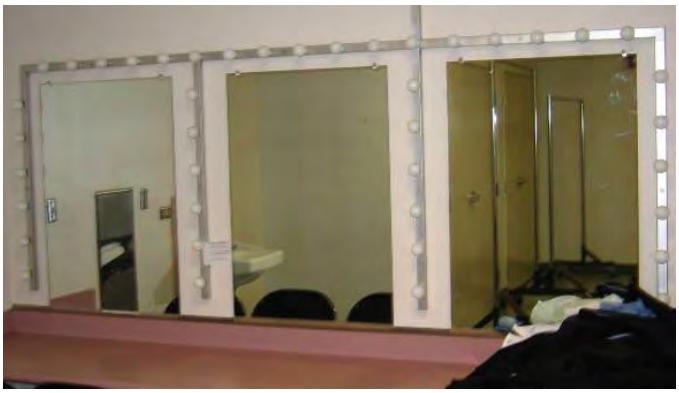


Figure 32 Incandescent Lights in Dressing Room

Recommended Action

Replace all 25W incandescent lamps in dressing rooms with 9W CFLs.

Estimated Energy Savings	= 5,591 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Energy Cost Savings	**= $ 945 /yr**
Estimated Implementation Cost	= $ 1,600 (after incentives)
Simple Payback Period	= 1.7 years
ROI	= 59%

Background

All dressing room mirrors were lit by incandescent lamps. There are approximately 95 lamps through the 5 dressing rooms. These could be directly replaced with decorative 9W CFLs. An additional savings is accrued but not shown, because of the longer life of CFLs over incandescents.

Figure 303 A 9W Vanity Globe CFL

ADDITIONAL MEASURES

Additional Measure: Install a PV System.

The Performing Arts Center and surrounding areas may be suitable for a PV system. A formal PV analysis by CCSE through its EAS program is recommended. A simple economic analysis for PV systems yields higher payback periods than more detailed versions. The cost of a PV system varies widely, from as low as $6/W to $12/W or higher for similar commercial applications. Some of the factors that affect this cost are panel selection, available space, system size and many other design issues that can be evaluated by a professional PV designer and/or installer. It is also possible that detailed energy consumption analysis would yield a faster payback on a smaller system designed to reduce peak loads, and new "solar friendly" rates such as DGR may also help reduce payback periods. For more information regarding the CSI and a list of registered installers, visit http://www.energycenter.org/ContentPage.asp?ContentID=370&SectionID=407

6.0 POWAY FIRE STATION #1

Summary for Poway Fire Station #1

Opportunities 1 through 4 (excludes PV):

Estimated Energy Savings	=	12,523 kWh/yr (Electrical)
	=	180 therms/yr (Gas)
Equivalent CO_2 Reduction	=	11,886 pounds/ year
Estimated Demand Savings	=	14.5 kW
Estimated Energy Cost Savings	**=**	**$ 2,105 / yr**
Estimated Implementation Cost	=	$ 23,443 (after incentives)
Simple Payback Period	=	11.1 years
ROI	=	9%
Current Energy Consumption	=	118,720 kWh/yr (Electrical)
Percent Savings with ECOs	**=**	**10 %**

Opportunities 1 through 5 (includes PV):

Estimated Energy Savings	=	103,667 kWh/yr
	=	180 therms/yr (Gas)
Equivalent CO_2 Reduction	=	83,050 pounds/ year
Estimated Demand Savings	=	14.5 kW
Estimated Energy Cost Savings	**=**	**$ 15,868 /yr**
Estimated Implementation Cost	=	$ 477,719 (after incentives)
Simple Payback Period	=	30.1 years
ROI	=	6%
Current Energy Consumption	=	118,720 kWh/yr (Electrical)
Percent Cost Savings with ECOs	**=**	**87%**

ECO No. 1
INSTALL OCCUPANCY SENSORS

Recommended Action

Install occupancy sensors in all private offices.

Estimated Energy Savings	=	480 kWh/yr
Estimated Demand Savings	=	0.2 kW
Estimated Energy Cost Savings	**=**	**$ 73 /yr**
Estimated Implementation Cost	=	$ 258 (after incentives)
Simple Payback Period	=	3.5 years
ROI	=	28 %

Background

Fire Station #1 has approximately five private offices that are lit by 2x4 T8 fixtures that have (2) 32W 4100K T8 lamps. Approximately ten of these fixtures can be controlled by occupancy sensors.

ECO No. 2
REPLACE PERIMETER WALL PACKS

Figure 314 A 32W Fluorescent Wall Pack

Recommended Action

Replace the 70W exterior wall packs with 32W CFL wall packs.

Estimated Energy Savings	= 480 kWh/yr
Estimated Demand Savings	= 0.2 kW
Estimated Energy Cost Savings	**= $ 73 /yr**
Estimated Implementation Cost	= $ 258 (after incentives)
Simple Payback Period	= 3.5 years
ROI	= 38%

Background

There are six LPS wall packs around the exterior walls that could be replaced with lower wattage equivalents. The 70W high pressure sodium fixtures can be replaced with 32W CFL fixtures while maintaining or exceeding the current light quality and quantity.

ECO No. 3
REPLACE HVAC UNITS

Recommended Action

Replace the existing gas pack HVAC with new, higher efficiency units.

Estimated Energy Savings	=	10,985 kWh/yr
Estimated Demand Savings	=	13.7 kW
Estimated Energy Cost Savings	**= $**	**1,659 / yr**
Estimated Implementation Cost cost)	= $	18,262 (after rebate, incremental
Simple Payback Period	=	11.0 years
ROI	=	9.1%

Background

There are four existing HVAC units with a total of 18 tons of service. The outdated units have an EER rating of 7 (or 1.72 kW/Ton), and they can be upgraded to new units with an EER rating of 14 (or 0.86 kW/Ton). Because many of the units are at or near the end of their useful life, an incremental cost analysis was performed. This is the cost difference between the cost of standard or similar equipment to the existing and the cost of the higher efficiency units used for calculating the energy savings.

ECO No. 4
INSTALL AN SWH SYSTEM

Figure 32 Example of SWH

Recommended Action

Install an SWH system for domestic hot water use.

Estimated Energy Savings	= 180 Therms/ Year
Estimated Energy Cost Savings	**= $ 241 / yr**
Estimated Implementation Cost	= $ 4,500 (after incentives)
Simple Payback Period	= 21.0 years
ROI	= 4.8%

Background

Fire Station #1 has a 50-gallon gas water heater that consumes approximately 300 therms per year. A SWH application may be designed to reduce the energy consumption by 70% or more for domestic hot water heating. The estimate provided here is based upon typical load reductions and the assumption of eligibility for one full rebate of $1500. A more thorough load evaluation could not be made from the metering information available, and such an analysis could yield a faster payback and higher annual savings. A formal estimate by a professional and reputable designer and/or installer (preferably a CCSE approved installer) or further analysis through CCSE's SWH Pilot Program is recommended.

For more information regarding CCSE's SWH pilot program, visit http://www.energycenter.org/ContentPage.asp?ContentID=409&SectionID=440. The current deadline for applications for this program is December 31, 2009. For a list of CCSE approved contractors, go to: http://www.energycenter.org/survey.asp.

ECO No. 5
INSTALL A PV SYSTEM

Figure 33 PV System

Recommended Action

Install a PV system for self-generation of electricity.

Estimated Energy Savings	= 91,144 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Energy Cost Savings	**= $ 13,763/ year**
Estimated Implementation Cost	= $ 454,277 (after rebate)
Simple Payback Period	= 33 years
ROI	= 3%

Background

Fire Station #1 and surrounding areas may be suitable for a PV system. It may also be possible to utilize a parking structure array system (solar trees) which acts as a generator while providing shade for the vehicles in the parking lot. A formal PV analysis by CCSE through its EAS program is recommended. A simple economic analysis like the one above for PV systems also yields higher payback periods than more detailed versions. For example, no consideration was given to increased utility rates over a 20-year period, which is a likely and widely accepted idea. The cost of a PV system varies widely, from as low as $6/W to $12/W or higher for similar commercial applications. Some of the factors that affect this cost are panel selection, available space, system size, and many other design issues that can be evaluated by a professional PV designer and/or installer. It is also possible that detailed energy consumption analysis would yield a faster payback on a smaller system designed to reduce peak loads, and new “solar friendly” rates such as DGR may also help reduce payback periods. For more information regarding the CSI and a list of registered installers, visit
http://www.energycenter.org/ContentPage.asp?ContentID=370&SectionID=407

7.0 POWAY FIRE STATION #3

Summary for Poway Fire Station #3

Opportunities 1 and 2 (excludes PV):

Estimated Energy Savings	=	8,620 kWh/yr (Electrical)
	=	300 therms/yr (Gas)
Equivalent CO_2 Reduction	=	10,243 pounds/ year
Estimated Demand Savings	=	.3 kW
Estimated Energy Cost Savings	**=**	**$ 1,659 / yr**
Estimated Implementation Cost	=	$ 16,242 (after incentives)
Simple Payback Period	=	9.8 years
Return on Investment	=	10%
Current Energy Consumption	=	172,800 kWh/yr (Electrical)
Percent Savings with ECOs	**=**	**10 %**

Opportunities 1 through 3 (includes PV):

Estimated Energy Savings	=	150,566 kWh/yr
	=	300 therms/yr (Gas)
Equivalent CO_2 Reduction	=	121,073 pounds/ year
Estimated Demand Savings	=	.3 kW
Estimated Energy Cost Savings	**=**	**$ 23,093 /yr**
Estimated Implementation Cost	=	$ 723,721 (after incentives)
Simple Payback Period	=	31.3 years
Return on Investment	=	3%
Current Energy Consumption	=	172,800 kWh/yr (Electrical)
Percent Savings with ECOs	**=**	**13%**

ECO No. 1
INSTALL AN SWH SYSTEM

Figure 34 Example of SWH

Recommended Action

Install a SWH system for domestic hot water use.

Estimated Energy Savings	= 300 Therms/ Year
Estimated Energy Cost Savings	**= $ 357 / yr**
Estimated Implementation Cost	= $ 6,500 (after incentives)
Simple Payback Period	= 18.2 years
ROI	= 5.5%

Background

Fire Station #3 has a100-gallon gas water heater that consumes approximately 600 therms/ year. A SWH application may be designed to reduce the energy consumption by 70% or more for domestic hot water heating. The estimate provided here is based upon typical load reductions and the assumption of eligibility for one full rebate of $1500. A more thorough load evaluation could not be made from the metering information available, and such an analysis could yield a faster payback and higher annual savings. A formal estimate by a professional and reputable designer and/or installer (preferably a CCSE approved installer) or a formal analysis through CCSE's EAS program is recommended. For more information regarding CCSE's SWH pilot program, visit http://www.energycenter.org/ContentPage.asp?ContentID=409&SectionID=440. The current deadline for applications for this program is December 31, 2009. For a list of CCSE approved contractors, go to: http://www.energycenter.org/survey.asp.

ECO No. 2
RETROFIT EMERGENCY GENERATOR WITH HEAT PUMP

Recommended Action

Install a Heat Pump to warm diesel generators rather than use existing strip heaters.

Energy Savings (produced)	= 8,620 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Total Cost Savings	**= $1,302 / year**
Estimated Implementation Cost	= $ 9,742 (after incentive)
Simple Payback Period	= 7.5 years (after incentive)
ROI	= 13.4%

Figure 35 Example of Heat Pump (On Right) For Back-Up Generator

Background

Most emergency power systems include diesel generators as a back-up power supply. An essential requirement to reduce the chance of failure is that the diesel generators need to be heated at all times. Traditionally this source of heating is provided by electric resistance heaters that operate at a Coefficient of Performance (COP) of 1.0; in other words one unit of electricity equals one unit of heat. The resistance heaters are enabled at all times and operate at least 60% of the time. In addition, if the heater fails there is no redundancy or back-up heater. The engine is maintained at between 90ºF and 110ºF.

It is recommended that Fire Station #3 install a heat pump to provide the primary heating for maintaining the engine at the desired temperature. The strip heater should be maintained as a back-up heater and for those days when the outside air temperature is too cold for the heat pump to maintain an adequate temperature. The heat pump will operate at a COP of greater than 4.0, which will lead to approximately 4 times less energy being used for the same task.

ECO No. 3
INSTALL A PV SYSTEM

Figure 36 PV System

Recommended Action

Install a PV system for self-generation of electricity.

Estimated Energy Savings	= 141,946 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Energy Cost Savings	**= $ 21,434/ year**
Estimated Implementation Cost	= $ 707,480 (after rebate)
Simple Payback Period	= 33 years
ROI	= 3%

Background

Fire Station #3 and surrounding areas may be suitable for a PV system. It may also be possible to utilize a parking structure array system ("Solar Trees"), which acts as a generator while providing shade for the vehicles in the parking lot. A formal estimate by a professional and reputable designer and/or installer (preferably a CCSE approved installer) is recommended. Simple economic analysis like the one above for PV systems also yield higher payback periods than more detailed versions. For example, no consideration was given to increased utility rates over a 20-year period, which is a likely and widely accepted idea. The cost of a PV system varies widely, from as low as $6/W to $12/W or higher for similar commercial applications. Some of the factors that affect this cost are panel selection, available space, system size, and many other design issues that can be evaluated by a professional PV designer and/or installer. It is also possible that detailed energy consumption analysis would yield a faster payback on a smaller system designed to reduce peak loads, and new "solar friendly" rates such as DG-R may also help reduce payback periods. For more information regarding the CSI and a list of registered installers, visit http://www.energycenter.org/ContentPage.asp?ContentID=370&SectionID=407

8.0 POWAY LIBRARY

Summary for Library

Opportunities 1 through 6:

Estimated Energy Savings	= 8,935 kWh/yr
Equivalent CO_2 Reduction	= 9,669 pounds/ year
Estimated Demand Savings	= 2 kW
Estimated Energy Cost Savings	= $ 1,517 /yr
Estimated Implementation Cost	= $ 4, 91(after incentives)
Simple Payback Period	= 2.8 years
ROI	= 35%
Current Energy Consumption	= 377,200
Percent Savings with ECOs	**= 2.4%**

ECO No. 1

REPLACE PENDANT PAR-38 LAMPS

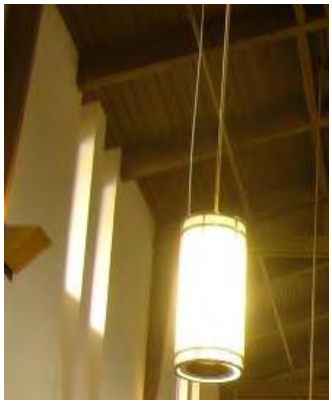


Figure 40 Pendant with Par 38

Recommended Action

Retrofit Par 38 incandescent down lights with 23W CFLs

Estimated Energy Savings	= 3,458 kWh/yr
Estimated Demand Savings	= 1.0 kW
Estimated Energy Cost Savings	**= $588/yr**
Estimated Implementation Cost	= $207 (after incentives)
Simple Payback Period	= 5 months
ROI	= 52%

Background

The main area in the Library is illuminated by 19 pendant up/down lights. The fixture down light section uses 75W incandescent Par 38 lamps. We recommend replacing them with energy efficient 23W CFLs. Light quality and quantity will be maintained while saving energy.

ECO No. 2

INSTALL OCCUPANCY SENSOR IN PRIVATE OFFICES

Recommended Action

Install an occupancy sensor in the facility's private offices.

Estimated Energy Savings	= 1,985 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Energy Cost Savings	**= $ 337 /yr**
Estimated Implementation Cost	= $ 600 (after incentives)
Simple Payback Period	= 1 year
ROI	= 97%

Background

All three private offices at the library have a manual light switch. This could be replaced with an occupancy sensor to prevent lights from being left on when the area is unoccupied. Most private offices have recurring problems with lights being left on because employees leave, thinking they may get back in 5 minutes or less. The use of occupancy sensors often results in energy savings of approximately 30%.

ECO No. 3
REPLACE LIBRARY SPOTLIGHTS

Figure 41 MR-16 Spotlighting In Library

Figure 42 LED MR-16 Replacement

Recommended Action

Replace the 50W MR-16 spotlights in the Library with 5W LED spotlights.

Estimated Energy Savings	= 2,363kWh/yr
Estimated Demand Savings	= .7 kW
Estimated Energy Cost Savings	**= $ 402 /yr**
Estimated Implementation Cost	= $ 1,307 (after incentives)
Simple Payback Period	= 3.3 years
ROI	= 31%

Background

The kids/youth computer section of the library area is illuminated by 10 50W MR-16 halogen spot lights. The use of the MR-16s for task lighting instead of actual spotlighting provides a good opportunity to switch to available LED equivalents with significantly lower wattage. LEDs have a rated life of 50,000 hours.

ECO No. 4
RETROFIT 2'x2' FIXTURES WITH LOWER WATTAGE LAMPS

Recommended Action

Retrofit the 2ft x 2ft fixtures that have 32W U-tube T8s lamps with 19W 2ft linear T8s.

Estimated Energy Savings	= 1,100 kWh/yr
Estimated Demand Savings	= 0.3 kW
Estimated Energy Cost Savings	**= $ 170 /yr**
Estimated Implementation Cost	= $ 1,210 (after incentives)
Simple Payback Period	= 6.8 years
ROI	= 15%

Background

The library has approximately 11 two-lamp 2' x 2' fluorescent fixtures in hallway and office areas. The lamps are U-shaped tubes of 32W each. We recommend retrofitting the fixtures with 19W 2-ft F17 T8 lamps. If a parabolic louver is in the lamp, we recommend replacing it with a clear prismatic lens.

ECO No. 5
TURN OFF WALL-WASHERS

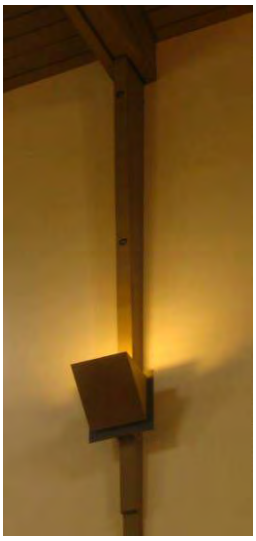


Figure 43 Wall-washer light

Recommended Action

Turn off the library wall-washer uplights in the main area of the library.

Estimated Energy Savings	= 2,205 kWh/yr
Estimated Demand Savings	= .6 kW
Estimated Energy Cost Savings	**= $ 375 / year**
Estimated Implementation Cost	= $ 90 (after incentives)
Simple Payback Period	= 3 months
ROI	= 418%

Background

The main area of the library has nine 70W high pressure sodium lamps accentuating the wall architecture. Since these lamps are not providing much light quantity to the library, we recommend turning them off.

ECO No. 6
RETROFIT 2'x4' FIXTURES

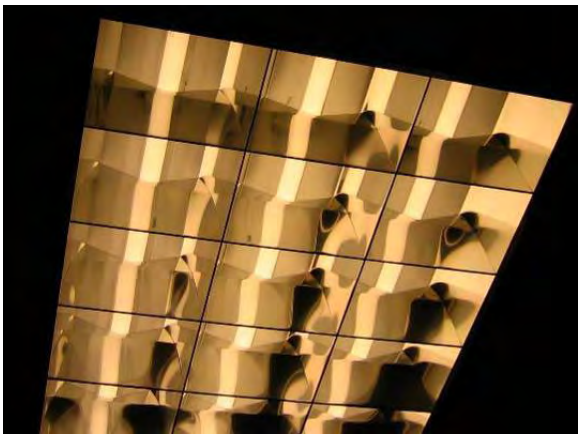


Figure 44 3-Lamp Fixture with 27-Cell Parabolic Louvers

Recommended Action

Retrofit the 2ft x 4ft fixtures that have three 32W T8 lamps in a 27-cell parabolic louver with a (2) 32W T8s and prismatic lenses.

Estimated Energy Savings	= 1,372 kWh/yr
Estimated Demand Savings	= 0.4 kW
Estimated Energy Cost Savings	**= $ 233 /yr**
Estimated Implementation Cost	= $ 1,385 (after incentives)
Simple Payback Period	= 5.9 years
ROI	= 17%

Background

The library has approximately 14 three-lamp 2' x 4' fluorescent fixtures in hallway and office areas. The fixtures have 27-cell parabolic louvers. We recommend retrofitting the fixtures to 2 x 32W 4100K 800 series T8 lamps. If a parabolic louver is in the lamp, we recommend replacing it with a clear prismatic lens.

9.0 POWAY SHERIFF'S STATION

Summary for Sheriff's Station

Opportunities 1 through 4 (excludes PV):

Estimated Energy Savings	=	8,816 kWh/yr
Equivalent CO_2 Reduction	=	6,884 pounds/ year
Estimated Demand Savings	=	2 kW
Estimated Energy Cost Savings	**=**	**$ 1,508 / yr**
Estimated Implementation Cost	=	$ 2,327 (after incentives)
Simple Payback Period	=	1.5 years
Return on Investment	=	65%
Current Energy Consumption	=	310,800 kWh/yr
Percent Savings with ECOs	**=**	**2.8 %**

Opportunities 1 through 5 (includes PV):

Estimated Energy Savings	=	308,816 kWh/yr
Equivalent CO_2 Reduction	=	241,121 pounds/ year
Estimated Demand Savings	=	2 kW
Estimated Energy Cost Savings	**=**	**$ 52,808 /yr**
Estimated Implementation Cost	=	$ 1,491,327 (after incentives)
Simple Payback Period	=	28.2 years
Return on Investment	=	4%
Current Energy Consumption	=	310,800 kWh/yr
Percent Savings with ECOs	**=**	**99%**

ECO No. 1
TURN OFF WALL-WASHERS

Figure 375 Wall-washer light

Recommended Action

Turn off the Station wall-washer up-lights in the open office area.

Estimated Energy Savings	= 1,187 kWh/yr
Estimated Demand Savings	= .6 kW
Estimated Energy Cost Savings	**= $ 323 / year**
Estimated Implementation Cost	= $ 6 (after incentives)
Simple Payback Period	= immediate

Background

The main office area of the sheriff station has eight 70W metal halide lamps accentuating the wall architecture. Since these lamps are not providing much light quantity to the Sheriff's Station, we recommend turning them off.

ECO No. 2
INSTALL OCCUPANCY SENSORS

Recommended Action

Install occupancy sensors in all private offices.

Estimated Energy Savings	= 2,595 kWh/yr
Estimated Demand Savings	= 0.2 kW
Estimated Energy Cost Savings	**= $ 444 /yr**
Estimated Implementation Cost	= $ 1,049 (after incentives)
Simple Payback Period	= 2.4 years
ROI	= 42%

Background

The Sheriff's Station has approximately nine private offices that are lit by 2x4 T8 fixtures that have three 32W T8 lamps. We recommend installing occupancy sensors to control these fixtures. Most private offices have recurring problems with lights being left on because employees leave thinking they may get back in five minutes or less, but then are unable to return as expected. The use of occupancy sensors often result in energy savings of approximately 30%.

ECO No. 3
RETROFIT 2'x4' FIXTURES

Recommended Action

Retrofit the 2ft x 4ft fixtures that have (3) 32W T8 lamps with (2) 32W 4100K T8s.

Estimated Energy Savings	= 1,835 kWh/yr
Estimated Demand Savings	= 0.6 kW
Estimated Energy Cost Savings	**= $ 314 /yr**
Estimated Implementation Cost	= $ 1,168 (after incentives)
Simple Payback Period	= 3.7 years
ROI	= 27%

Background

The Station has (9) three-lamp 2' x 4' fluorescent fixtures illuminating the private offices. We recommend retrofitting the fixtures to 2 x 32W 4100K 800 series T8 lamps. We recommend cleaning the lenses as part of the retrofit.

ECO No. 4
Install Vending Machine Controllers

Recommended Action

Install a vending machine controller on the soda and snack machines.

Estimated Energy Savings	= 2,321 kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Energy Cost Savings	**= $ 428 /yr**
Estimated Implementation Cost	= $ 105 (after rebate)
Simple Payback Period	= 3 months
ROI	= 407%

Figure 46 Vending Machine Controller

Background

There is one beverage machine and one snack machine that can be fitted with vending machine controllers. The “VendingMiser” control device powers down a machine when the area surrounding it is unoccupied and automatically repowers the vending machine when the area is reoccupied. Intelligent controllers use fuzzy logic to learn from the habits of the occupants, and modify the time-out periods accordingly. Additionally, the controllers monitor the ambient temperature while the vending machine is powered down. Using this information, the control automatically powers up the vending machine at appropriate intervals, independent of occupancy, to ensure that the vended product stays cold. VendingMiser has been tested by The Coca-Cola Company and The Pepsi-Cola Company and they have concluded that the VendingMiser has no impact on product quality or on the vending machine. For more information, visit http://www.bayviewtech.com/.

Based on a study done by Rutgers University the average savings per soda machine is about 1,300 to 1,900 kWh/yr (about 46% saving).

ECO No. 5
Install a PV System

Figure 47 PV System

Recommended Action

Install a 200-kW PV system for self-generation of electricity.

Estimated Energy Savings	= 300,000kWh/yr
Estimated Demand Savings	= 0.0 kW
Estimated Energy Cost Savings	**= $ 51,300/ year**
Estimated Implementation Cost	= $ 1,489,000 (after rebate)
Simple Payback Period	= 29 years
ROI	= 3%

Background

The Poway Sheriff's Station and surrounding areas may be suitable for a PV system. A formal PV analysis by CCSE through its EAS program is recommended. A simple economic analysis, like the one above, for PV systems also yield higher payback periods than more detailed versions. For example, no consideration was given to increased utility rates over time, which is likely and widely accepted over a 20-year period. The cost of a PV system varies widely, from as low as $6/W to $12/W or higher for similar commercial applications. Some of the factors that affect this cost are panel selection, available space, system size, and many other design issues that can be evaluated by a professional PV designer and/or installer. It is also possible that detailed energy consumption analysis would yield a faster payback on a smaller system designed to reduce peak loads, and new "solar friendly" rates such as DGR may also help reduce payback periods. For more information regarding the CSI and a list of registered installers, visit
http://www.energycenter.org/ContentPage.asp?ContentID=370&SectionID=407

III. POWAY SUSTAINABILITY EDUCATION AND OUTREACH RECOMMENDATIONS

Based on ECOs coupled with California's sustainable energy policies, Poway can take advantage of multiple incentive programs and policies to further their planning goals. The following is a partial list of outreach and education recommendations for the City of Poway. The next section will focus on policy issues.

Public outreach initiatives can be undertaken to increase penetration of sustainable policies and practices that:

- Increase businesses' motivation to adopt sustainable operations
- Motivate residents to make sustainable consumer choices
- Foster an appreciation and understanding of the link between energy consumption and the protection of Poway's natural environment

Sustainability Working Group (SWG) or Community Meetings

The scope and impacts of recently passed sustainability legislation coupled with Poway's local actions could warrant establishment of a working group in which all involved stakeholders are represented and have the ability to voice ideas and concerns. The main purposes of the working group could be to:

- Ensure the active participation of the community in decision-making
- Advocate and advance the measures in the community
- Assist in the dissemination of knowledge about the implemented measures
- Respond to questions of interested parties during regularly-held public forums

A SWG can focus on general policy recommendations or goals such as:

- Adopting a LEED silver design policy for all municipal projects
- Adding an optional energy element to the general plan or add EE policies within the General Plan Conservation Element , with policies for EE, public and private, including:
    - Implementing green building standard for new construction and major renovations with minimum EE requirement above Title 24
    - Promoting early adoption of the new California green building standards and in-lieu fee to establish a retrofit program for residential retrofits.
    - Mandating infill redevelopment based on smart growth guidelines that provides a mixture of land uses, is pedestrian friendly, and is located near transit
    - Incentivizing green building practices
    - Incentivizing drought tolerant plants and turf

Business Sector

The business community can assist Poway with its presence in the community and online to complement city goals and to promote the commercial redevelopment with commercial buy-in through staff members dedicated to the following tasks:

- Learn improved operations through SDG&E Energy Education and Training or CCSE workshops to improve workplace efficiency and foster behavioral change

- Lead interactive audits and train others to actively improve daily office operations including lighting, HVAC, appliances and equipment, recycling and waste management, water use
- Facilitate and ensure compliance with programs required by code, and optional initiatives
- Update and share Best Practices with other organizations

Residential Sector

The City of Poway can partner with SDG&E to conduct CFL exchanges, LED Christmas light exchanges, promote retrofit and rebate programs and climate change education. Further, the city should partner with the parks department to promote environmental education essential to connect consumption and environmental challenges. By disseminating information to Poway residents and visitors about the relationship of energy and the environment at parks, employees will reach diverse audiences. By seeking educational opportunities in non-commercial areas, sustainability is likely to be valued and taken to homes, schools and work.

City Staff Education

The integration of sustainable energy practices within the City of Poway will require those implementing the measures to possess a technical knowledge of EE, mechanical systems, practical skills in the installation of new technologies, as well as advocates for peer-behavioral change. Employees responsible for building maintenance and operations will need to understand the new codes and adapt to emerging techniques and more sustainable practices. Certified Building Operator educational opportunities for city and commercial building engineers, building services managers, maintenance supervisors, O&M technicians, electricians, include Building Operator Certification: EE through Operator Training through several programs:

- Building Operator Certification is a nationally recognized training and certification program for building operators offering improved job skills and more comfortable, efficient facilities. Two Levels of certification are offered in an 8-session, 7-month long program www.theboc.info/ca
- SDG&E's Energy Education & Training: SDG&E offers free workshops and seminars to improve energy usage at facilities including topics on HVAC from The Institute of Heating and Air Conditioning Industries, Title 24 Standards, energy modeling, operations, and efficiency. www.sdge.com/training
- SDG&E's Inspector Training: Still in development, SDG&E's curriculum will include equipment identification and compliance, residential and commercial California Energy Code documentation and compliance, building plan verification for EE standards, and the 2010 California Green Building Code. www.sdge.com/training
- CCSE Events & Workshops: CCSE offers free public programs, services, information, and forums that facilitate the adoption of renewable and efficient technologies and practices. The Energy Resource Cente(ERC) r offers a library of media and tools that assist making facilities more efficient. Workshops have included trainings in permitting, installation, and inspection of alternative generation technologies. For more

information, visit
http://www.energycenter.org/ContentPage.asp?ContentID=41&SectionID=38

IV. ENERGY REGULATIONS, POLICIES AND RESOURCES FOR LGs

The City of Poway has been proactive to date with elements of their energy plans by addressing EE, renewable energy and associated GHG reductions through their public works department. To further the energy goals for the city, staff should be aware of and stay updated on current policy trends and tools available to facilitate their plans.

LEGISLATION

In California, legislators sign new bills into law that codify the state's commitment to carbon reduction through EE, renewable energy and conservation practices. The following is a partial list of laws that will aid Poway in achieving its energy goals.

Assembly Bill 32 (AB 32)

AB 32, "The Global Warming Solutions Act of 2006," commits the state to reducing their GHG emissions to 1990 levels by 2020. In 2008, the attorney general's office mandated municipalities to create policies, actions and mitigation measures to reduce GHG emissions. To this end, the attorney general is assisting LGs with suggested policies, educational resources and the review of draft GHG mitigation and reduction documents in accordance with the California Environmental Quality Act (CEQA).

The California Air Resources Board (CARB) is the lead agency for implementing AB 32. The key elements CARB focuses on are:

- Expansion/strengthening of EE programs and building and appliance standards
- Potential for expansion of the Renewable Portfolio Standard (RPS) to 33% by 2020
    - The renewable energy expansion will include placing solar arrays and SWH installations on houses throughout California and an increase in building standards for EE

Currently, CARB is developing a toolkit of recommended measures and best practices for LGs and small businesses to reduce their GHG emissions. Poway staff can use the AB 32 Scoping Plan (Scoping Plan) measures which include adoption of the following technologies and mandates:

- Government-led EE programs
- Expanding green building through zero net energy practices
- Water conservation programs
- Renewable energy generation installations
- Climate-friendly procurement of goods and services
- Cap-and-Trade system for carbon
- 15% GHG reduction for LGs

According to the Scoping Plan, LGs need to reduce GHG directly and indirectly through planning and permitting processes, local ordinances, outreach and education efforts and municipal operations. CARB recently adopted the LG Operations Protocol to facilitate LG tracking of GHG.

In addition to tracking emissions using these protocols, the Scoping Plan encourages LGs to adopt "reduction goals for municipal operations emissions and move toward establishing

similar goals for community emissions that parallel the state commitment to reduce greenhouse gas emissions by approximately 15 % from current levels by 2020.

Senate Bill 375 (SB 375)

SB 375 requires the CARB to establish regional GHG reduction targets through Metropolitan Planning Organizations (MPOs) including SANDAG. SB 375 calls for the integration of regional transportation planning, regional housing needs assessment planning, and GHG planning while streamlining aspects of CEQA.

It requires MPOs to create Sustainable Communities Strategies (SCS) as part of the Regional Transportation Plan. The SCS will need to demonstrate how a region will meet its GHG reduction target. If the target cannot be met, an Alternate Planning Strategy (APS) must be developed.

AB 811

AB 811 allows LGs to implement on tax bill financing of EE and renewable energy projects. It authorizes California cities and counties to establish financing mechanisms for property owners to invest in renewable energy and EE improvements and for those investments to be paid through the property owner's property tax bill. Should Poway employ this financing mechanism, it will allow property owners to finance renewable energy and EE projects through the municipality or a third party, and ties the financed items to the property instead of the party who initiated the installation of the items.

AB 811 authorizes LGs to provide up-front financing to property owners to install solar or other renewable energy-generating devices or make EE improvements to their properties. The purpose is to create a means by which an energy project that provides both a public benefit and an incidental benefit to particular property owners can be financed without imposing the cost on non-participating property owners who derive no benefit.

AB 2466

AB2466 allows LGs to receive a credit for excess generation from a renewable energy generation system and to apply that credit against other accounts in the jurisdiction. The LG also retains the renewable energy credits. To be eligible under AB 2466, a renewable generation facility must meet the following criteria:

- Have a generation capacity of no more than one megawatt (MW).
- Be owned, operated, or on property controlled by the LG entity.
- Be located within the boundaries of the governmental entity or on land owned or controlled by governmental entity, including leased land.
- Sized to offset all or a port of electrical load of the benefiting account.
- Be an eligible renewable energy resource pursuant to the California RPS

AB 2466 contains a total statewide limit (250 MW) to the amount of renewable energy generators that can participate in the crediting arrangement. Using an estimate from a recent CPUC resolution, SDG&E's service territory limit is approximately 20 MW.

United States House Resolution 1424 (HR 1424)

On the federal level, Division B of HR 1424 was signed into law in October 2008. Entitled the "Energy Improvement and Extension Act of 2008," the legislation contains $18 billion in incentives for clean and renewable energy technologies, as well as for EE improvements. The 30 % tax credit for installation of PV solar panels has been extended for residential and commercial customers, with no upward limit on the credit amount. The bill also extends a tax credit for EE installations.

HR 1424 provides opportunities for homeowners, businesses and LGs to obtain a portion of the $18 billion granted in incentives for clean and renewable energy technologies, including:

Solar

- Extends the tax credits for investment in commercial and residential solar projects for eight years
- Allows a new energy tax credit for combined heat and power system property
- Removes the $2,000 cap on investments in residential solar electric installations
- Adds utilities as eligible recipients of tax credits

Wind

- Extends the tax credit for the production of energy from wind for one year
- Allows a new energy tax credit for 30% of expenditures for wind turbines used to generate electricity in a residence and for geothermal heat pump systems

Miscellaneous Renewable/Non-renewable generation

- Allows offsets of tax credit amounts against alternative minimum tax (AMT) liabilities
- Extends tax credit for other facilities, including closed and open-loop biomass, solar energy, small irrigation power, landfill gas, trash combustion and hydropower for two years
- Allows a new tax credit for investment in new clean renewable energy bonds for capital investment in renewable energy facilities
- Extends the tax credit for microturbine property for eight years
- Extends the tax credits for investment in commercial fuel cells for eight years and increases the credit limitation for fuel cell property to $1500

Vehicles

- Allows a new tax credit for new qualified plug-in electric drive motor vehicles
- Extends the excise tax credit for alternative fuel and fuel mixtures for one year
- Requires such fuels to include compressed or liquefied biomass gas and to meet certain carbon capture requirements

SANDAG REGIONAL ENERGY AND CLIMATE PLANNING

Regional planning initiatives and documents can assist in shaping LG decisions. The following documents were approved by the SANDAG Board of Directors or are the process of being updated to reflect current policy trends.

Regional Energy Strategy (RES)

Last adopted in 2003, the RES serves as the energy policy blueprint for the San Diego region. It contains nine goals that include expanding the role of EE, diversifying our energy resources, expanding the use of renewable energy and increasing the use of distributed generation. With input by the SANDAG Energy Working Group (EWG), an update to the RES will be available in draft form in May 2009. The update will:

- Assess performance measures from the 2003 plan
- Address local implementation of the state enacted loading order
- Address regional transportation energy issues
- Integrate land use and transportation planning with energy planning
- Address climate change

For more information on the RES, visit
http://www.sandag.org/uploads/publicationid/publicationid_1383_8418.pdf

Regional Climate Action Plan (RCAP)

The RCAP is under development with input from the EWG. A draft plan will be released in June 2009 and a final plan for adoption in November 2009. The RCAP is a climate mitigation plan that will include an inventory of regional GHG emissions, GHG reduction scenarios that reduce vehicle miles traveled (VMT), and policy and planning methods to meet 2020 and 2030 reduction targets. It will focus on the largest emitting sectors: transportation and energy. For more information on the RCAP, visit
http://www.sandag.org/index.asp?projectid=337&fuseaction=projects.detail

Regional Alternative Transportation Fuels, Vehicles and Infrastructure Assessment

As part of an agreement with the California Energy Commission, SANDAG is performing an assessment of potential locations for siting alternative fuel infrastructure to best leverage geographic, institutional, financial and environmental resources. The report also will identify opportunities for alternative fuel vehicles within municipally owned fleets and franchisees of cities, such as trash haulers and curbside recyclable haulers. A draft will be available March 31, 2009 and final report in the fall of 2009.

Regional Transportation Plan (RTP)

The 2030 San Diego RTP: Pathways for the Future was approved by the SANDAG Board of Directors on November 30, 2007. The RTP incorporates a regional growth forecast, strategic initiatives from the Regional Comprehensive Plan, the Independent Transit Planning Review and several other white papers. SANDAG will begin an update of the RTP in FY 2010 to be completed by fall of 2011. The update will include a Sustainable Communities Strategy to mitigate climate change. To view the RTP, visit
http://www.sandag.org/programs/transportation/comprehensive_transportation_projects/2030rtp/2007rtp_final.pdf

Regional Comprehensive Plan (RCP)

The RCP serves as the long-term planning framework for the San Diego region. It provides a broad context in which local and regional decisions can be made that move the region toward a sustainable future – a future with more choices and opportunities for all residents of the region. The RCP integrates local land use and transportation decisions. For more information on the RCP, visit http://www.sandag.org/programs/land_use_and_regional_growth/comprehensive_land_use_and_regional_growth_projects/RCP/rcp_final_complete.pdf

RENEWABLE ENERGY PROGRAMS

California Solar Initiative (CSI)

Through the CSI, the CPUC is currently providing over $2.1 billion in solar incentives through 2016 to existing residential and new and existing commercial, industrial and agricultural solar projects. The CEC provides incentives to new residential solar projects through its New Solar Homes Partnership. The CSI has been allocated $203.5M for incentives in the San Diego region.

The CSI provides incentives for homes, businesses and government/non-profit entities for qualifying PV systems that are connected to the utility grid. The incentive levels decrease over time. Residential and commercial systems may be eligible for additional federal tax credits. The program concludes when all the incentive funds are allocated or 2016, whichever comes first. CCSE implements the CSI in the SDG&E service territory.

CCSE implements the SWH Pilot Program in the SDG&E service territory for systems that displace a portion of the existing water heater load. Residential and commercial systems qualify for incentives and may be eligible for additional federal tax credits. The SWH Program concludes when all the incentive funds are allocated or December 31, 2009, whichever comes first.

The CPUC's CSI proceeding R.08-03-008 sets policies, procedures and rules for the CSI, the Self-Generation Incentive Program (SGIP) and other Distributed Generation (DG) issues. The SGIP provides financial incentives for qualified self-generation equipment, which, when installed on the customer's side of the utility meter, provides electricity for either a portion or that customer's entire onsite electric load. The CPUC has currently added incentives for advanced energy storage systems to their SGIP. This decision may allow DG to be more reliable so that utilities can rely on their output. Currently, utilities cannot rely on DG like solar for the majority of their power because such power generation is inconsistent and varies with the weather. Advanced energy storage (AES) systems can provide a way for solar owners to store energy for their own use on cloudy days or to sell back to the utilities. This green technology may prove to be lucrative for cities, homeowners and businesses. For more information on the CSI, visit http://www.cpuc.ca.gov/puc/energy/solar/ or www.energycenter.org

PV Assessment

CCSE offers technical PV potential assessments to demonstrate maximum energy and money savings available for a chosen site. CCSE conducts an evaluation of historical electricity consumption, billing data and load shapes if available to make projections for the near future. That information is mapped to client's current rate schedule and compared with

SDG&E's new tariff for customers with installed DG capacity. CCSE then recommends an appropriate system size and estimated performance and demonstrates the financial impact.

Available services include:

- Analysis of historical electricity consumption for the previous two years (or as much data as accessible through SDG&E)
- Analysis of billing data for the previous two years (or as much data as accessible through SDG&E)
- Estimation/measurement of available solar area
- Shade analysis
- Recommended system sizing
- Expected monthly system performance
- Detailed life-cycle cost analysis including estimated project costs, benefits, financial return, and simple payback. This includes identifying a neutral to positive gain price per kWh for a power purchase agreement.

For more information on this program, please visit the CCSE website at www.energycenter.org

EE PROGRAMS

The CPUC has initiated and oversees the state's three investor owned utility EE programs through Rulemaking 06-04-010. Municipalities can benefit from the EE programs and policies implemented through this rulemaking. The following is a partial list of EE programs offered through SDG&E or third party contractors.

TEC Program

The TEC program is part of the broader SDG&E ESB program. It provides technical and administrative assistance and generous financial incentives to assist tax-exempt organizations implement EE measures. The program addresses the myriad barriers tax-exempt organizations face, namely shortages of time, staffing, technical resources and funding. TEC provides the extra resources needed to take projects from concept to successful implementation. The TEC program is scheduled to sunset by mid-2009, but could be replaced by another utility-administered program. For more information, visit http://www.sdenergy.org/ContentPage.asp?ContentID=328&SectionID=325

ESB Program

The ESB program offers all nonresidential SDG&E customers and project sponsors incentives for EE projects with a combined savings of at least 500,000kWh annually. A project may include a single customer or a combination of customers at multiple sites. Sites can have different measures, operating hours and energy use profiles. For more information, visit http://www.sdge.com/business/esc/large/largeesb.shtml

Standard Performance Contract (SPC)

The SPC program offers incentive payments for EE projects involving the installation of new, high-efficiency equipment or systems. A project may consist of the retrofit of existing equipment/systems or the installation of equipment associated with new added load. SPC estimation software or engineering calculations are used to estimate the energy savings and incentive depending on the type of EE measure installed. Some projects may require a measured savings approach. For more information, visit http://www.sdge.com/business/esc/large/largespc.shtml

EEP

The EEP is a nonresidential rebate program designed to help customers add or retrofit existing equipment with high efficiency equipment. The program provides cash rebates to eligible nonresidential customers for energy efficient lighting, refrigeration, food service, natural gas and other technologies. Rebates can help offset the overall cost of installed equipment. Customers may qualify for rebates up to $350,000 per meter, per fuel, per year.

Over 140 measures qualify for the EEP. Eligible products include steam cookers and combination ovens for food service, pipe and tank insulation, high bay lighting fixtures, compact and linear fluorescent fixtures, and anti-sweat heater controls. Equipment must meet the requirements as stated in the terms and conditions on the rebate forms. All equipment must be new. Used or rebuilt equipment is not eligible for rebate. For a complete listing, visit http://www.sdge.com/business/esc/large/largeee.shtml

On-Bill Financing (OBF)

The OBF option helps qualified commercial and tax-payer funded customers pay for efficient business improvements through an interest-free loan on their monthly SDG&E bills. Poway can use the OBF program in conjunction with other EE incentive and rebate programs for comprehensive EE retrofit projects totaling up to $250,000. The projects must have a 10-year or less payback. For more information on the 2009 OBF program, visit http://www.sdge.com/business/esc/promo_obf.shtml

Technical Assistance and Technology Incentive (TATI) Program

The technical assistance or “TA” component of the TATI Program provides funding for engineering audits which identify and quantify strategic DR measures to achieve temporary reduction in electrical usage for a specific time period, typically during times of need due to strained resources. These audits also identify potential energy conservation and efficiency measures for consideration. The technology incentive or “TI” component of the program provides funding of $100-$300/kW for equipment or controls programming for DR measures which are focused on automation to achieve these temporary reductions of discretionary electrical loads. After implementation of upgraded systems incorporating these measures or determination of feasible DR options, customers then enroll in an appropriate DR program that provides incentives based on actual event participation during specified high electrical demand summer periods. For more information on this program, visit http://www.sdge.com/business/esc/documents/FINAL-TATI_3-4-08.pdf

WEBSITES AND OTHER RESOURCES

California Public Utilities Commission (CPUC)

In 2008, the CPUC adopted California's first Long Term EE Strategic Plan as a roadmap to achieve maximum energy savings across all major groups and sectors in California. The Plan advances a solid framework that incorporates EE into the standard for operating in California—for utilities, businesses, and consumers. The CPUC EE Strategic Plan includes four "Big Bold strategies" strategies for significant energy-savings:

- All new residential construction in California will be zero net energy (NZE) by 2020:
- All new commercial construction in California will be NZE by 2030
- The Heating, Ventilation, and Air Conditioning (HVAC) industry will be reshaped to ensure optimal equipment performance; and
- All eligible low-income homes will be efficient by 2020

To view the approved EE Strategic Plan, visit
http://www.californiaenergyefficiency.com/index.shtml

California Energy Commission (CEC)

The CEC's Public Interest Energy Research (PIER) Program supports energy research, development and demonstration projects designed to bring environmentally safe, affordable and reliable energy services and products to the marketplace. To learn more about the programs and research conducted through he CEC, visit http://www.energy.ca.gov/pier/

SANDAG

The SANDAG website includes a copy of the RCP, the Smart Growth Concept Map, the RES, smart growth visual simulations and the soon-to-be-completed Smart Growth Design Guidelines, as part of the Smart Growth Tool Box to assist local jurisdictions in implementing smart growth and transit oriented development locally. The web site address for these and the previously discussed plans, visit http://www.sandag.org/RCP.

LG Commission (LGC)

The LGC produced a detailed report in 2002 entitled General Plan Policy Options for EE in New and Existing Development. The document sets forth energy saving policies suitable for inclusion in general plans. Policies range from exceeding state minimum building EE standards, to retrofitting buildings to reduce energy consumption, to implementing energy conservation strategies for roofs, pavement and landscaping. The report also contains suggested general plan language. To view the entire report, visit http://www.redwoodenergy.org/uploads/Energy_Element_Report.pdf.

San Diego Natural Guide

The San Diego Natural Guide evaluates businesses individually on health and sustainability and produces a bi-annual publication. The guide writers determine the characteristics of

products and services that makes them more earth-friendly than conventional businesses and includes the “greenest shade” for a particular type of business on criteria including:

- Energy conservation, water conservation, recycling & waste reduction programs, use of earth-friendly& non-toxic materials, use of organic/ Fair Trade/ local materials, provides a service that is beneficial to health.
- Promotes the *San Diego Area Green Business Program* in their October 2008 publication, the *Go Green Book* and is willing to work with other organizations in San Diego

For more information on the San Diego Natural Guide, visit http://www.sandiegonaturalguide.com/

Climate Action Plans

Various cities’ Climate Action Plans are located at the Cool Cities website: http://www.coolcities.us/resources.php.

Institute for LG

The Institute for LG (ILG), has instituted a program that provides information about the latest climate action resources and case studies: http://www.cacities.org/index.jsp?displaytype=&section=climate&zone=ilsg, detailed list of climate change “best practices” for local agencies is available at http://www.cacities.org/index.jsp?displaytype=&section=climate&zone=ilsg&sub_sec=climate_%20local

Natural Capitalism Solutions (NCS)

NCS has developed an on-line *Climate Protection Manual for Cities*. NCS states that its mission is “to educate senior decision-makers in business, government and civil society about the principles of sustainability.” The manual is available at http://www.climatemanual.org/Cities/index.htm

Pew Center

The Pew Center on Global Climate Change was established in 1998 as a non-profit, non-partisan and independent organization. The Pew Center has published a series of reports called *Climate Change 101*. These reports cover climate science and impacts, technological solutions, business solutions, international action, recent action in the U.S. states, and action taken by LGs. The *Climate Change 101* reports are available at http://www.pewclimate.org/global-warming-basics/climate_change_101

United States Environmental Protection Agency (EPA)

In cooperation with U.S. EPA, LGC has produced a booklet discussing the benefits of density and providing case studies of well-designed, higher density projects throughout the nation.

Creating Great Neighborhoods: Density in Your Community (2003) is available at: http://www.lgc.org/freepub/PDF/Land_Use/reports/density_manual.pdf

In November 2007, U.S. EPA issued a report entitled *Measuring the Air Quality and Transportation Impacts of Infill Development.* This report summarizes three regional infill development scenarios in Denver, Colorado; Boston, Massachusetts; and Charlotte, North Carolina. The analysis shows how standard transportation forecasting models currently used by MPOs can be modified to capture at least some of the transportation and air quality benefits of brownfield and infill development. In all scenarios, more compact and transit oriented development was projected to substantially reduce vehicle miles traveled. As the agency found, "The results of this analysis suggest that strong support for infill development can be one of the most effective transportation and emission-reduction investments a region can pursue." The report is available at http://www.epa.gov/smartgrowth/impacts_infill.htm

Urban Land Institute (ULI)

In 2007, ULI produced a report entitled *Growing Cooler: The Evidence on Urban Development and Climate Change*, which reviews existing research on the relationship between urban development, travel, and GHG emitted by motor vehicles. It further discusses the emissions reductions that can be expected from compact development and how to make compact development happen. The *Growing Cooler* report is available at http://www.uli.org/growingcooler

California Department of Housing and Community Development (CAHCD)

CAHCD has many useful resources on its website related to housing policy and housing elements and specific recommendations for creating higher density and affordable communities. To view the website, visit http://www.hcd.ca.gov/hpd/hrc/plan/he/

California Transportation Commission (CTC)

The CTC recently made recommendations for changes to regional transportation guidelines to address climate change issues. Among other things, the CTC recommends various policies, strategies and performance standards that a regional transportation agency should consider including in a greenhouse reduction plan. These or analogous measures could be included in other types of planning documents or local climate action plans. The recommendation document and Attachment A, entitled *Smart Growth/Land Use Regional Transportation Plan Guidelines Amendments*, are located at http://www.dot.ca.gov/hq/transprog/ctcbooks/2008/0108/12_4.4.pdf

Planners Book of Lists

The Governor's Office of Planning and Research (OPR) provides valuable resources for lead agencies related to CEQA and global warming at http://opr.ca.gov/index.php?a=ceqa/index.html. In addition, OPRs' *The California Planners' Book of Lists 2008*, which includes the results of surveys of local agencies on matters related

to global warming, is available at
http://www.opr.ca.gov/index.php?a=planning/publications.html#pubs-C

California Air Pollution Control Officers Association (CAPCOA)

CAPCOA has prepared a white paper entitled *CEQA and Climate Change (2008*). The document includes a list of mitigation measures and information about their relative efficacy and cost and is available at http://www.capcoa.org/ceqa/?docID=ceqa

California Attorney General (AG)

The AG's global warming website includes a section on CEQA is located at http://ag.ca.gov/globalwarming/ceqa.php. The site includes all of the AG's public comment letters that address CEQA and global warming.

V. CONCLUSION

This Plan contains detailed findings from nine energy assessments completed at Poway city facilities. It identifies energy- and money-saving opportunities commensurate with these measures that can aid city officials and staff in future energy-related procurement decisions.

The energy assessments were followed by recommendations for education and outreach activities for Poway residents, businesses and city staff. Activities that not only educate the public about programs and services but also form relationships between key stakeholders can facilitate long-term success of the Poway's planning efforts.

The final section of the Plan defines key legislation that will shape the regional energy climate and provides links to organizations that can assist Poway in developing and maintaining high standards for energy-saving policies and technologies. When updating the Poway General Plan, staff can use the policy documents and links to inform their energy proposals.

This document can serve the staff of Poway in their efforts to meet the energy and climate change mandates imposed by state and federal lawmakers. Poway officials and staff can look to the policy drivers, e.g. the IEPR, the EE Strategic Plan and the RES along with the ECOs provided in the document to assist in shaping their energy decisions.

With the beginning of a new federal administration, approximately $300-600 million will be allocated to California to engage in energy-saving and GHG reduction research. Once this budget is approved, the City of Poway staff can engage in the federal economic stimulus spending plan fund implementation by pursuing the recommendations in this Plan.

SANDAG, CCSE and SDG&E staff members appreciate the opportunity to contribute to Poway sustainability efforts. Staff continues to be available for policy, programmatic, technical and jurisdictional inquiries and networking, and we encourage the City of Poway officials and staff to continue to utilize these services.

VI. APPENDIX- LIGHTING BEST PRACTICES GUIDE BY STAN WALERCZYK, LC

Background

This section applies to new construction, remodels, retrofits, and maintenance. The purpose of this guide is to provide a road map for an optimal balance of:

- Architectural appearance
- Lighting quality
- Control flexibility
- Ease of use
- Initial cost
- EE
- CCSE/SDG&E incentives
- Parts maintenance costs
- Labor maintenance costs
- Sustainability

Lamp Minimization

Lamp types shall be minimized when lighting quality is not significantly sacrificed. For example, instead of using 18W, 26W and 32W four-pin CFLs in various fixtures use just one wattage, which could maybe be 26W, and adjust fixture type and spacing accordingly.

Primary Lamp Type

Four-foot F32T8s shall be primary lamp type. All F32T8s shall be 32W, 3100+ initial lumen, 82 – 86 CRI, and rated for 24,000+ hours with instant start ballasts at industry standard 3 hour cycles. One example would be the Philips F32T8/ADV841/ALTO lamp. Two-foot F17T8s shall only be used where 4' F32T8s are not feasible.

Lamps to be avoided--None of these lamps should be used:

- Fluorescent
- T5s
- T5HOs
- Biax
- U-bend
- 8 ft T8 lamps
- All T12 lamps
- MH (metal halide)
- Standard or probe start MH

Sole source / very expensive metal halide lamps

Ceramic metal halides for outdoor/foliage illumination

Ballasts for T8 Lamps

All fixed output ballasts shall be extra efficient, 120 – 277V, units. Program start ballasts are preferred (these ballasts provide an additional ~6,000 hours in life to reduce maintenance cost for lamps located in high ceilings). Qualifying fixed-output extra-efficient program-start ballasts are:

- Advance Optanium
- GE Ultrastart (Parallel wired, which is a significant advantage over series wired)

- Sylvania PSX

Qualifying fixed-output extra-efficient instant-start ballasts are:

- Advance Optanium
- GE Ultramax
- Sylvania QHE
- Universal ULTimT8

This ballast section is very important when ordering new T8 fixtures, because practically all new T8 fixtures come with GEBs (generic electronic ballasts), unless otherwise specified. Getting new T8 fixtures with better than GEB ballasts often takes more lead-time. Also pricing needs to be checked, because some fixture manufacturers, especially some of the very large ones, initially want to charge an arm and a leg adder for extra efficient ballasts, because they are used to large production runs with GEBs. The adder for extra efficient ballasts should only be $3 to $5, compared to GEB equivalents.

Dimming

Since dimming ballasts and connected control systems are so expensive initially and difficult to maintain (and they are also energy hogs), dimming ballasts shall only be used where necessary (e.g. conference rooms). Proprietary systems should be avoided.

Lamp Quantity Reduction

Except when multiple switching or lamp redundancy is important, the number of lamps in fixtures shall be reduced. This can often be accomplished with higher ballast factor (BF) ballasts in T8 fixtures.

Recessed cans are recommended to have only one compact fluorescent lamp (CFL) instead of two. Two lamps in such a small space usually reduce fixture efficiency and can cause heat problems and premature lamp failure.

Lamp Life

Long life lamps are recommended. An example is using 130V instead of 120V incandescents. Another example is using fewer 320 – 400W 20,000 hour rated pulse start MH lamps rather than 175 – 250W 15,000 hour rated pulse start MH lamps. Also, only CFLs with at least 10,000 hours shall be used. CFLs with 20,000 – 25,000 hour rated life are recommended.

Compact Fluorescent Lamps (CFLs)

Typical CFL use shall be minimized, because there are often better solutions. Following are some examples:

- 2’ F17T8s, when sufficient space in available
- Cold cathode CFLs, which are rated for 25,000 hours (up to 12W)
- White light LEDs, which are rated for 40,000 – 100,000 hours

Lighting Controls

Many controls look great in the brochures and can work fairly well in a small mock-up, but many controls do not work that well in real-life complete buildings. Controls should be as ‘idiot proof’ as possible. Also, all controls and control systems should be backed with at least 5

references of facilities that already have these controls or control systems and are satisfied with commissioning, performance, and manufacturer support.