California State Senate

COMMITTEE ON ENERGY, UTILITIES AND COMMUNICATIONS

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Energy Efficiency in Schools: Are the Light Bulbs On or Off?

The purpose of this hearing is to examine past energy efficiency programs available to K-12 schools, and associated costs and outcomes. As the Legislature considers an allocation plan for the California Clean Energy Jobs Act (Proposition 39), it is prudent to conduct such a review. Proposition 39 is expected to provide as much as $550 million annually for energy efficiency and clean energy, and Governor Brown has proposed in his 2013 budget plan that $450 million of Proposition 39 revenues be allocated on a per student basis to K-12 schools and community colleges. This legislative session has already seen proposals for the expenditure of Proposition 39 funding, including SB 39, authored by Senators De León and Steinberg. This hearing is intended to inform the Legislature regarding the methods and practices that are currently being used to conduct energy efficiency programs, which may be beneficial as the Legislature considers options to implement Proposition 39. The hearing will highlight different programs, and the varied issues that create a complex system.

California's K-12 system includes 962 districts and 9,895 schools, and it serves 6.2 million students. It has been reported that schools account for nearly 12% of commercial energy consumption, and the 2011 General Fund expenditures for utility bills at California public schools exceeded $1 billion – more than was spent on school books and supplies, combined. Thus, energy efficiency programs hold the potential for significant energy and financial savings. These programs reduce demand for energy in facilities through a range of implementations from replacing old equipment to retrofitting windows and insulation, garnering savings that accrue over the course of years. A breakdown of energy usage in school facilities is shown in Figure 1. While these data show the breakdown of the total energy usage, it is important to note that each individual school will have a unique energy-use profile. As time progresses there will be continued potential for schools to take advantage of new, more efficient equipment, and updated building standards.

Schools currently have several avenues available to pursue energy efficiency goals. These include partnering with a utility, a third party implementer, an energy service company or a combination thereof. Schools can also seek assistance through the Department of General Services (DGS) Office of Public School Construction (OPSC) or the California Energy Commission (CEC) Bright Schools Program. We outline some of these resources below.

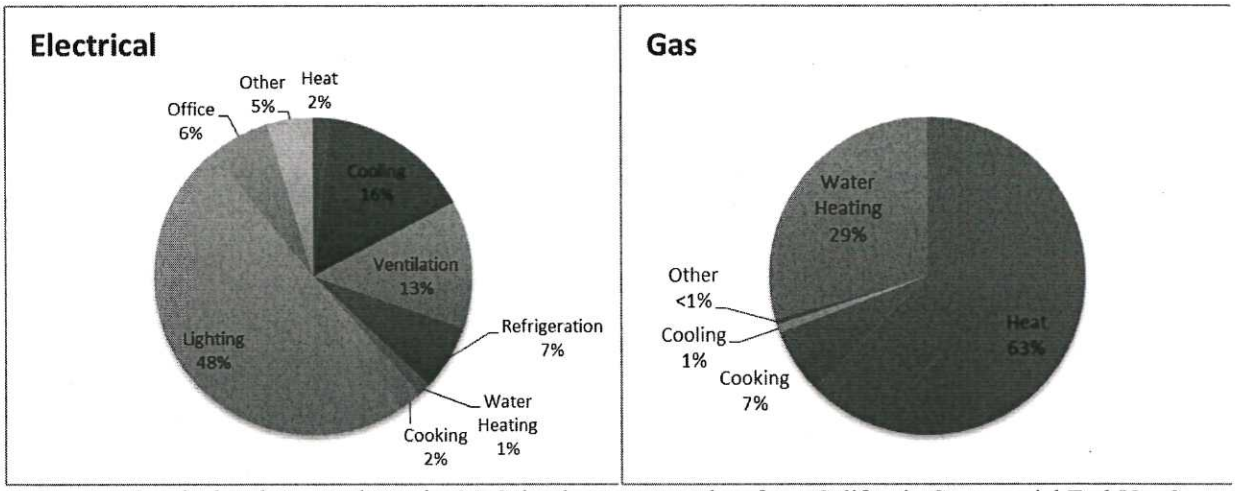

Figure 1: Electrical and Gas End-Use in CA Schools. Data are taken from California Commercial End-Use Survey, March 2006, CEC-400-2006-005 (see tables E-2 and E-4). Relative percentages are based on total annual usage.

What is Energy Efficiency?

Energy efficiency programs are an implementation of shared interests between schools, utilities, and the state. From a school district perspective, energy efficiency projects can save money on energy costs. The reduced demand eases pressure on the electrical grid, and in the long run can save the state the need for extra gas and electric procurement. Energy efficiency can be realized through a variety of means including modifying usage, replacing equipment such as lighting and heating, ventilation, and air-conditioning (HVAC) systems, and retrofitting buildings with new windows or insulation. The basics for planning energy efficiency rely on:

- Energy audits – a comprehensive analysis of a facility's energy usage and efficiency. The audit identifies various energy losses due to, e.g., lighting, HVAC, refrigeration, window quality, dropped ceilings, and wall insulation.

- Benchmarking – a method for determining the total amount of energy a building uses. Benchmarking allows direct comparisons of building energy use to the average for similar buildings by normalizing for variables such as local climate, square footage, occupancy levels, number of computers, and operating hours. The U.S. EPA's ENERGY STAR Portfolio Manager, a free and secure online tool, is the standard for benchmarking.

- Commissioning (or retro-commissioning) – a process that instructs faculty and staff on the best usage of their energy systems. This includes implementing the technical features present in advance lighting and HVAC systems.

- Cost-effectiveness – a determination of the amount of savings compared to the investments. The determination of cost-effectiveness depends on the perspective. The California Public Utilities Commission (CPUC) identifies four different tests for cost-effectiveness. These are the utility test, the program administrators test, the ratepayers test, and the participant test. Each perspective provides a unique analysis of cost-effectiveness. As a result, certain programs may be cost-effective from one viewpoint but not another.

The Role of Electric & Gas Utilities in School Energy Efficiency Programs

Energy efficiency portfolios for the investor-owned utilities (IOUs) are approved by the CPUC on a 2-3 year cycle. The portfolio for the 2013-2014 period was approved in November, 2012[1] and includes 14 categories of programmatic activities. The decision adopted energy savings goals and outlined IOU program targets for 2013 as 599 gigawatt-hours (GWh), with peak savings of 114 megawatts (MW) and gas savings of 21.0 million therms (MMtherms). In the decision, the CPUC recommended that the utilities conduct a targeted third-party solicitation for the Municipal, Universities, Schools, and Hospitals (MUSH) market during the 2013-2014 program period.

The energy efficiency programs from the large investor- and publicly-owned utilities in California are very similar in structure. Typically the utility and school begin with an energy audit, performed by a third party contractor, in order to identify the most cost-effective sources for energy efficiency upgrades. The utilities then offer a series of rebates and incentives for energy efficiency upgrades and renovations. Some items that qualify for rebates include lighting, HVAC systems, water heating, and refrigeration and food service. Qualifying equipment must be chosen from a preferred list of manufacturers, retailers, and eligible equipment.

PG&E, Sempra Energy (SDG&E, and Southern California Gas), and Southern California Edison have prepared a supplemental document that outlines the IOUs' programs, and provides some data regarding project cost and energy savings. Please see the addendum for this document.

The Role of the Private Sector in School Energy Efficiency Programs

Energy Service Companies (ESCo) develop, install, and arrange financing for projects designed to improve the energy efficiency and maintenance costs for facilities over a seven- to twenty-year time period. ESCos generally act as project developers for a wide range of tasks and assume the technical and performance risk associated with the project. The ESCo and school enter into a contract for long-term repayment. These contracts have been seen as barriers to implementation, because school districts are concerned that continued savings may not be realized while they are still repaying the ESCo. To address this, new contracts include an energy savings guarantee where payment is forgiven if certain energy savings are not achieved. This provides an incentive for the ESCo to provide the best savings possible and in some cases to follow up with schools to ensure the maintained savings.

Independent Program Implementers (or Third Party Implementers) are very similar to ESCos but have a different repayment model. Program implementers approach schools with a solicitation, but are paid by the local utility. Payment to the third party implementer occurs immediately upon completion of the project based on electricity and gas savings estimates. School administrators often have a number of demands on their attention, which creates a barrier to implementation of energy efficiency programs. To compensate, third party implementers actively guide the school through the various steps of implementation. After an energy audit, schools are presented a series of program options (e.g., lighting, variable frequency HVAC drives, pool pumps and covers) for

[1] Decision Approving 2013-2014 Energy Efficiency Programs and Budgets, CPUC D.12-11-015, A12-07-001

energy efficiency savings. The companies sometimes work with the school over the course of several years, implementing a few options at a time.

The Role of State Agencies in School Energy Efficiency Programs

The Department of General Services has two offices that are involved with school construction and retrofits. The Division of the State Architect authorizes plans for school construction and modification. The state architect reviews all energy efficiency and retrofit plans submitted by schools under various programs in order to ensure they do not adversely impact the structure of the school. The office also ensures that project proposals comply with Title 24 building code standards.

The Office of Public School Construction (OPSC) distributes funding for school construction and for modernization projects. Both modernization projects and new construction naturally provide energy savings by upgrading equipment and ensuring compliance with Title 24 building regulations. The Modernization Program provides bond funds to match local funds for modernization projects on a 60-40 basis. The modernization grant can be used to fund a large variety of work at an eligible school site. Air conditioning, insulation, roof replacement, and the purchase of new furniture and equipment are just a few of the eligible expenditures of modernization grants. Qualification for the program includes an age requirement on the buildings.

The OPSC also distributes grants that accompany funding for new construction through its High Performance add-on program. The grant is intended for use on high performance and energy efficiency items which are outlined in a scorecard format. The school chooses the items to implement when the funding is granted.

The CEC's Bright Schools program has provided assistance to schools by conducting energy audits and review of retrofit plans since the 1990s. Prior to the Bright Schools program, the CEC operated the Small School program that provided the same service, but also issued loans to finance projects. Financing for the Bright Schools program is provided through low-interest loans by the Energy Conservation Assistance Act (ECAA, see below).

All publicly funded California K-12 school districts are eligible for assistance under the Bright Schools program. The CEC reports that the program can typically reduce annual utility costs by an average of 20 percent. Since 1988, the Small Schools and Bright Schools programs have assisted a combined 311 school districts. The average cost to the program for audits is $13,000, and the program has a $20,000 cap on the audit cost.

For two years between 2010 and 2012, the CEC was focused on distributing American Recovery and Reinvestment Act (ARRA) funds and suspended conducting audits through the Bright Schools program. In November, 2012, the program was reopened to accept applications from school districts.

For existing schools, the Bright Schools program can:

- Conduct energy audits and feasibility studies;
- Review existing proposals and designs;
- Develop equipment performance specifications;
- Assist with contractor selection;
- Review equipment bid specifications; and
- Review commissioning plans.

For new school construction, the Bright Schools program can:

- Provide design consultation;
- Identify cost-effective energy-saving measures;
- Provide recommendations to maximize Collaborative for High Performance Schools (CHPS) energy credits for state funding;
- Compare different technologies;
- Provide equipment specification consultation;
- Develop computer simulation models of the planned project;
- Help select design professionals with energy efficiency expertise;
- Review schematics and construction plans; and
- Assist with system commissioning.

Financial assistance for Bright Schools is provided by the ECAA. Since 1979, approximately $292 million has been allocated through a revolving loan fund to more than 780 recipients. K-12 schools received 17% of the allocated funds (about $49.6 million). Since the year 2000, the approved loan amount for school districts was approximately $31 million, which led to an annual cost savings of $4 million, electric savings of 38.4 million kilowatt-hours, demand savings of 7.6 MW, and gas savings of 102,000 therms.[2]

[2] Historical ECAA Energy Savings Data from March 1, 2000 to December 31, 2012, http://www.energy.ca.gov/efficiency/financing/calmap/county/counties/energy_savings_data.xls

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2008-2012 IOU Energy Efficiency programs and K-12 Schools

Overview

The IOUs' energy efficiency programs save energy in K-12 classrooms, as well as in other K-12 support facilities, such as administrative offices, cafeterias, libraries, and athletic facilities. In characterizing the IOUs' work with K-12 schools, the number of billing (or service) accounts assisted provides the best representation of the scale of programs. The California IOUs currently manage over 30,000 school gas and electric accounts, which cover all types of K-12 facilities, including California's approximately 11,000 K-12 schools. Since 2008, the IOUs have provided incentives or rebates to over 9,000 of these accounts.

K-12 Accounts*			
IOU	**Type**	**Private**	**Public**
SCE	Electric	974	6,630
PG&E	Gas	1,168	4,977
	Electric	1,250	7,532
SDG&E	Gas	141	753
	Electric	340	1,474
SCG	Gas	852	5,255
Subtotal	Electric and Gas	4,725	26,621
Total	**Electric and Gas**		**31,346**

2008-2012 K-12 Account Participation				
		Private	Public	Total
Accounts Receiving Incentives or Rebates	SCE	166	2,283	2,449
	PG&E	404	5,417	5,821
	SDG&E	34	752	786
	SCG	51	194	245
Total Accounts				9,301

* A service/bill account represents all types of K-12 facilities.

For reference, general objectives of our K-12 programs are provided in the second half of this document.

Energy Efficiency Activities

Over the last 25 years, the IOUs have been working closely with schools to identify opportunities to save energy and money. IOU programs facilitate a number of energy saving activities, including benchmarking and audits. In the last five years, the IOUs have performed benchmarking for 2,533 accounts, and performed 4,938 audits.

K-12 Account Participation in Select Energy Efficiency Activities: 2008-2012				
		Private	Public	Total
# Accounts Benchmarked	SCE	199	606	805
	PG&E	56	1209	1265
	SDG&E	4	459	463
	SCG*	-	-	-
Total Benchmarked				2,533
Audits Performed	SCE	210	1707	1917
	PG&E	207	1649	1856
	SDG&E	17	215	232
	SCG	55	878	933
Total Audits Performed				4,938

*SCE and SCG coordinated benchmarking in their joint service territory.

Energy Efficiency Investments and Savings: 2008-2012[1]

From 2008 to 2012, the IOUs and K-12 schools spent over $115 million on energy efficiency upgrades. Of this amount, an estimated $62 million came directly from the IOUs in the form of rebates or incentives, while the remainder approximates the investment made by the schools.

Total Project Cost ($)								
		2008	2009	2010	2011	2012	Subtotal	Total
SCE	Private	$ 230	$ 91,628	$ 408,535	$ 801,992	$ 1,327,173	$ 2,629,558	$ 45,632,512
	Public	$ 3,230	$ 5,305,941	$ 6,191,119	$ 7,949,864	$ 23,552,801	$ 43,002,954	
PG&E	Private	$ 435,893	$ 581,995	$ 552,941	$ 1,396,888	$ 659,837	$ 3,627,553	$ 61,727,138
	Public	$ 9,713,472	$ 7,478,537	$ 9,552,267	$ 14,862,158	$ 16,493,151	$ 58,099,585	
SDG&E	Private	N/A	N/A	$ 9,180	$ 45,757	$ 39,994	$ 94,931	$ 4,917,045
	Public	N/A	N/A	$ 845,512	$ 2,596,797	$ 1,379,805	$ 4,822,114	
SCG	Private	n/a	n/a	$ 105,851	$ 174,359	$ 285,550	$ 565,760	$ 2,582,628
	Public	n/a	n/a	$ 1,222,378	$ 399,616	$ 394,874	$ 2,016,868	

[1] Therm savings do not include interactive effects from increased heating requirements of some electric measures. Total project cost is based on information provided by the customer. 2008-2009 data not recorded in SCG and SDGE databases.

These energy efficiency investments saved 280 GWh, 51 MW, and 4.3 million therms. Energy savings were tracked and calculated in accordance with established California Public Utilities Commission policies. A breakdown of energy savings by IOU is provided below.

Total Energy Savings (kWh)								
		2008	2009	2010	2011	2012	Subtotal	Total
SCE	Private	205,401	184,010	486,785	1,414,038	2,855,872	5,146,105	104,181,556
	Public	10,101,837	14,439,846	16,229,756	12,006,100	46,257,913	99,035,452	
PG&E	Private	2,038,326	2,343,946	1,639,238	2,337,579	15,763,870	24,122,959	150,694,219
	Public	26,477,471	17,631,671	19,468,812	31,941,144	31,052,162	126,571,260	
SDG&E	Private	7,390	106,950	12,365	445,881	234,462	807,048	22,842,803
	Public	3,177,122	2,495,266	4,121,106	4,470,977	7,771,284	22,035,755	
SCG	Private	n/a	n/a	n/a	n/a	n/a	-	-
	Public	n/a	n/a	n/a	n/a	n/a	-	

Total Energy Savings (kW)								
		2008	2009	2010	2011	2012	Subtotal	Total
SCE	Private	25	14	137	340	777	1,293	11,829
	Public	1,628	399	1,138	2,032	5,339	10,536	
PG&E	Private	625	302	227	417	601	2,172	35,614
	Public	13,339	4,173	5,317	6,104	4,509	33,442	
SDG&E	Private	29	56	4	89	48	226	3,676
	Public	477	730	571	909	763	3,450	
SCG	Private	n/a	n/a	n/a	n/a	n/a	-	-
	Public	n/a	n/a	n/a	n/a	n/a	-	

Total Energy Savings (Therm)								
		2008	2009	2010	2011	2012	Subtotal	Total
SCE	Private	-	-	-	-	-	-	-
	Public	-	-	-	-	-	-	
PG&E	Private	26,866	166,633	72,977	21,591	46,412	334,480	3,387,312
	Public	97,769	334,810	274,723	1,894,634	450,897	3,052,833	
SDG&E	Private	-	638	18	42	-	698	16,909
	Public	4,451	2,480	-	158	9,122	16,211	
SCG	Private	5,491	2,999	10,899	103,379	133,683	256,451	937,340
	Public	42,886	23,263	108,369	299,204	207,167	680,889	

Goals

Although there are aggressive energy savings goals for the IOUs overall energy efficiency portfolios, the utilities do not have energy efficiency goals specific to K-12.