Aloha Systems

Evaluation, Measurement, and Verification (EM&V) Report

The Energy Coalition

2002-2003 Energy Efficiency Program

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Eli W. Kollman
Energy Division
California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102-3298

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Dr. Mark S. Shirilau
Scott D. Jakubowski
Gina S. Jojola

14801 Comet Street ✠ Irvine, California 92604-2624 ✠ (949) 851-2221 Fax (949) 851-5008
Villa Grande, California ✠ Austin, Texas ✠ Ellenburg Center, New York
CA Prof Engr E-11818 ✠ NY PE 080236 ✠ TX PE 88014 ✠ CA Contractor 541443 ✠ CA Locksmith LCO 3045
www.alohasys.com

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Summary

Introduction

The Six Cities Energy Project exceeded its savings goals, achieving an ex-ante savings estimate of 110% of its goals. From a process standpoint, the project has catalyzed a movement in Southern California cities and instilled a sense of awareness and community not previously present. Anecdotes from a number of different sources – many of which are described within this report – reflect the benefits this project brings as a complement to the statewide energy efficiency programs.

The project reaches out with energy efficiency through community organizing and development of "energy districts" in which a comprehensive and coordinated approach to energy efficiency is presented to residents and small businesses. Lighting measures are given away or sold through a variety of means for customers to install compact fluorescent lights and/or fluorescent torchieres in their homes. Energy efficiency tune-ups are conducted in residences and small businesses to provide these customers with several lighting, HVAC, and water heating efficiency measures. Municipal governments are given financial leverage to catapult with their own facilities and employees into energy-efficiency action. School districts are involved with their own facilities as well as through educating elementary and middle school students in the PEAK program.

The energy savings are achieved from equipment installation and through behavior modification. Some of the processes are very direct, such as installing light bulbs during a tune-up. Others are less direct, such as teaching students at school and asking them to go home and help their families save energy. The program's goals and our evaluations assess these types of savings – direct installation and direct behavior modification.

At still a third level there is a sort of "evangelical" component to the program, where the participants in turn tell their family and friends about conservation. The third-party effects are not claimed and are evaluated only at the level of discussion. The concentrated effects and combination of Energy Coalition, city government, and school district participation also enables very high participation rates, even among traditionally "hard-to-reach" customers. Apartment complex and mobile home park participation usually exceeded 50% of the residents, and occasionally reached 100% participation. Another benefit was an established synergy between the six cities. These cities are geographically and demographically diverse, but the interaction between key municipal employees with their counterparts enabled enhanced knowledge and awareness. Throughout the report we present anecdotal information demonstrating these successes.

Our primary evaluation consisted of four main components – *ex-ante* evaluation, near-*ex-post* evaluation, customer opinion and satisfaction research, and process evaluation. The *ex-ante* evaluation verified installation of measures and commitments between parties in order to assess the program's official success. The *ex-ante* energy savings are the products of the verified unit quantities and the stipulated per-unit energy

savings or demand reduction. In our "near-*ex-post*" evaluation, we delved to a deeper level in estimating actual energy savings. In some cases we were able to provide considerable detail to revise per-unit energy savings parameters. In other cases we could only discuss the reasonableness of the original assumptions. Some of the softer behavior modification aspects of the program would have required an evaluation methodology far more complex than appropriate for this study in order to conduct the extensive metering necessary to gather true *ex-post* values. It is for this reason that we provide a "near-ex-post" assessment in which limited primary and secondary research provide considerable fine-tuning to savings estimates without going all the way to categorically determine the "true" savings of the program.

Significant customer opinion and satisfaction research was conducted among the residential and commercial tune-up participants, the PEAK students, and their parents. These surveys provided considerable insight into the behavior of these participants. The results were sometimes used in the near-*ex-post* evaluations and are also useful in assessing the validity of the evangelical claims about the program's ability to spread the message of energy efficiency.

Finally, we conducted a process evaluation. For the most part this was an on-going endeavor. Aloha Systems personnel participated in the entire spectrum of Six Cities Energy Project activities. We observed lighting events, we tagged along on tune-ups, we attended teacher training sessions, facilities staff meetings, and the design charrette. We took detailed notes and presented our information, opinions, and recommendations directly to senior and middle management at The Energy Coalition. Some of our process evaluation is included in this report, but the most significant aspect of it was the continuous communication with Coalition staff that led to various program improvements and problem resolutions during the program's implementation.

Savings Summaries

The following tables present summaries for the savings goals and the *ex-ante* and *ex-post* estimates for the various components of the program. All of the values are gross savings, and the net-to-gross ratios are discussed separately. The "goal" column presents the estimates from the PIP spreadsheet. The spreadsheet goal and *ex-ante* values for demand are not really peak demand reductions, but are more like "connected loads" that serve as multipliers in the tables. The *ex-post* evaluations are presented as coincident peak demand reductions, and thus are much lower than the other two columns.

Electric Energy Savings, kWh/year				
Measure	**Goal**	***Ex-Ante***	**% of Goal**	***Ex-Post***
CFL Distribution	2,200,000	2,177,450	99.0%	1,734,893
Torchiere Dist	1,400,000	1,027,600	73.4%	1,209,632
Total Lighting Distributions	**3,600,000**	**3,205,050**	**89.0%**	**2,944,525**
Tune-Up Lighting	1,800,000	1,828,800	101.6%	3,441,343
Tune-Up Misc	375,000	1,129,000	301.1%	387,220
Tune-Up Thermostats	325,000	86,500	26.6%	110,000
Common Areas	800,000	1,400,000	175.0%	1,007,315
Total Residential Tune-Ups	**3,300,000**	**4,444,300**	**134.7%**	**4,945,878**
Tune-Up Lighting	2,500,000	2,710,000	108.4%	1,307,253
Tune-Up Misc	200,000	542,200	271.1%	187,493
Tune-Up Thermostats	150,000	166,500	111.0%	120,000
Total Small Business Tune-Ups	**2,850,000**	**3,418,700**	**120.0%**	**1,614,746**
Student Households	4,500,000	4,753,200	105.6%	2,851,800
CFLs	825,000	1,260,600	152.8%	916,800
District Facilities	900,000	900,000	100.0%	900,000
Total PEAK	**6,225,000**	**6,913,800**	**111.1%**	**4,668,600**
Total Municipal	**5,000,000**	**5,000,000**	**100.0%**	**5,000,000**
Grand Total	**20,975,000**	**22,981,850**	**109.6%**	**19,173,749**

Electric Demand Reduction, kW				
Measure	**Goal (Connected)**	***Ex-Ante* (Connected)**	***Ex-Ante* % of Goal**	***Ex-Post* (Coincident)**
CFL Distribution	1,500	1,485	99.0%	520
Torchiere Dist	960	705	73.4%	363
Total Lighting Distributions	**2,460**	**2,290**	**93.1%**	**883**
Tune-Up Lighting	1,233	1,253	101.6%	1,305
Tune-Up Misc	256	772	301.6%	58
Tune-Up Thermostats	223	59	26.5%	0
Common Areas	137	411	300.0%	44
Total Residential Tune-Ups	**1,849**	**2,495**	**134.9%**	**1,407**
Tune-Up Lighting	410	927	226.1%	289
Tune-Up Misc	82	185	225.6%	47
Tune-Up Thermostats	62	57	91.9%	0
Total Small Business Tune-Ups	**554**	**1,169**	**211.0%**	**336**
Student Households	3,075	3,248	105.6%	260
CFLs	563	860	152.8%	275
District Facilities	308	308	100.0%	105
Total PEAK	**3,946**	**4,108**	**104.1%**	**640**
Municipal	**1,712**	**1,712**	**100.0%**	**450**
Grand Total	**10,521**	**11,774**	**111.9%**	**3,716**

The Six Cities Energy Project was implemented through Southern California Edison public goods charge funds, so natural gas savings were not strictly part of the program. Nonetheless, they were sometimes discussed in the text and provided in the spreadsheets. The program did include measures that provided gas savings.

Gas Energy Savings, therm/year				
Measure	**Goal**	***Ex-Ante***	**% of Goal**	***Ex-Post***
Total Lighting Distributions	**0**	**0**	**0**	**0**
Tune-Up Lighting	0	0	0	0
Tune-Up Misc	0	0	0	62,081
Tune-Up Thermostats	25,000	6,930	27.7%	13,200
Common Areas	0	0	0	789
Total Residential Tune-Ups	**25,000**	**6,930**	**27.7%**	**76,070**
Tune-Up Lighting	0	0	0	0
Tune-Up Misc	0	0	0	311
Tune-Up Thermostats	30,000	13,320	44.4%	9,600
Total Small Business Tune-Ups	**30,000**	**13,320**	**44.4%**	**9,911**
Student Households	225,000	237,660	105.6%	142,590
CFLs	0	0	N/A	0
District Facilities	45,000	45,000	100.0%	45,000
Total PEAK	**270,000**	**282,660**	**104.7%**	**287,590**
Municipal	**250,000**	**250,000**	**100.0%**	**237,500**
Grand Total	**575,000**	**552,910**	**96.2%**	**611,071**

Ex-Ante Evaluation

The program met and exceeded its energy savings performance goals. The *ex-ante* electricity savings estimate (22,981,850 kWh/yr) is 110% of the original savings goal contained in the spreadsheet (20,975,000 kWh/yr). The *ex-ante* values for both residential and small business tune-ups as well as the PEAK program exceeded the program goals because more tune-ups were conducted than planned and more school district participation was achieved than planned. The "lighting measures" (distribution events) goal was not fully met primarily because fewer torchieres were distributed than planned.

The spreadsheet goals and *ex-ante* demand reduction numbers are just multipliers that do not have significant meaning. The *ex-post* value is a meaningful estimate of coincident peak demand reduction.

The gas savings goals were met by PEAK and the municipal facilities. The tune-ups did not provide the *ex-ante* gas savings estimated because programmable thermostats were the only tune-up measure that attributed gas savings *ex-ante*, and fewer thermostats were installed than anticipated.

Near-*Ex-Post* Evaluation

The near-*ex-post* savings estimate (19,173,749 kWh/yr) is 91% of the program goal. The residential tune-ups are the one area in which *ex-post* savings exceed the *ex-ante* savings. The most significant contributor to that fact is the long operating times of lights reported in the customer surveys. Even though other factors reduced the estimated savings of a CFL, the longer operating times were sufficient to bring the per-residence savings higher than anticipated.

Commercial tune-ups had significantly less *ex-post* savings than *ex-ante*. The *ex-post* savings were calculated based upon actual measures installed in the businesses. The number of measures actually installed in the average business was less than anticipated. Thus the *ex-post* savings were lower than the goal, even though more customers participated.

The *ex-post* savings from lighting distribution events was slightly less than the *ex-ante* estimate or the goal because we adjusted the wattage reduction assumption and also accounted for an 80% installation rate of CFLs provided to customers (not to be confused with the 0.8 NTG ratio). The *ex-post* savings for PEAK is also lower than the ex-ante and goal because we took into account the fact that only 64% of students indicated that they told their family about conservation and also accounted for the lack of full implementation of the program in some districts (i.e., some teachers did not provide their students with the full curriculum). We were unable to accurately assess *ex-post* savings in the municipal facilities and assigned the *ex-ante* value, which we consider reasonable, to them.

The *ex-post* demand estimate, 3,716 kW, is 93% of the "approximately 4 MW" discussed in the text. We do not know how this number was derived, nor how it relates to

the demand reduction values discussed in some of the subsections. Nonetheless, we note confidently that the text's overall estimate of the program's coincident peak demand reduction is very reasonable.

The *ex-post* natural gas savings exceed the *ex-ante* estimate and the goal because the residential tune-ups included hot water conservation measures. Only thermostats were given a natural gas savings in the spreadsheet, but we included the gas savings from the 93% gas water heater saturation of the residential tune-up participants that was achieved by installing water heater blankets, faucet aerators, and low-flow showerheads.

Net-to-Gross Ratio

The program used the default 0.8 net-to-gross ratio for all measures except the small business tune-ups, for which it used an NTG ratio of 0.96. (An NTG ratio of 1.3 had been used for fluorescent torchieres in the original plan, but this was corrected to 0.8 in the revised plan.)

We believe the 0.8 value for the residential tune-ups and lighting distribution events is a reasonable assumption. The customers provided with these services, particularly the tune-ups, are hard-to-reach and include high proportions of low-income and/or senior citizen households. Nonetheless, the measures provided in the tune-ups are basic, and knowledge of CFLs and the other devices is growing, so it is possible that 20% of the participants would have eventually bought some of these devices or perhaps participated in upstream rebate programs by purchasing a discounted light bulb. We note that 53% of tune-up participants had never heard of a fluorescent torchiere prior to the tune-up, 39% had never heard of a CFL, and 53% had never heard of a programmable thermostat (See pages 42-45 of the "Residential Tune-Ups" Chapter). So the program definitely does reach people that would not have been reached otherwise.

We also believe the 0.96 NTG value used for the small business tune-ups is reasonable. We visited several of these businesses and observed the general lack of energy efficiency action that permeates this customer segment. Furthermore, the small business tune-up measures are much more difficult to implement than the residential tune-up measures. There is some chance (20% implicit in an 0.8 NTG) someone will buy a CFL, bring it home, and install it. There is virtually no chance (4% implicit in an 0.96 NTG) the owner of a dry cleaning business will go to the building supply store, buy T-8 electronic ballasts, and retrofit his shop lighting. Lighting contractors do not typically target these businesses for retrofits because the jobs are too small and difficult to sell in sufficient quantity to be profitable for the contractors.

The 0.8 NTG ratio is also used for the PEAK program. The concept of net-to-gross is perhaps not as exactly defined for such programs as it is for hardware installation programs where it defines the number of people who would have installed the hardware even without the program. If NTG is meant to represent the number of students who would have participated in a comprehensive energy efficiency program without PEAK, then the proper value is 1.0. While there are a small number of programs available for districts to solicit, we saw no evidence that any of the participating districts would have

used such a program had they not been directly solicited by the Coalition to participate in PEAK.

If, on the other hand the NTG ratio of PEAK is meant to describe the ratio of students or parents who would have taken energy conservation actions without having learned about it through PEAK, then the generic 0.8 value seems appropriate.

A similar discussion could be made regarding the meaning of NTG with respect to the municipalities and city facilities.

In some instances we discuss installation rates of items. Some of these values look like NTG ratios at first glance. (This is especially true of CFL installation rates because the value determined by one comprehensive study is 80%.) The two concepts represent different things and should be distinguished. The installation rate is simply the number of participants who buy or are given an energy efficiency device and then actually install or use it. The net-to-gross ratio represents the number of people who buy or receive (and install) a device who would have done so anyway even without the program's assistance.

Effective Useful Life

For the most part, the Coalition used conservative effective useful life (EUL) values for its measures. For example, the project values were 5 years for a CFL, 10 years for a thermostat, and 10 years for small business lighting. The default values from the *Energy Efficiency Policy Manual* for these measures are 8, 11, and 16 years, respectively. We agree with the use of five years for a CFL because we also found longer daily operating hours than assumed in the standard estimates. Thus the total lifetime operating hours of the bulb are consistent with its rated lifetime hours. We believe that future program plans could raise the EUL for thermostat and small business lighting measures to the standard values.

The "miscellaneous" measures have EULs of 10 years in mobile homes, 7 years in small businesses, and 5 years in apartments and condominiums. These measures primarily consist of fans, weatherization measures, and water measures (that save hot water energy) such as aerators. Many of these do not have standard EULs in the *Policy Manual*. A consistent use of 10 years certainly would be acceptable, so the Coalition's spreadsheets probably underestimate the lifetime savings from these measures.

The PEAK and municipal sections include 5-year EULs for the household savings and facility savings. These values are probably high. The savings achieved in PEAK households as well as school and municipal facilities include a combination of hardware and behavior modification savings. For the most part, the household hardware directly attributable to PEAK would be installation of CFLs. It seems unlikely that the behavior modification component would have a general persistence of five years directly attributable to the program. A three-year value for the EUL of these programs is probably a more reasonable average.

We also note that the CFLs contained in the PEAK program have an EUL of 7 years, as opposed to the 5-year value for the tune-ups. This is still below the 8-year value

of the Policy Manual and is acceptable given that the PEAK households represent a larger cross-section of the housing stock and we attributed a lower daily operating time to these CFLs.

Customer Satisfaction

We conducted telephone or in-person interviews with 227 residential tune-up participants and on-site interviews of 32 small business tune-up participants. A small number on non-participants – typically neighbors or near-by businesses – were also interviewed. We also sent out surveys to PEAK students and their parents. A total of 439 students and 181 parents returned surveys.

Overall satisfaction with the program was very good across all sectors. Ninety-four percent of the residential tune-up participants indicated they were satisfied with the program. In the small business sector the average satisfaction rating was 4.63 on a 1-to-5 scale. In PEAK, 95% of parents indicated that they believe energy conservation is an important topic for students to learn at school. The details of these surveys are very interesting. The individual questions and their results are presented in the respective tune-up and PEAK chapters of this report.

Market Transformation

Part of the enthusiasm of the Six Cities Energy Project and The Energy Coalition in general derives from its assertive belief that it transforms the attitudes of people regarding conservation. The clear awareness and emphasis on this effect is part of the program's uniqueness. The program implementers clearly believe that participants tell others about their experience. They believe by focusing a variety of efforts in a specific local area – home tune-ups, small business tune-ups, city involvement, student involvement, etc. – that a critical mass of efficiency awareness can be developed. The program managers speak openly and enthusiastically about these concepts, and we have witnessed that enthusiasm being shared with other program personnel – contractors, city workers, teachers, etc. – as communities are organized around energy efficiency awareness. We term this aspect of the program "evangelical" because it is an essential endeavor to spread the "good news" about energy efficiency.

The program makes no direct energy saving claims for this aspect of its work. Nonetheless, we have collected information that is quite useful in exploring this concept. We specifically asked both tune-up participants and PEAK students and parents whether they had told others about energy efficiency.

We asked residential tune-up participants, "Have you told any friends or family members about your energy savings and tune-up?" Of the 217 respondents, 178, or 82% of them, said "Yes." A total of 213 people answered an additional question, "Do you know of any friends/family members who bought these energy saving lights/other energy efficient technology because they saw yours?" Forty-nine (23%) said "Yes," while 146 said "No" and 18 said they did not know.

Compact fluorescent lamps are most economically purchased in quantity. In a question asked of tune-up participants who said they purchased additional lights, we determined that the average quantity was 3.57. If we assume that one friend or family member of 23% of the 4,706 tune-up recipients went out and bought 3.57 CFLs, that is an additional 3,864 CLFs that were purchased because of the evangelical component of the project. If these are 23W bulbs installed in similar fashion as assumed for the tune-ups, thus saving 187 kWh per year, this results in additional annual energy savings of 722,568 kWh.

We also found that 52% of the PEAK parents surveyed indicated that they had told family or friends about energy efficiency. We are aware of a bias in this survey, as enthusiastic teachers, students, and parents each had a role in the distribution and return of surveys. The 52% probably does not represent the average PEAK household. Nonetheless, it does demonstrate that people do tell others about energy efficiency when they learn about it with enthusiasm.

Process Evaluation

We became involved in the Six Cities Energy Project and observed many of the activities. In general, we believe the program is well run. The program managers clearly believe in what they are doing, and this core belief is an important component of their success with inducing efficiency enthusiasm in others.

During the course of observing the program we continuously provided feedback and thoughts to program managers. In most cases where we identified problems, they were corrected promptly. Two general issues should be addressed in future programs. Both of them have the common issue of carrying the message all the way through the levels

Involvement to the Installer Level. The "chain of command" goes from The Energy Coalition managers to the owners/managers of the subcontractors, to their employees who actually do the installations. Most installers did a very good job. However, there are occasions where installers did not provide full implementation of the program during tune-ups. The most serious breach of this responsibility was the failure to install either thermostats or fans that were provided. Since these were provided free to the participating customers, they did not know that installation was part of the deal. Therefore they did not report the problem. We discovered this only through our customer survey contacts.

This was immediately brought to the attention of the program managers, and we have no evidence that the problem is continuing. However, the nature of the program and the construction industry in general is to have a certain amount of turn-over at the technician/installer level. Clear directions should be given to the installers as to what their responsibilities are.

We believe that a "buy-in" process is appropriate. By this we mean that every person involved with the programs implementation, all the way down to the technicians actually doing the tune-up, should be part of group participation. At least quarterly, and perhaps more often, full staff sessions should be held. The subcontractors should not just

be represented by managers and owners, but all of their staff should attend these events. The events do not need to be long or complex, and regional events could be held to minimize travel time of lower level staff. Nonetheless, it will give everyone an opportunity to meet the full spectrum of people involved in the program. A question and answer section should be held to help everyone better understand the program. Equally important, it will provide an opportunity for the energy-efficiency enthusiasm to be transferred to the full staff of the program. It is, after all, the installation technicians who are the ones that can transmit this enthusiasm to the participating customers.

PEAK Implementation. Some teachers perceive PEAK as one more thing thrown at them by the administration. This is problematic when there are other systemic problems within a school district. PEAK does not appear to cause the problem, and we have no evidence that it even enhances the problem. However, if teachers are not interested in the program for whatever reason, it is much less effective. The underlying assumption in PEAK's ability to transfer energy efficiency knowledge and enthusiasm is that the full curriculum is implemented. This is not always the case.

Part of the problem is beyond control. Energy efficiency is not a subject tested on the standardized tests for elementary and middle school students. To the extent that districts push for test performance, they push somewhat away from diverse programs such as PEAK.

The definition of PEAK participation needs to be clarified in future programs, and the contract between the Coalition and the districts should specify the portion of the curriculum that each teacher will be held accountable for teaching. Ideally this would be 100%, but we realize that this may not be an achievable goal in every situation. Nonetheless, it is important for Coalition personnel and school district administrators to be aware that the problem exists so that they can at least attempt to resolve it.

Conclusion

The Six Cities Energy Project was a success. It accomplished nearly all of the goals it set out to do. It also demonstrated an ability to induce an enthusiasm about energy efficiency into a population exceeding 25,000 participants. We are pleased that the CPUC has chosen to continue and expand this work through the Community Energy Partnership, and we believe that program will continue to demonstrate the need for this work.

Lighting Measures

Introduction

Distributions of compact fluorescent lamps are a source of a significant portion of the energy savings achieved through the Six Cities Energy Project. The distribution totals represented in this section are separate from the distribution totals reported in the residential, small business, and PEAK sections of this report. Those sectors of the project include direct installation to residential and small business customers or no-cost distribution to students participating in the PEAK program. This section of the report will analyze the total number of CFLs distributed primarily through discounted sales at energy district fairs, school fundraising activities, and special events. In addition, the distribution of fluorescent torchieres through various exchange events will also be analyzed in this section.

Ex-Ante *Evaluation*. For the sake of program evaluation, these measures are evaluated on an *ex-ante* basis. This is a very important consideration for the CFL and torchiere distribution aspects of the program. The per-unit energy savings of the lighting measures is stipulated. The program's effectiveness, therefore, is defined by its ability to distribute the quantity of measures it set out to distribute.

"*Near*-Ex-Post" *Evaluation*. A true *ex-post* assessment of energy savings for lighting measures was not included in the evaluation plan because it would be impractical. Nonetheless, we do present our best estimates of actual energy savings and will from time to time present commentary regarding (a) whether the estimates used by The Energy Coalition appear consistent with such standard estimates and (b) whether either the Coalition's or the standard estimates appear reasonable to us. For this reason we call this evaluation "near-*ex-post*."

Useful Life. A common useful life of 8,000 hours is used routinely for compact fluorescent lamps. At the beginning of the program we installed several CFLs in Aloha's offices and at employees' homes in January 2003. One bulb that operates 16 hours per day in three daily on-off cycles is still operating, having accumulated 8,131 hours so far. Four others that have been operating continuously have accrued approximately 12,000 hours as of this writing and are still burning. Two others that operated continuously burned out, one after about 6,000 hours and one at approximately 8,000 hours. None of the bulbs burned out exceedingly early. We do not in anyway claim that this simple test has been a scientifically valid study of CFL life. However, we do believe that it demonstrates that the 8000-hour life used by The Energy Coalition is an acceptable number, and perhaps even a conservative estimate. This analysis of useful life fits within our definition of "near-*ex-post*."

Savings Summaries. The following tables present summaries for the lighting distribution savings goals and the *ex-ante* and *ex-post* estimates totaled for both CFLs and fluorescent torchiers. The "goal" column presents the estimates from the PIP spreadsheet.

Electric Energy Savings, kWh/year				
Measure	**Goal (Gross)**	***Ex-Ante* (Gross)**	***Ex-Ante* % of Goal**	***Ex-Post* (Gross)**
CFLs	2,200,000	2,177,450	99.0%	1,734,893
Torchieres	1,400,000	1,027,600	73.4%	1,209,632
Total Lighting	**3,600,000**	**3,205,050**	**89.0%**	**2,944,525**

Electric Demand Reduction, kW				
Measure	**Goal (Gross Connected)**	***Ex-Ante* (Gr Connected)**	***Ex-Ante* % of Goal**	***Ex-Post (Gr Coincident)***
CFLs	1,500	1,485	99.0%	520
Torchieres	960	705	73.4%	363
Total Lighting	**2,460**	**2,290**	**93.1%**	**883**

The *ex-ante* savings estimate is 89% of the program goal, primarily because only three quarters as many fluorescent torchieres were provided as estimated. The near-*ex-post* energy estimate, 2,944,525 kWh/yr, is slightly less than the *ex-ante* savings primarily because it accounts for an estimated non-installation of 20% of the bulbs distributed.

The peak load reduction of 883 kW appears reasonable and is consistent with the ratio of demand reduction to energy savings found in the DEER. The text did not present a demand reduction goal, and the spreadsheet values, which are much higher than our *ex-post* estimate, were presented as connected load reductions rather than coincident peak demand reductions, and thus would be expected to be higher than coincident demand savings.

Compact Fluorescent Lamps

Ex-Ante *Evaluation*. The Six Cities Energy Project's goal was to distribute 8,000 CFLs through school fundraisers and 12,000 CFLs through "employee-awareness programs, energy district fairs, and special events" (herein referred to as "special events") totaling 20,000 CFLs. An additional 8,000 CFLs earmarked for distribution to students at no cost through the PEAK Student Energy Actions program will be discussed and analyzed in the "PEAK" chapter. With final totals received from The Energy Coalition, 19,795 CFLs were distributed.

"For the cost-effectiveness analysis, we assume that the CFLs will be in place for 5 years and that they have an 8,000-hour operating life, for an annual kWh usage of 123 kWh per year. As such, the 28,000 CFLs will result in annual electricity savings of 2,460,000 kWh, adjusted downward to account for the 0.8 net-to-gross ratio to 1,968,000 kWh." [1]

As stated, the program goal for this section is 20,000 CFLs. The demand reduction per unit (CFL) listed in the CPUC spreadsheets is 0.075 kW, with estimated annual hours of operation at 1,460 per unit. The annual energy savings per unit is stipulated at 110 kWh, for a total gross savings goal of 2,200,000 kWh/yr. The total *ex-ante* gross annual electricity savings of 19,795 CFLs is 2,177,450 kWh with a connected load reduction of 1,485 kW.

The assumed net-to-gross ratio is 0.8 and the measure useful life is 5 years. The net annual savings are 1,741,960 kWh, and 1,188 kW. Over the five-year useful life this amounts to 8,709,800 kWh.

These savings are 99.0% of the originally proposed energy savings per the spreadsheet and 88.5% of the 2,460,000 kWh value contained in the text of the program plan. The primary difference in these values is a result of the kWh/year estimate for an individual bulb.

[1] The Energy Coalition. *The Six Cities Energy Project Revised Program Implementation Plan*, CPUC Program Reference #232A-02. Page 8

The following table delineates the events that combined to distribute 19,795 CFLs:

CFL Distribution Event/Activity	Event Totals	Totals per City
Brea		
Brea City CFL sale	2,000	
CFLs sold at Family Day, Brea	180	
Brea Torchiere trade-in and bulb sale	2,074	
		4,254
Irvine		
Irvine City CFL sale	2,000	
Irvine Meadows Event (Saturday sales)	638	
Irvine Meadows Event (follow-up sales)	10	
Irvine - Groves Event	999	
Follow-up to The Groves	1,176	
Irvine Woodbridge (Spring Fair) Buck-a-bulb	1,364	
		6,187
Moreno Valley		
Moreno Valley City CFL sale	1,853	
CFLs distributed at MoVal torchiere trade-ins	47	
Moreno Valley Senior Center bulb distribution	396	
First Baptist Church, Moreno Valley	470	
		2,766
Palm Desert		
Palm Desert City CFL sale	1,000	
Palm Desert SpringFest	130	
PD CFL school fundraiser	800	
PD Senior Center Bulb Sale	480	
		2,410
Santa Monica		
Santa Monica City CFL sale	2,000	
Santa Monica Spring Fair	850	
Santa Monica Holiday Light-Up distribution	96	
		2,946
West Hollywood		
West Hollywood City CFL sale	777	
		777
Other Activities		
Kickoff Meeting	95	
Team Leaders Meeting	360	
		455
TOTAL		**19,795**

Although the implementation plan specified differing amounts of CFLs between school fundraising activities and special events, the per-unit energy savings of these CFLs is the same. Therefore, reaching specific distribution goals for those two categories is irrelevant in realizing the program's effectiveness.

"*Near*-Ex-Post" *Evaluation*. The main parameters that determine the energy savings of a lighting fixture are the change in operating power (wattage) and the operating time (hours per year). The vast majority (95%-98%) of the CFLs given away or sold in these events were 23-watt bulbs designed to replace 75W or 100W incandescent lamps. It is difficult to accurately estimate the average wattage of incandescent bulbs replaced since people do not necessarily replace light bulbs with the same wattage each time nor would they necessarily use their 23W CFL to replace a 100W incandescent. Assuming a 15/15/70% split of 60W, 75W, and 100W incandescents, the average wattage of the bulb replaced is 90W. This results in a 67W reduction in load for each CFL sold. (The 75W reduction assumed in the Coalition's calculations is essentially what one would achieve if all of the CFLs replaced 100W incandescent bulbs.)

The spreadsheet assumed 1,460 operating hours per year (which is four hours per day). Over the course of five years this amounts to 7,300 hours. This value is therefore somewhat consistent with the five-year useful life and 8,000 total operating hours assumptions. As discussed in the introduction, we believe that the 8,000 average total operating hours is easily achievable by the CFLs being used, and in fact their average lifetime might be considerably longer.

Operating schedule probably affects the total life-cycle savings from a CFL less than it affects the bulb's annual savings. This is because a bulb that is used less will probably remain operational for more years than one that is used for longer periods of time.

Aloha staff attended two of the bulb distribution events and asked people purchasing bulbs to estimate their hours of operation. At the first event (The Meadows, January 25, 2003) the people were asked to estimate weekly operating hours, but some of the responses seemed to be daily rather than weekly values, so the average value was very low. At the second event (The Groves, February 22, 2003) we changed the survey instrument to ask for daily operating hours. Fifteen people completed their surveys. Operating estimates ranged from one to ten hours per day, with an average of four hours per day. Four hours per day equates to 1,460 hours per year, exactly the assumption used by the Coalition.

We conducted telephone and on-site surveys of residential customers who received CFLs as part of the "tune-up" program. The detailed results of these surveys are included in the "Residential Tune-Up" chapter of this report. A total of 193 respondents answered the question regarding how long their CFLs operated. The average operating time was 6.5 hours per day, or 2,373 hours per year.

During these surveys we also asked where participants had placed their CFLs. These locations were matched with the average operating hours for a CFL in those various locations as described in a 2002 study done by Kema-Xenergy for San Diego Gas and Electric.[2] This resulted in an average operating time estimate of 3.7 hours per day, or 1,350 hours per year.

[2] Kema-Xenergy. *Phase 4 Market Effects Study of California Residential Lighting and Appliance Program.* For SDG&E, April 26, 2002, section 8, pages 10. CALMAC study 3910.

Assuming a 67W reduction for each CFL, the following table presents per-unit annual energy savings for each of the operating scenarios discussed:

Source	Daily Hours	Annual Hours	Annual kWh Savings
SDG&E Kema-Xenergy	3.7	1,350	90
Energy Coalition & Groves Survey	4.0	1,460	98
Aloha Telephone Survey	6.5	2,373	159

Both the 110 kWh/yr of the spreadsheet and the 123 kWh/yr value of the plan text are higher than what one would anticipate from the estimated operating hours because it is not reasonable to assume that 100% of the 23W CFLs replaced 100W incandescents. However, there is some evidence that the operating time of an installed CFL exceeds the four hours per day assumed. In fact our most robust survey (the 193 persons responding to how long they used their CFLs) provided the 6.5 hour per day figure, leading to the 147 kWh/year estimate. The Kema-Xenergy study was more comprehensive and underwent a rigid statistical sampling design. However, it measured several programs conducted by the various investor-owned utilities throughout the state. Its overall target sample size for the lighting survey was 804 surveys.[3] One cannot categorically assume that the results from this survey (which averaged 4.2 h/yr and led to a weighted average of 3.7 h/yr based upon the room distribution of Energy Coalition responses) are more accurate than the 6.5 number reported through our survey of 193 respondents. Our survey, for example, included only the housing types served by the Energy Coalition (mobile homes, apartments, and condominiums), and these homes often have less natural daylighting than single-family homes. However, the 6.5 h/day number may be more applicable to our residential tune-up analysis (which involved specific home types) than the CFL distribution programs, which involved people living in all types of housing.

Another significant factor affecting the ability of CFLs to save energy is whether they were actually installed once they were taken home. Our telephone and on-site surveys did not address this subject because these were surveys of direct-install tune-up participants, not participants from discounted CFL sales events.

The Kema-Xenergy study did address this subject for the various give-away programs it surveyed. In the Powerwalk Program, four CFLs were given to participants. The survey found an average of three bulbs actually installed (this varied slightly by utility). In Edison's Refrigerator Recycling Program, participants could receive five CFLs for recycling a refrigerator. The survey found that on average 3.9 of these bulbs

[3] *Op. Cit*, Chapter 3, Page 3.

were actually installed. Installation rates therefore seem to be around 75% to 80% of CFLs actually received.[4]

There do not seem to be any obvious reasons why the CFL installation rates of the various Energy Coalition lighting programs would differ significantly from this value. The respondents in the Groves distribution survey were asked whether they were planning to install their lights "today," "within a week," or "within a month." One indicated they would install the bulbs that day. Eleven said they would do it within a week, and three said within a month. If we assume that three who said "within a month" would actually never get around to installing their bulbs, we come up with the same 80% installation rate observed by Kema-Xenergy.

Part of the argument for the 6.5 hours per day figure is that the homes participating in the tune-ups – apartments, condominiums, and mobile homes – often do not have as many windows and daylighting as single-family homes. Another possible reason is the higher concentration of senior citizens in the tune-up sample, since seniors tend to have reduced eyesight and need more light. However, many of the bulb distribution events represented a more general aspect of the population than the tune-ups.

For the sake of our evaluation we separated the quantity of CFLs distributed at events in tune-up complexes or senior centers and those distributed at more generic city-wide events. The 3,219 CFLs in the former group were assigned 127 kWh per bulb, and the 16,576 CFLs in the latter group were assigned 80 kWh per bulb. These values represent 80% of the 159 kWh and 98 kWh savings achieved by a bulb that is actually installed, accounting for an estimate that only 80% of the bulbs distributed are in fact installed.

The 19,795 CFLs distributed through discounted sales save 1,734,893 kWh/year based upon these operating time estimates.

Demand Reduction. It is important to note that the total connected load power reduction achieved through the lighting retrofits is *not* the coincident peak load reduction. There is an implicit demand reduction of 0.3 watt/kWh in the *DEER Update Study*.[5] The 1,734,893 kWh/yr estimated to be saved by the CFLs results in a demand reduction estimate of 520 kW based upon the DEER's demand reduction to energy savings ratio.

This value is much less than the value derived from the spreadsheet (*ex-ante*) but that value is presented as a connected load reduction and does not take into account the coincidence factor of actual light operation.

[4] *Op. Cit*, Chapter 8, Page 4-5.

[5] This value can be determined by dividing demand reductions by energy savings for the various lighting types listed on p. 117 of Chapter 6.

Fluorescent Torchieres

The Energy Coalition's goal was to distribute 4,000 fluorescent torchieres during the Six Cities Energy Project. Using information received from The Energy Coalition, we established that 2,936 fluorescent torchieres were distributed through various exchange events.

"The Six Cities Energy Project will distribute 4,000 safe and efficient fluorescent torchieres in the 2002-2003 program years. In the 2002-2003 program years, the Six Cities Energy Project will shoulder 100% of the costs of these exchange events. Note that each halogen torchiere consumes 300 watts minimum (some up to 500 watts) while the cool-burning fluorescent versions consume 58 watts. Assuming that each lamp has a duty factor of three hours per day and savings of about 242 watts, each device will result in an annual savings of about 265 kWh. Assuming an Energy Division stipulated net-to-gross ratio of 0.8 for early retirement and replacement of the halogen torchieres, the annual electricity savings are projected at 1,400,000 kWh." [6]

In the spreadsheets, the demand reduction per unit (torchiere) is stipulated as 0.240 kW. The estimated annual hours of operation per unit is stipulated as 1,460 per unit. The annual energy savings per unit is stipulated as 350 kWh. Therefore, the total *ex-ante* gross annual electricity savings of 2,936 fluorescent torchieres is 1,027,600 kWh with a demand reduction of 705 kW.

The assumed net-to-gross ratio is 0.8 and the measure useful life is 5 years.[7] The net annual savings are 822,080 kWh, and 564 kW. Over the five-year useful life this amounts to 4,110,400 kWh.

These savings are 99.0% of the originally proposed energy savings per the spreadsheet and 88.1% of the 2,460,000 kWh value contained in the text of the program plan. The primary difference in these values is derived from the kWh/year estimate for an individual torchiere.

The following table delineates the distribution of these torchieres:

Torchiere Distribution Events	Totals
Irvine Meadows & The Groves (MHP)	170
Moreno Valley Torchiere Trade-Ins (3)	1,769
Palm Desert Holiday Light Up	440
Brea Trade-In	557
TOTAL	**2,936**

[6] The Energy Coalition. *The Six Cities Energy Project Revised Program Implementation Plan*, CPUC Program Reference #232A-02. Page 9.

[7] Originally a 1.3 net-to-gross ratio had been used. This was corrected to 0.8 in the text of the revised Program Implementation Plan (p. 8), though the 1.3 value is still found on some program spreadsheets.

"*Near*-Ex-Post" *Evaluation*. At the torchiere trade-in event at the Groves Mobile Home Park, we physically inspected a portion of the old torchieres traded in. The sample consisted of 20% 500-watt incandescent halogen bulbs and 80% 300-watt bulbs. The Coalition staff coordinating the trade-ins felt that this was an accurate representation of the general trade-in stock. This amounts to an average pre-trade-in power of 340 watts. The fluorescent torchieres have a power rating of 58 watts, meaning that the average power reduction of a trade-in is 282 watts. This is higher than the 242W value used by the Coalition because it gives credit for the portion of 500W incandescent fixtures observed.

The Coalition also assumed a 3 h/day torchiere operating time in the text of its program plan, resulting in 265 kWh/year in savings. In the spreadsheet calculations an operating time of 1460 h/year (four hours per day) was assumed, resulting in 350 kWh/year savings.

Our customer survey did not distinguish between CFLs and torchieres when asking customers where their new lights were installed or how long they operated them. The Kema-Xenergy study cited regarding CFLs did not inquire as to the operating characteristics of fluorescent torchieres. The 3 hour per day estimate is probably low, and the 4 hour per day estimate seems justified.

Maintaining the 3 h/day operating time but increasing the wattage reduction increases the per-unit annual energy savings to 309 kWh. Using a 4 h/day operating time the annual per-unit energy savings increases to 412 kWh. If the operating time is increased to 6.5 hours per day (the average reported in our customer survey), the annual per-unit energy savings increases to 669 kWh. We believe that a 4 hour per day estimate is the most appropriate to use for these fixtures.

Torchieres are only sold or given away to customers who trade in a halogen unit. The installation rate is therefore assumed to be 100%, as it is unlikely that a customer would bring down an old lamp, turn it in, and then not install the new lamp. The various annual energy savings estimates therefore do not have to be reduced to account for non-installed units, as is the case with purchased CFLs. We thus assign a savings of 412 kWh per year to each torchiere distributed.

The 2,936 torchieres provided through the trade-ins save a total of 1,209,632 kWh per year. Even though the full 4,000 torchieres were not provided, the near-*ex-post* energy savings estimate is higher than the goal because each torchiere is reported to operate for a longer period of time than assumed in the preliminary analysis.

Demand Reduction. We assume the same 0.3 watt/kWh of demand reduction used for a CFL in the DEER database applies to torchieres. The 1,209,632 kWh/yr estimated to be saved by the torchieres results in a demand reduction estimate of 363 kW.

Residential Tune-Ups

Introduction

The evaluation of the measures implemented in the residential section of the Six Cities Energy Project required an analysis of the direct benefits received through individually customized energy tune-ups, and an interest in realizing the potential energy-savings achieved through indirect benefits. To effectively do this, Aloha Systems attended various residential "energy rallies" orchestrated by The Energy Coalition, conducted multiple "ride-along" evaluations with both installation contractors, surveyed residential participants through telephone and on-site visit interviews, cross-referenced for accuracy contactor installation agreements with actual database entries, and analyzed The Energy Coalition's database for final results.

The information contained in this section of the report is separate and unique from the data analyzed in the section entitled "Lighting Measures." This section analyzes the direct implementation of energy-efficiency measures into residential units. Torchieres and compact fluorescent lamps given away in tune-ups are included here, while those sold or given away through community events are included in the Lighting Measures chapter.

Ex-Ante *Evaluation*. The primary means of analyzing the effectiveness of the project is defined by its ability to distribute the total quantity of measures it set out to distribute. The energy efficiency measures implemented in mobile homes, apartments, and condominiums are outlined in three categories – lighting measures, miscellaneous measures, and thermostats. Those three categories will be discussed in detail in this report. Common-area savings will also be analyzed in this report. In all cases where measures were installed by its contractors, the cumulative results from these activities were retrieved from The Energy Coalition's master database.

The per-unit energy savings of lighting measures and miscellaneous measures are the same for mobile homes, apartments, and condominiums. Thermostats are the only measure that stipulates varying energy savings demand reduction numbers by sector. Out of a combined goal of 4,500 residential energy tune-ups, 4,706 were conducted. The following table delineates the total number of residential tune-ups made, excluding common-area visits:

City	Mobile Homes	Apartments	Condominiums	# of Tune-ups
Brea	58	325	19	402
Irvine	0	633	34	667
Moreno Valley	442	801	136	1,379
Palm Desert	233	340	22	595
Santa Monica	0	1,586	71	1,657
West Hollywood	0	6	0	6
Total	**733**	**3,691**	**282**	**4,706**

The original plan was to conduct 1,500 tune-ups in each housing-type sector. Early on in the program the Coalition realized that condominiums were not as easy a target to reach (and conversely probably *less* like the traditional "hard-to-reach" demographic). Since the per-unit program savings goals were the same (except for thermostats), we supported the Coalition's decision to focus on the overall goal of 4,500 tune-ups rather than concentrate on reaching individual housing sector goals. This evaluation report reflects that agreement by presenting combined savings for residential tune-ups rather than separating the savings by housing sector. We do present housing sector differentiation in the customer survey information, but also note that this differentiation was generally not significant.

In addition to the individual residence goals, The Energy Coalition set a goal to conduct 14 common-area tune-ups. A total of 32 common-area tune-ups were made.

Ex-Post *Evaluation*. Although rigid *ex-post* evaluation was not conducted, we do assess installations at a more detailed level that leads us closer to a true energy savings calculation than using a simple generic average for "lighting," and "miscellaneous" measures at a variety of homes. Additionally, although no end-use metering was required for this evaluation, we collected self-reported operating hours from customers during our process evaluation survey. We present "near-*ex-post*" values for the tune-ups by analyzing actual equipment installations and customer-reported operation information. These analyses are included in the respective subsections of this chapter.

Net vs. *Gross*. The text of the Revised Program Implementation Plan for the most part presented savings goals in terms of "net" savings. These are basically 80% of the gross savings based upon a net-to-gross ratio of 0.8. The analyses we discuss, unless otherwise indicated, are gross savings. There are two main reasons for this: (1) in a few instances the net-to-gross ratio is something other than 0.8, and (2) we have not conducted a sophisticated assessment of the NTG ratios and do not want to add that level of uncertainty to our *ex-post* evaluation numbers. The net *ex-ante* estimates are presented on the following pages in the various narratives based upon the NTG ratios contained in the Program Implementation Plan spreadsheet for that particular measure.

Savings Summaries. The following tables present summaries for the residential savings goals and the *ex-ante* and *ex-post* estimates totaled for all three housing-type sectors. The "goal" column presents the estimates from the PIP spreadsheet.

Electric Energy Savings, kWh/year				
Measure	**Goal (Gross)**	***Ex-Ante* (Gross)**	***Ex-Ante* % of Goal**	***Ex-Post* (Gross)**
Lighting	1,800,000	1,828,800	101.6%	3,441,343
Miscellaneous	375,000	1,129,000	301.1%	387,220
Thermostats	325,000	86,500	26.6%	110,000
Common Areas	800,000	1,400,000	175.0%	1,007,315
Total Residential	**3,300,000**	**4,444,300**	**134.7%**	**4,945,878**

Electric Demand Reduction, kW				
Measure	**Goal (Gross Connected)**	***Ex-Ante* (Gr Connected)**	***Ex-Ante* % of Goal**	***Ex-Post (Gr Coincident)***
Lighting	1,233	1,253	101.6%	1,305
Miscellaneous	256	772	301.6%	58
Thermostats	223	59	26.5%	0
Common Areas	137	411	300.0%	44
Total Residential	**1,849**	**2,495**	**134.9%**	**1,407**

Gas Energy Savings, therm/year				
Measure	**Goal (Gross)**	***Ex-Ante* (Gross)**	***Ex-Ante* % of Goal**	***Ex-Post* (Gross)**
Lighting	0	0	0	0
Miscellaneous	0	0	0	62,081
Thermostats	25,000	6,930	27.7%	13,200
Common Areas	0	0	0	789
Total Residential	**25,000**	**6,930**	**27.7%**	**76,070**

The program clearly exceeded its goals in the residential tune-up sectors. This is true both for the *ex-ante* evaluation and the *ex-post* evaluation. The *ex-ante* savings significantly exceeded the goals because more "miscellaneous" measures were included than had been anticipated. A more important observation is that the *ex-post* evaluation exceeds its goals because more CFLs were given away than anticipated, and these lights were reported to operate for longer periods of time than originally assumed.

Process Evaluation. Following the discussion of the four "measures" (lighting, miscellaneous, thermostats, and common areas), we provide process evaluation and customer satisfaction analysis from the residential sector. These survey results and discussions are in the "Residential Survey" subchapter starting on page R-20.

Lighting Measures

The Energy Coalition's implementation plan stipulated that *each* of the three residential sectors will have lighting retrofits provided to 1,500 units. The demand reduction per residence is stipulated as 0.274 kW, with 1,460 estimated annual hours of operation. The annual energy savings of lighting measures per residential unit is stipulated as 400 kWh. The lighting savings goal for each sector was therefore 600,000 kWh, with a combined energy savings goal of all three sectors of 1,800,000 kWh with a total of 4,500 lighting retrofits. The demand reduction goal is 1,233 kW.

Out of the 4,706 residential units that received an energy tune-up, 4,572 received lighting measures. (One hundred thirty-four residential units did not receive any type of lighting measure.) Therefore the total *ex-ante* gross annual electricity savings of the 4,572 residential units that received lighting measures is 1,828,800 kWh with a demand reduction of 1,253 kW.[1]

The assumed net-to-gross ratio is 0.8, so the net annual savings are 1,463,040 kWh with a demand reduction of 1,002 kW.

The measure useful life is 5 years for both apartment and condominium residents. A combined total of 3,858 apartment and condominium residents (3,594 apartment and 264 condo residents) received lighting measures. The measure useful life for mobile home residents was stipulated at 7 years.[2] A total of 714 mobile home residents received lighting measures. Over the five-year useful life the apartment and condominium savings amount to 6,172,800 kWh. Over the seven-year useful life the mobile home savings amount to 1,599,360 kWh. The combined net annual savings of all three sectors amounts to 7,772,160 kWh.

Out of the 4,572 residential units that received lighting measures, a total of 43,580 products were distributed. This averages to 9.53 products per residential unit. The following table delineates the breakdown of all lighting measures installed:

Lighting Measures	Mobile Homes	Apartments	Condos	# of Products
11W cfl	13	407	19	**439**
15W cfl	4,736	21,894	1,562	**28,192**
20W cfl	69	2,641	87	**2,797**
23W cfl	87	581	66	**734**
30W cfl	0	10	0	**10**
Nightlight	1,126	6,507	418	**8,051**
Torchiere	32	571	48	**651**
Kitchen Light	36	1,460	97	**1,593**
Bathroom Light	12	125	18	**155**
Porch Light	118	809	31	**958**
Grand Total	**6,229**	**35,005**	**2,346**	**43,580**

[1] The "demand reduction" values given in the spreadsheet are actually connected load reductions and do not take into account the peak coincidence factor, which is significantly less than 1.0.

[2] This 7-year value appears to be an error in the spreadsheet. It was, however, approved as part of the program plan without correction, so we use it for the *ex-ante* evaluation.

The average operating time of the lights in the residences was 6.5 hours per day, or 2,373 hours per year, according to our survey of tune-up participants. (See discussion on page R-23.) The following table presents the annual energy savings of each measure based upon that average operating time:

Lighting Measures	Power Reduction	Per Unit Savings	Total Installed	**Totals**
11W cfl	29.0	68.82	439	**30,211**
15W cfl	45.0	106.79	28,192	**3,010,483**
20W cfl	55.0	130.52	2,797	**365,051**
23W cfl	77.0	182.72	734	**134,117**
30W cfl	95.0	225.44	10	**2,254**
Nightlight	0.0	0.00	8,051	**0**
Torchiere	282.0	669.19	651	**435,640**
Kitchen Light	90.0	213.57	1,593	**340,217**
Bathroom Light	90.0	213.57	155	**33,103**
Porch Light	45.0	106.79	958	**102,300**
Grand Total			43,580	**4,453,376**

The power reduction levels were estimated by assuming the 11, 15, 20, and 23W CFLs replaced 40, 60, 75, and 100W incandescents, respectively, and that the 30W CFL replaced an even mix of 100W and 150W incandescents. Torchiere wattage reduction was based upon our observations described in the Lighting Measures chapter (page L-7). Kitchen and bathroom fixtures were assumed to be 30W CFL fixtures replacing 120W incandescent fixtures (two 60W bulbs), presumably a conservative estimate. Porch light fixtures were assumed to be a 15W CFL fixture replacing a 60W incandescent.

There remains an issue as to whether the CFL bulbs provided in the tune-ups were actually installed. A total of 32,172 CFLs were given away in the 4,572 tune-ups receiving lighting measures, equating to just slightly over 7 bulbs per home. Some participants interviewed indicated that some or all of their bulbs were handed to them without installation. During our ride-along observations with the contractors, we also noted that it was common practice to give customers extra CFLs for self-installation or for replacement when the installed CFLs burned out.

The CFL bulbs (as opposed to fixtures) represent 3,542,115 kWh of the above total. If we assume that two of the seven average CFLs were not actually installed, and will not achieve energy savings during the first year, this number should be reduced to 5/7 of the value (*i.e.* a 29% reduction). The resultant adjusted savings is 2,530,082 kWh per year. Similar adjustments do not need to be made for the installed fixtures, so the adjusted total lighting savings is 3,441,343 kWh/yr.

Even with this adjustment the actual savings are 191% of the originally proposed value. Additional adjustments may be necessary to bring this value in line with actual savings, including whether the full 6.5 hour/day value reported by the customers truly represents all five installed CFLs. That level of analysis is beyond the scope of this evaluation, but we believe there is little if any doubt that the proposed energy savings achieved from tune-up lighting measures were in fact exceeded.

Demand Reduction. It is important to note that the total connected load power reduction achieved through the lighting retrofits is *not* the coincident peak load reduction. There is an implicit demand reduction of 0.3 watt/kWh in the *DEER Update Study*.[3] Of the 4,453,376 kWh/yr estimated to be saved by the lighting measures, 102,300 are for porch lights which are assumed to have no demand savings. The inside light savings of 4,351,076 kWh/yr results in a demand reduction estimate of 1,305 kW based upon the DEER's demand reduction to energy savings ratio.

This value is slightly higher than the program goal and the *ex-ante* savings. It should be noted, however, that the *ex-post* lighting energy savings are much greater than the goal or the *ex-ante* savings. The ratio of demand savings to energy reduction implicit in the original goal calculations is therefore too high and should be reduced in future program planning.

[3] This value can be determined by dividing demand reductions by energy savings for the various lighting types listed on p. 117 of Chapter 6.

Miscellaneous Measures

The Energy Coalition's implementation plan stipulated that *each* of the three sectors would save 125,000 kWh annually from 500 installations of miscellaneous efficiency measures. The combined energy savings goal of all three sectors equals 375,000 kWh with a total of 1,500 residential units receiving miscellaneous efficiency measures. The demand reduction goal is 256 kW. Gas savings were not proposed for the "miscellaneous" measures, even though some of them do result in gas savings.

Out of the 4,706 residents who received energy tune-ups, 4,516 residential units received miscellaneous measures. (One hundred and ninety residential units did not receive any type of miscellaneous measure.) The demand reduction per residential unit is stipulated as 0.171 kW with an estimated 1460 annual hours of operation. The annual energy savings of miscellaneous measures for each sector per residential unit is stipulated as 250 kWh. Therefore, the total *ex-ante* gross annual electricity savings for miscellaneous measures is 1,129,000 kWh with a demand reduction of 772 kW.

The assumed net-to-gross ratio is 0.8 and the measure useful life is five years for both apartment and condominium residents. A combined total of 3,793 apartment and condominium residents (3,521 apartment and 272 condo residents) received lighting measures. The measure useful life for mobile home residents was stipulated at ten years.[4] A total of 723 mobile home residents received lighting measures. The net annual savings of apartment and condominium resident lighting measures is 758,600 kWh. Over the five-year useful life this amounts to 3,793,000 kWh. The net annual savings of mobile home residents who received lighting measures is 144,600 kWh. Over the ten-year useful life this amounts to 1,446,000 kWh. The combined net annual savings of all three sectors amounts to 5,239,000 kWh.

Actual Distributions

Out of the 4,516 residential units that received miscellaneous efficiency measures, a total of 13,914 products were distributed. This averages to 3.08 miscellaneous products per residential unit. The table on the following page delineates the grand total of all miscellaneous measures installed:

[4] As with the EUL discrepancy for lighting, this is probably a typographical error, but was approved by the CPUC's acceptance of the plan.

Miscellaneous Measures	Mobile Homes	Apartments	Condos	# of Products
AC Filters	47	1	8	**56**
Ceiling Fan	12	8	28	**48**
Table Fan	412	2,175	154	**2,741**
Standing Fan	2	7	0	**9**
Window Caulk	13	3	0	**16**
Door Caulk	1	0	0	**1**
Door Weatherstrip	12	637	16	**665**
Showerhead	843	3,186	251	**4,280**
Faucet Aerator	1,444	2,199	142	**3,785**
Waterheater Wrap	14	635	29	**678**
Waterheater Strap	3	7	4	**14**
Smoke Detector Battery	96	131	9	**236**
Smoke Detector Install	692	580	113	**1385**
Grand Total	**3,591**	**9,569**	**754**	**13,914**

AC Filters. Only 56 air conditioning filters were cleaned. The savings attributable to such cleaning is very difficult to estimate and is dependent on a large number of factors. Because of the small number, detailed analysis of this measure will not be provided, and an electricity savings estimate of 100 kWh/year and demand reduction of 50 watts per filter cleaning will be used.

Fans. Fans are given away as part of the tune-up both to directly save energy and as an incentive to participants. When they are given to customers who have air conditioning, they save energy. When they are given as incentives to customers without air conditioning, they may be the reason why a customer listens to a presentation on energy efficiency, but they do not directly save energy. The following table delineates the fans given to residents with and without air conditioning. Some of the fans were installed in homes where the technician did not indicate an air conditioning type.

The "counted" column represents the number of fans we count for energy savings. It includes a portion of the "unspecified" fans based upon the ratio of fans installed in homes with and without air conditioning. This is the quantity that will be used to multiply by the per-unit energy savings.

Fan Type	Total	Without AC	With AC	Unspecified	Counted
Ceiling Fan	48	3	34	11	**44**
Table Fan	2,741	1,086	1,181	474	**1,428**
Standing Fan	9	0	9	0	**9**
Total	**2,798**	**1,089**	**1,124**	**485**	**1,481**

The ability of a fan to save energy is entirely dependent upon how it is actually used and how tolerant the residents are to warmer temperatures (and saving energy) as

opposed to using their air conditioners. The DEER does not evaluate ceiling or table fans as energy-saving measures. It does evaluate whole-house fans. Whole-house fans are large fans installed to circulate significant quantities of air throughout the entire house, often up through the attic, thus cooling it as well. It is reasonable to assume that the savings achieved from a whole-house fan would be toward the upper limit of that which would be achieved from a table or ceiling fan. One should note that the table or ceiling fan obviously does much less to cool an entire house, but the fan itself also uses less electricity than a whole-house fan does. Additionally, ceiling and table fans can be used in conjunction with refrigerated air conditioning and can save energy by raising thermostat settings, while whole-house fans should never be used while the air conditioner is running.

The tune-ups were conducted in DEER Climate Zones 8 (Long Beach) and 10 (San Bernardino, which, accurately or not, is assumed in the DEER to represent the desert areas as well). Whole-house fan savings for multifamily dwelling units in CZ 8 range from 144 to 259 kWh/year; in CZ 10 they range from 118 to 198 kWh/year.[5] It is interesting to note that the fans actually save less energy in hot climate zones, presumably because there is less time when they are judged to be effective alternatives to refrigerated air conditioning.

We believe that 150 kWh per year is a reasonable savings to attribute to the fans given away through tune-ups. This represents approximately 30 to 40 hours per year of HVAC compressor operation eliminated in homes with central air conditioning (which were approximately 2/3 of the air conditioned homes receiving tune-ups). Obviously very aggressive use of fans in place of air conditioning would increase these savings. However, for each fan used in such an aggressive manner, there are very likely others that are seldom used to *replace* use of the air conditioner.

We do not attribute demand reduction to the fans. Because the system demand happens on very hot days, these are days when the fans are least likely to replace air conditioner usage.

Weatherization Measures. The energy savings of weatherization measures are difficult to accurately measure. Furthermore, some available studies and estimates are anti-intuitive. The DEER frequently gives negative savings for such measures as caulking and weatherstripping. Negative heating savings, both gas and electric, are also found in a SDG&E evaluation study[6] for weatherization measures. The DEER study is based upon modeling, and the SDG&E study is based upon statistical analysis of billing data and measure installation. It does not seem logical that weatherizing doors and caulking windows would increase heating energy use.

[5] Xenergy, Inc. *2001 DEER Update Study Final Report*, Ch. 6, p. 93. (Oakland, CA: Aug 2001.) The lower numbers are for pre-1978 residences, which are assumed to save a much lower percentage of overall HVAC energy use by installing a whole-house fan. We note that these savings are made through modeling programs and do not represent metered studies. Their accurate description of actual customer behavior is not well established.

[6] Kirkland, Patrick. *1996 Residential Weatherization Incentives Program First Year Load Impact Evaluation*. (San Diego, CA: San Diego Gas and Electric Marketing Programs and Planning. CALMAC Study ID 989.)

The SDG&E study does include a 151 kWh/year savings for space cooling resulting from a combination of installed weatherization measures similar to those in the Six Cities tune-ups. When the 37 kWh/year space heating increase is subtracted, the net annual savings attributable to the measures is 114 kWh/year. We will use this as an estimate for the installation of door weatherstripping. Zero savings are attributed to the other measures because they were typically installed in conjunction with door weatherstripping, which was also the case in the SDG&E program evaluated in the study.

Gas savings resulting from the weatherization measures in the study were slightly negative. We do not attribute a negative savings to the weatherization, as it seems a statistical oddity, so we leave gas savings at zero for these measures.

The demand savings attributed in the study were 0.056 kW per household, and this value is used for door weatherstripping in this analysis.

Water Heating Measures. The showerheads, faucet aerators, and water heater wraps save electricity in homes with electric water heaters and save natural gas in homes with gas water heaters. Of the 4,706 customers receiving tune-ups, 266 were coded with electric water heaters, 3,496 were coded as having gas water heaters, and the other 944 were not coded as to water heater type. Electric water heaters were therefore assumed to comprise 7% of the customers (266/3762, where 3762 is the number of water heaters with fuel type coded).

Electric energy savings, demand reduction, and therm savings estimates for the water heating measures can be found in the DEER Update[7], page 297. The per-unit values are summarized as follows:

Low-flow showerhead	179 kWh/yr	39 W	10 Th/yr
Faucet aerators	70 kWh/yr	15 W	4 Th/yr
Water heater blanket	242 kWh/yr	53 W	13 Th/yr

The DEER values above are for either an electric water heater (which saves only the kWh and watt values listed) or a gas water heater (which saves only the therm values listed). Assuming the 7% electric and 93% gas water mix of the tune-up population, the *average* measure therefore saves the following amount of *both* gas and electricity:

Low-flow showerhead	12.43 kWh/yr	2.73 W	9.30 Th/yr
Faucet aerators	4.90 kWh/yr	1.05 W	3.72 Th/yr
Water heater blanket	16.94 kWh/yr	3.71 W	12.09 Th/yr

Safety Measures. Some of these measures have no associated energy savings and were installed as part of the customer-service and safety aspects of the tune-ups. Although they did not *directly* affect the electricity or gas savings of the program, these measures nonetheless provided a valuable community service. Furthermore, including these measured broadened the overall interest of the program, both from the standpoint of

[7] Xenergy, Inc. *2001 DEER Update Study Final Report*, Ch.6, p. 117 [electric] and p. 124 [gas]. (Oakland, CA: Aug 2001.)

having building or mobile home park managers be interested in the service, and from the standpoint of reaching certain residents that may not be directly motivated by the energy conservation aspects of the program. These measures include water heater straps, smoke detectors, and smoke detector batteries.

Summary. The table below presents a summary of the savings attributed by the various "miscellaneous" measures. The electric energy savings (kWh/yr), demand reduction (kW), and gas savings (Therm/yr) values shown on each line item are total savings for the various measure items.

Miscellaneous Measure	Quantity	kWh/yr	kW	Therm/yr
AC Filters	56	5,600	3	0
Ceiling Fan	44	6,600	0	0
Table Fan	1,428	214,200	0	0
Standing Fan	9	1,350	0	0
Window Caulk	16	0	0	0
Door Caulk	1	0	0	0
Door Weatherstrip	665	75,810	37	0
Showerhead	4,280	53,628	12	39,804
Faucet Aerator	3,785	18,547	4	14,080
Waterheater Wrap	678	11,485	3	8,197
Waterheater Strap	14	0	0	0
Smoke Detector Battery	236	0	0	0
Smoke Detector Install	1,385	0	0	0
Grand Total		**387,220**	**58**	**62,081**

The *ex-post* estimated electric energy savings are slightly higher than the original goal. It should be noted, however, that this was achieved by installing "miscellaneous" measures in approximately three times the number of dwelling units as originally assumed. The individual measures do not appear to save as much energy as assumed in the planning, and care should be taken in the future to make sure that fans are only installed in homes with air conditioning.

The *ex-post* demand reduction value we have attributed to the miscellaneous measures is much less even than the original goal. This is primarily because we do not believe that most of these measures significantly reduce demand on the very hot summer afternoons that cause the system demand peak. The gas savings reported are significant even though not originally claimed. We also note that the demand reductions contained within the Program Implementation Plan, particularly those in the spreadsheet, are not necessarily specified as peak-coincident.

Thermostats

A combined distribution goal of 1,500 thermostats was set for the 2002-2003 program years. Out of the 4,706 residents who received an energy tune-up, the total number of thermostats distributed was 440. (Each household received no more than one thermostat.) According to The Energy Coalition's plan spreadsheet, annual savings of 125,000 kWh would result from installation of 500 thermostats in mobile homes; 75,000 kWh from 500 thermostats installed in apartments; and 125,000 kWh from 500 thermostats installed in condominiums. This totals to a goal of 325,000 kWh annual savings.

Demand goals were based upon 171 W/unit on mobile homes and condominiums, and 103 W/unit in apartments. This results in a demand reduction goal of 223 kW. Natural gas goals were based upon 15 therm/year in mobile homes and apartments, and 20 therm/year in condominiums. This results in a gas savings goal of 25,000 therms per year.

The annual energy savings of thermostats among all three residential sectors varies. Therefore, each sector is analyzed individually for correct energy savings. The estimated hours of operation are the same for each sector with 2,880 hours estimated annually per unit. The following table delineates the annual energy savings differences among the three residential sectors:

Sector	Savings Per Unit			Number of Units	Total Savings		
	kWh/yr	kW	Th/yr		kWh/yr	kW	Th/yr
Mobile Homes	250	0.171	15	139	34,750	24	2,085
Apartments	150	0.103	15	235	35,250	24	3,525
Condominiums	250	0.171	20	66	16,500	11	1,320
				Totals	**86,500**	**59**	**6,930**

Given the number of thermostats installed in each sector, the total *ex-ante* gross annual electricity savings is 86,500 kWh with a demand reduction of 59 kW. The annual gas savings is 6,930 therms. This is significantly less than the goal because only 440 of the estimated 1,500 thermostats were installed.

The assumed net-to-gross ratio is the same for all sectors with 0.8 and the measure useful life is 10 years. The net annual savings are 69,200 kWh and 5,544 therms. Over the ten-year useful life this amounts to 692,000 kWh and 5,544 therms.

Ex-Post *Estimates*. To our knowledge, good studies of the savings attributable to programmable thermostats used by average people in average homes have not been done. The DEER provides the following estimates:

DEER Programmable Thermostat Annual Savings Estimates, kWh/yr[8]				
Age of Unit	Multi CZ 8	Multi CZ 10	Single CZ 8	Single CZ 10
Pre-1978	345.9	668.3	326.9	350.5
1978-1992	93.5	163.4	267.0	290.0
1992-1998	78.8	95.5	256.2	213.3
Post-1998	71.7	89.1	227.5	239.8

The database was calculated using computer programs that modeled a building in great detail but made sweeping assumptions and generalizations about occupant behavior that are not substantiated. Furthermore, there is discussion as to why the values presented above appear somewhat illogical. Why, for example, does the pre/post-1978 difference appear extremely significant in multifamily units but rather trivial in single-family units?

An evaluation study of the 2001 Low Income Energy Efficiency programs established very small savings for programmable thermostats – 28.3 kWh/yr for mobile homes and 17.4 kWh/yr for multifamily dwellings.[9] This study used a billing analysis and covered multiple measures. We are not convinced of its ability to separate thermostat savings from those of other measures contained in the program.

Although it makes sense to separate the programmable thermostats installed through the Six Cities Program into city (and thereby climate zone), we do not have data on the age of the homes in which the thermostats were installed. According to the DEER, housing age is far more important than the difference between Climate Zone 8 and Climate Zone 10. We also note that Climate Zone 10 does not adequately represent Palm Desert, even though it is assigned to that zone.

The buildings in which we conducted tune-ups are for the most part pre-1978 or between 1978 and 1992. We note that for the older buildings, multifamily savings exceeds single-family, and mobile home savings were not given in the DEER. (In the LIEE study, mobile homes saved only slightly less than single-family units). The Six Cities program separated apartments from condominiums and granted less savings (150 kWh/yr) to apartments than condos and mobile homes (250 kWh/yr for both).

In our telephone surveys, we noted that 57% of people claim to still be using their programmable thermostat as it was set upon installation. (It is still unknown whether that setting will save energy as opposed to the customer's prior behavior.) Others have adjusted it or overridden it. One cannot conclude, however, that these customers are *not* saving energy. Merely providing a customer with a new thermostat increases awareness of the importance of controlling HVAC use by the thermostat, and it is possible that the 43% of the customers who have changed their thermostats are actually saving *more* energy than if they had left it alone.

[8] *2001 DEER Update Study*, pages 6-4 and 6-64.
[9] Kema-Xenergy, Inc. *Impact Evaluation of the 2001 Statewide Low-Income Energy Efficiency (LIEE) Program.* Final Report, Vol 2. Page E-5. (Oakland, CA: Apr 8, 2003. CALMAC Study ID 577).

We believe the 250 kWh/yr value is a reasonable estimate for all of the housing types of the Six Cities Program. It is reasonably consistent with DEER estimates. Therefore in the *ex-post* evaluation, we increase the apartment per-unit savings to 250 kWh/yr and leave the condominium and mobile home values as stated. The 440 installed thermostats therefore save 110,000 kWh per year.

Demand Reduction. The DEER shows negative demand savings for programmable thermostats. Presumably (although not explained) this is because these thermostats can actually increase HVAC usage during the hot peak periods or cause demand spikes when they adjust for residents returning home in the afternoon. We set the *ex-post* demand reduction to zero, and do not feel there is sufficient evidence to set it at a negative number.

Gas Savings. Multifamily gas savings in the DEER range from 58 therm/yr (pre-1978, CZ 10) to 7 therm/yr (post-78, CZ 8). Single-family savings range from 130 to 59 therm/yr. We believe that the per-unit estimates in the Six Cities goals (15 for mobile homes and apartments, and 20 for condominiums) may be low. We ascribe a generic 30 therm/yr to the 440 thermostats, resulting in a total savings of 13,200 therms per year.

Common Areas

The Six Cities Energy Project projected ten common areas in apartment buildings and four mobile home park common areas would receive energy tune-ups. Mobile home park tune-ups were ascribed 100,000 kWh/yr and apartment complex tune-ups were ascribed 40,000 kWh/yr. The total goal therefore was 800,000 kWh/yr, evenly distributed between mobile home parks and apartment complexes.

At the conclusion of the project, a total of 32 common areas were visited. Two of these were in mobile home parks. The *ex-ante* savings estimate therefore is 200,000 kWh/yr for mobile home parks and 1,200,000 kWh/yr for multifamily units, for a total of 1,400,000 kWh/yr.

The demand reduction per unit (kW) is stipulated as 13.699 kW for apartment common areas, making the demand reduction goal 137 kW for the ten tune-ups. No demand reduction was assigned to mobile home common areas. The total *ex-ante* gross annual demand reduction of the 30 apartment common area tune-ups is 411 kW. Natural gas savings were not assigned to any common area tune-ups.

The assumed net-to-gross ratio is 0.8 and the measure useful life is 8 years. The *ex-ante* net savings are 1,120,000 kWh/yr and 329 kW. Over the eight-year useful life this amounts to 8,960,000 kWh.

Ex-Post *Estimate*. Out of the 32 common-areas that received energy tune-ups, a total of 3,887 products were distributed. This averages to 121.47 products per common-area.

We estimate "near-*ex-post*" savings by attributing savings to each of these individual devices or actions and tabulating the totals based upon actual devices installed rather than the number of complexes served.

The following table delineates the distribution of energy-savings measures for common-area visits in each city:

Measures	Brea	Irvine	Moreno Valley	Palm Desert	Santa Monica	West Hollywd	**Totals**
15W cfl	66	0	115	0	18	0	**199**
20W cfl	0	0	0	0	40	0	**40**
23W cfl	0	0	75	25	3	0	**103**
30W cfl	0	0	12	0	0	0	**12**
R30	25	0	27	0	8	0	**60**
R40	57	0	46	0	1	0	**104**
Led Exit	70	0	25	0	27	0	**122**
4T1	0	0	1	0	43	0	**44**
4T2	73	0	213	213	282	0	**781**
4T3	0	0	1	0	0	0	**1**
4T4	2	0	122	0	0	0	**124**
8T1	12	0	12	12	12	0	**48**
8T2	8	0	2	20	0	0	**30**
Lense	17	0	0	0	0	0	**17**
Torchiere	0	0	5	0	0	0	**5**
Bath Light	24	0	58	2	36	0	**120**
Porch Light	274	0	860	40	38	0	**1,212**
PostYd Light	2	0	45	4	0	0	**51**
Carport Light	0	0	126	146	146	0	**418**
AC Filters	0	0	48	0	0	0	**48**
Evap Cool Filt	0	0	17	0	0	0	**17**
Thermostat	1	0	13	0	0	0	**14**
Ceiling Fan	0	0	8	8	8	0	**24**
Stand Fan	135	0	50	0	0	0	**185**
Door Strip	1	0	0	0	0	0	**1**
Showerhead	4	0	30	0	0	0	**34**
Aerator	4	0	0	0	0	0	**4**
Waterheater Wrap	0	0	1	0	0	0	**1**
Smoke Det Install	5	0	63	0	0	0	**68**
Totals	**780**	**0**	**1,975**	**470**	**662**	**0**	**3,887**

The following table calculates the energy savings estimates for each of the fixtures listed. The power reductions are based upon the same assumptions as detailed in the Small Business chapter of this evaluation. The per-unit energy savings (kWh/yr) are based upon 12 hours per day of operation, except for exit lights. Many of the lights are exterior lights. Some interior lights are probably on continuously, and others probably on much less than 12 hours per day. We consider 12 h/day a viable estimate for the average operating time of all these fixtures in common areas.

Lighting Measures	Power Reduction [W/measure]	Per Unit Savings [kWh/yr]	Total Installed	**Totals [kWh/yr]**
15W cfl	45.0	197.10	199	**39,223**
20W cfl	55.0	240.90	40	**9,636**
23W cfl	77.0	337.26	103	**34,738**
30W cfl	95.0	416.10	12	**4,993**
R30	50.0	219.00	60	**13,140**
R40	82.0	359.16	104	**37,353**
Led Exit	28.0	245.28	122	**29,924**
4T1	25.5	111.69	44	**4,914**
4T2	35.5	155.49	781	**121,438**
4T3	49.5	216.81	1	**217**
4T4	56.0	245.28	124	**30,415**
8T1	53.0	232.14	48	**11,143**
8T2	77.0	337.26	30	**10,118**
Lense	0.0	0.00	17	**0**
Torchiere	282.0	1235.16	5	**6,176**
Bath Light	90.0	394.20	120	**47,304**
Porch Light	77.0	337.26	1,212	**408,759**
PostYd Light	77.0	337.26	51	**17,200**
Carport Light	77.0	337.26	418	**140,975**
Lighting Total			**3,491**	**967,665**

Of the 967,665 kWh/yr estimated for lighting savings, 566,934 kWh/yr are clearly exterior lights (porch, post, and carport) that operate only during the night. The total connected load reduction is 218 kW, of which 88 kW are interior lights. Assuming half of these lights are operating during the on-peak period gives a demand reduction for the lighting measures of 44 kW.

The following table delineates the savings from HVAC-oriented measures. The per-unit values we used are the same as those for individual residences. There are no demand savings from these measures. Replacing evaporative cooler filters are expected to make the coolers work more effectively, but will not help them save significant amounts of energy.

Other Measures	Per Unit Savings [kWh/yr]	Total Installed	**Totals [kWh/yr]**
AC Filters	100	48	**4,800**
Evap Cool Filter	0	17	**0**
Thermostat	250	14	**3,500**
Ceiling Fan	150	24	**3,600**
Stand Fan	150	185	**27,750**
Grand Total		288	**39,650**

The following table delineates the savings from gas measures. The per-unit values we used are the same as those for individual residences.

Gas Measures	Per Unit Savings [therm/yr]	Total Installed	**Totals [therm/yr]**
Thermostat	30	14	**420**
Door Strip	0	1	**0**
Showerhead	10	34	**340**
Aerator	4	4	**16**
Water heater Wrap	13	1	**13**
Grand Total		**54**	**789**

The total *ex-post* savings for the common area tune-ups are 1,007,315 kWh/yr with a peak demand reduction of 44 kW. The total gas savings are 789 therms per year.

Residential Survey

The Energy Coalition's comprehensive database of information was used for the telephone and site-visit survey section of the residential evaluation process. The primary purpose of the survey was to receive customer feedback on a variety of topics which include, but are not limited to product placement and retainment, hours of usage, attitudinal transformations, and customer satisfaction. The survey also provided a means to verify the quantitative accuracy of the measures installed.

Our target goal of contacting 300 residents from all participating cities via telephone was met. We also surveyed an additional 25 residents through on-site visits. In doing this, consideration was given in sampling a representative population of the project participants. In October of 2003, we received our first copy of the database with 1,264 entries. Many of the tune-ups had occurred during the previous year. As a result, some of the residents could not remember the details of their tune-up and therefore could not participate in the survey. By mid-December of 2003, we gained easier access to the database and were able to download the most recent contractor entries on a continuous basis. We added the new entries to our list and made an effort to contact those new entries with the most recent tune-up dates. Over 4,000 entries were added by the end of the residential survey process.

A total of 930 telephone calls were made throughout the survey process. At the conclusion of the survey process, a total of 397 people did not answer their phone, 50 phone numbers were disconnected, 39 entries had a wrong number, and 14 busy signals were received. In addition, 127 people spoke Spanish at the time our Spanish-speaking team-member was unavailable to take the call. (Twenty-four Spanish speaking residents are included in the telephone survey.) Lastly, three residents spoke a language other than English or Spanish that were unable to participate in the survey. Although we made contact with these foreign language residents, we did not include them in the total number of people who were contacted and declined the survey.

During the month of January, 2004, we conducted the on-site visits and rang the doorbell of 128 residents. We met our goal of 25 survey participants from the various cities. If a resident participated in the telephone survey, that resident would not be asked to participate in the site-visit survey. Santa Monica owner-occupied residents were the hardest to reach due to a high level of security at their complex, and the impression that many of them were not present while the survey was taking place. Residents living in mobile home communities were often the easiest to reach, except for the residents living in Palm Desert where many communities were also gated. Overall, the main reason for the high "miss" percentage (81%) is attributed to the time of day the surveys took place. The assumption that many older residents would be home during the mid-morning and afternoon hours proved false after realizing that many were possibly working or at the local senior center.

We also conducted a total of 45 non-participant surveys during the on-site visits. Using the data acquired from the Energy Coalition, we sorted the residents by address and used that to locate clusters of residents who participated in the program. This helped minimize wasted drive-time between residents. Non-participants were easily identified

because their address was not entered in the database. While conducting the site-visit surveys, we spent time asking non-participants their reasons for not being involved in the program. The main reasons given for non-participation were unawareness of the program, unavailability for the tune-up, and skepticism and disinterest in participating.

The tables in this report list categories of responses that we anticipated. The questions were asked in open-ended format, and possible responses were not prompted by reading our list. If responses did not fit into the categories we anticipated, they were coded as "other." We also created new categories for common responses. The only question in which survey participants were prompted by possible answers was for the question regarding the number of hours they have the lights on. Additionally, not everyone contacted was interested in participating in the survey. Also, some participants in the evaluation were not asked every question for various reasons including time constraints and relevance of the questions to their individually customized tune-up. The sample sizes for each particular question are listed along with the results. The telephone and in-person survey results were combined because no significant differences were observed. The results gathered from the questionnaire are presented in the following pages.

Placement of CFLs and Torchieres in Households

The location of the newly acquired CFLs and/or torchieres was analyzed for savings calculations. Strategic installation of these products in high-use areas of the residence increases the use of the product, and thus increases the probability that the customer will achieve greater energy savings.

Location - by City

Two-hundred and nine people who acknowledged receiving CFLs and/or torchieres were asked an additional question about the location of the energy-efficient lighting in their homes. Of the 490 total answers received, survey respondents averaged 2.34 different locations of placement within their home. The bedroom received the highest percentage of answers from all six cities, with Palm Desert responses sharing first place honors with the living room. These locations were most likely chosen because these rooms have the highest use throughout a 24 hour period, and therefore increased energy savings could be achieved.

In which rooms have you placed the CFLs and/or torchiere? Sample Size: 209

	Location										
CITY	P	LR	FR	DR	BAT	BED	C	KIT	H	G	O
BREA	1	16	3	7	14	23	1	10	1	0	3
% SUMMARY	1%	20%	4%	9%	18%	29%	1%	13%	1%	0%	4%
IRVINE	1	7	7	5	9	17	1	1	2	1	0
% SUMMARY	2%	14%	14%	10%	18%	33%	2%	2%	4%	2%	0%
MORENO VALLEY	9	32	11	14	31	59	1	18	4	3	4
% SUMMARY	5%	17%	6%	8%	17%	32%	1%	10%	2%	2%	2%
PALM DESERT	6	13	5	2	11	13	1	11	0	0	1
% SUMMARY	10%	21%	8%	3%	17%	21%	2%	17%	0%	0%	2%
SANTA MONICA	5	21	3	6	18	24	2	18	6	0	0
% SUMMARY	5%	20%	3%	6%	17%	23%	2%	17%	6%	0%	0%
SUMMARY	**22**	**91**	**29**	**34**	**85**	**139**	**6**	**58**	**14**	**4**	**8**
% SUMMARY	**4%**	**19%**	**6%**	**7%**	**17%**	**28%**	**1%**	**12%**	**3%**	**1%**	**2%**

Table Key:
P: porch
LR: living room
FR: family room
DR: dinning room
BAT: bathroom
BED: bedroom
C: closet
KIT: kitchen
H: hall
G: garage
O: other

Location - by Sector

Of the 490 answers given, 119 were received from mobile home residents, 146 were received from owner occupied residents, and 225 were received from rental apartment residents. The bedroom was the number one answer from all three sectors. The bathroom was the second highest response for mobile home respondents with 18%, while the living room earned second place for owner occupied and rental apartment respondents with 15% and 22%, respectively.

In which rooms have you placed the CFLs or torchieres? Sample Size: 209

	Location										
SECTOR	P	LR	FR	DR	BAT	BED	C	KIT	H	G	O
MOBILE HOME	5	20	9	9	22	25	0	21	2	0	6
% SUMMARY	4%	17%	8%	8%	18%	21%	0%	18%	2%	0%	5%
OWNER OCCUPIED	5	22	14	14	17	55	2	7	5	4	1
% SUMMARY	3%	15%	10%	10%	12%	38%	1%	5%	3%	3%	1%
RENTAL APTS	12	49	6	11	46	59	4	30	7	0	1
% SUMMARY	5%	22%	3%	5%	20%	26%	2%	13%	3%	0%	1%
SUMMARY	**22**	**91**	**29**	**34**	**85**	**139**	**6**	**58**	**14**	**4**	**8**
% SUMMARY	**4%**	**19%**	**6%**	**7%**	**17%**	**28%**	**1%**	**12%**	**3%**	**1%**	**2%**

Table Key:

P: porch	BAT: bathroom	H: hall
LR: living room	BED: bedroom	G: garage
FR: family room	C: closet	O: other
DR: dinning room	KIT: kitchen	

Average Operating Hour Calculations

In 2002 Kema-Xenergy conducted a comprehensive study for San Diego Gas and Electric in which it explored the operating hours by location of CFLs given away in various programs. The following table presents the daily operating hours by location as matched with the locations indicated by customers in the Six Cities Project.[10]

	P	LR	FR	DR	BAT	BED	C	KIT	H	G	O
Quantity	**22**	**91**	**29**	**34**	**85**	**139**	**6**	**58**	**14**	**4**	**8**
Hours per Day	**5.7**	**4.2**	**4.2**	**3.7**	**3.0**	**3.2**	**2.3**	**4.3**	**3.6**	**4.2**	**4.2**

Based upon these values, the average operating time of a CLF given away through the tune-up would be 3.7 hours per day, which equates to 1,350 hours per year.

[10] Kema-Xenergy. *Phase 4 Market Effects Study of California Residential Lighting and Appliance Program.* For SDG&E, April 26, 2002, section 8, pages 10. CALMAC study 3910.

Hours of Usage

In the survey, residents were asked to give an approximate number of hours they have the lights on in a 24 hour period.

Average Number of Hours

When asked how often the people surveyed used the energy-efficient lights that they received from the tune-ups, most of the 193 responding participants estimated their average daily usage to be between five and eight hours. Thirty percent approximated their usage at one to four hours a day and 12% said nine to twelve hours a day. Longer time frames were rarely chosen.

On average, how many hours a day do you have your lights on? Sample Size: 193						
	Number of Hours					
CONTACT METHOD	1-4	5-8	9-12	13-16	17-20	20-24
PHONE CALLS	49	85	17	7	1	4
SITE VISITS	9	14	6	1	0	0
SUMMARY	**58**	**99**	**23**	**8**	**1**	**4**
% SUMMARY	**30%**	**51%**	**12%**	**4%**	**1%**	**2%**

Assuming midrange average values for each of the categories (2.5, 6.5, 10.5, 14.5, 18.5, and 22.5 hours per day), the average operating time of an installed energy-efficient light was 6.5 hours per day. This did not vary significantly from mobile homes (6.4) to condominiums (6.8) to rental apartments (6.3).

This is significantly longer than the 3.7 hours per year derived by attributing average operating hours from the 2002 Kema-Xenergy study to the locations specified by the participants. One possible explanation for this significant difference is the fact that mobile homes and multifamily housing units often have less natural lighting capabilities than single-family residences. The Kema-Xenergy study included a variety of housing types.

Use of Extra CFLs

During the energy tune-up, contractors would occasionally give residents extra CFLs to install when needed. Aloha Systems analyzed the effectiveness of this self-installation concept.

Installation of Extras - by City

Of the 89 people who were questioned and who received extra CFL bulbs, about 18% of them had already installed them in their homes. Santa Monica was the city with the higher percentage of people who installed the extra bulbs with 35%. Brea, Moreno Valley and Palm Desert had the same percentage of installation -- 14%.

Have you installed the extra CFLs that were given to you? Sample Size: 89				
	Summary		Percentage Summary	
CITY	Yes	No	% Yes	% No
BREA	3	18	14%	86%
IRVINE	0	2	0%	100%
MORENO VALLEY	5	30	14%	86%
PALM DESERT	2	12	14%	86%
SANTA MONICA	6	11	35%	65%
WEST HOLLYWOOD	0	0		
TOTAL	**16**	**73**	**18%**	**82%**

Installation of Extras - by Sector

All three sectors of housing showed similar results as well. Residents in mobile homes, owner occupied housing and rental apartments had an average 18% likeliness to install the extra bulbs.

Have you installed the extra CFLs that were given to you? Sample Size: 89				
	Summary		Percentage Summary	
SECTOR	Yes	No	% Yes	% No
MOBILE HOME	4	25	14%	86%
OWNER OCCUPIED	3	13	19%	81%
RENTAL APARTMENTS	9	35	20%	80%
TOTAL	**16**	**73**	**18%**	**82%**

Causes for Non-Installation of Extra Compact Fluorescent Lights

There were several reasons why the 73 people in the previous question did not install the extra CFL bulbs given to them by the contractors. The most common answer was that they simply did not have any place or need to install them. The second most common answer was that the people were waiting for their newly installed lights to burn out and then use the extras as replacements.

If no, what reasons caused you not to install them?								Sample Size: 73
Method of Contact		No Place or Need	Did Not Get To It	Did Not Fit	Gave It Away	Wait for Old Ones To Burn Out	Too Dim	Other
CALLS	Summary	36	5	2	3	11	4	8
	% Summary	52%	7%	3%	4%	16%	6%	12%
VISITS	Summary	1	1	2	0	1	0	0
	% Summary	20%	20%	40%	0%	20%	0%	0%
TOTAL	**Summary**	**37**	**6**	**4**	**3**	**12**	**4**	**8**
	% Summary	**50%**	**8%**	**5%**	**4%**	**16%**	**5%**	**11%**

Removal of CFLs

We also surveyed residents who received CFLs to analyze the post-installation continuity of the products in their homes.

Number of Removals - by City

Out of the 209 people answering this question, approximately 82% stated that they had not removed the CFLs that were installed in their homes during the tune-up. Irvine and Santa Monica residents were slightly more likely to have removed them with 25% and 33% reporting doing so.

Have you removed any of the CFLs since their installment?			Sample Size: 209	
	Summary		Percentage Summary	
CITY	Yes	No	% Yes	% No
BREA	4	27	13%	87%
IRVINE	5	10	33%	67%
MORENO VALLEY	12	72	14%	86%
PALM DESERT	6	31	16%	84%
SANTA MONICA	10	30	25%	75%
WEST HOLLYWOOD	0	2	0%	100%
TOTAL	**37**	**172**	**18%**	**82%**

Number of Removals - by Sector

Survey respondents in the mobile home, owner occupied, and rental apartment households ranged from 84% to 79% keeping their bulbs installed.

Have you removed any of the CFLs since their installment?			Sample Size: 209	
	Summary		Percentage Summary	
SECTOR	Yes	No	% Yes	% No
MOBILE HOME	10	53	16%	84%
OWNER OCCUPIED	13	49	21%	79%
RENTAL APARTMENTS	14	70	17%	83%
TOTAL	**37**	**172**	**18%**	**82%**

Reasons for Removals - by City

The 37 people that stated that they had removed one or all of their CFL bulbs that were provided to them were questioned further to determine the specific reasons for removal. The three primary causes for removal were: (1) they burned out rapidly because they were defective, (2) the lights were too dim, and (3) "other." This "other" category included incompatibility issues with the type of fixture in which it was installed, in some cases causing the CFL to burn out, burst or flicker.

If yes, why did you remove them? Sample Size: 37

CITY	Too Dim	Too Bright	Don't Come On Right Away	Burned Out	Other
BREA	3	1	0	1	1
IRVINE	0	0	0	1	2
MORENO VALLEY	5	0	1	5	3
PALM DESERT	1	0	0	1	2
SANTA MONICA	4	0	0	6	0
WEST HOLLYWOOD	0	0	0	0	0
SUMMARY	**13**	**1**	**1**	**14**	**8**
% SUMMARY	**35%**	**3%**	**3%**	**38%**	**22%**

Purchases Since Tune-up

As part of the attitudinal transformation analysis, Aloha Systems surveyed resident initiative to purchase additional CFLs after their energy tune-up.

Further Purchases of CFLs - by City

Out of the 210 people responding to this question, about 18% of the people who received CFLs through the program have gone out and bought more since their tune-ups for various reasons.

Have you purchased more CFLs since your tune-up?			Sample Size: 210	
	Summary		Percentage Summary	
CITY	Yes	No	% Yes	% No
BREA	6	25	19%	81%
IRVINE	4	11	27%	73%
MORENO VALLEY	16	68	19%	81%
PALM DESERT	4	34	11%	89%
SANTA MONICA	6	34	15%	85%
WEST HOLLYWOOD	1	1	50%	50%
TOTAL	**37**	**173**	**18%**	**82%**

Further Purchases of CFLs - by Sector

As for each of the sectors surveyed, the owner occupied and mobile home residents were slightly more likely to purchase additional CFLs than residents of rental apartments.

Have you purchased more CFLs since your tune-up?			Sample Size: 210	
	Summary		Percentage Summary	
SECTOR	Yes	No	% Yes	% No
MOBILE HOME	12	51	19%	81%
OWNER OCCUPIED	14	47	23%	77%
RENTAL APARTMENTS	11	75	13%	87%
TOTAL	**37**	**173**	**18%**	**82%**

Number of Additional CFLs Purchased - by City

The 37 people who stated that they had purchased additional CFLs beyond those that were given to them by the contractors were asked an additional question regarding how many they purchased. The average number that each person said they bought was 3.57. Brea and Moreno Valley respondents had the largest average number of purchased CFLs, with 4.5 and 4.0, respectively.

If yes, how many extra CFLs have you purchased?			Sample Size: 37
	Summary		Average Per City
CITY	Yes	Total No. Purchased	Amount Purchased
BREA	6	27	4.50
IRVINE	4	14	3.50
MORENO VALLEY	16	64	4.00
PALM DESERT	4	15	3.75
SANTA MONICA	6	10	1.67
WEST HOLLYWOOD	1	2	2.00
TOTAL	**37**	**132**	**3.57**

Number of Additional CFLs Purchased - by Sector

In a comparison by sector of the 37 people who answered "yes," the mobile home and owner occupied residents had purchased significantly more bulbs – 4 to 4.5 per person, respectively. This was more than residents of rental apartments, who purchased an average 1.82 bulbs per resident that bought more bulbs.

If yes, how many extra CFLs have you purchased?			Sample Size: 37
	Summary		Average Per Sector
SECTOR	Yes	Total # Purchased	Amount Purchased
MOBILE HOME	12	49	4.08
OWNER OCCUPIED	14	63	4.50
RENTAL APARTMENTS	11	20	1.82
TOTAL	**37**	**132**	**3.57**

Usage of Programmable Thermostats

During the course of the energy tune-ups**,** some residents received a new, energy-efficient programmable thermostat in exchange for their old, manual model. Using the database of installation information provided by the Energy Coalition, if a resident was noted as receiving this item, he/she would be asked the question. Otherwise, the question was skipped.

Usage of Automatic vs. Override Settings - by City

According to the 62 people who were surveyed, 57% were currently using the programmable thermostats with automatic settings. In Moreno Valley, 70% of the residents use their thermostats with automated settings and have not manually overridden the controls. In Brea and Palm Desert however, only about 30% of the residents still use the automatic settings.

Is the programmable thermostat still being used with automatic settings and not overridden?				Sample Size: 62
	Summary		Percentage Summary	
CITY	Yes	No	% Yes	% No
BREA	3	7	30%	70%
IRVINE	1	1	50%	50%
MORENO VALLEY	29	13	70%	30%
PALM DESERT	2	5	29%	71%
SANTA MONICA	0	1	0%	100%
WEST HOLLYWOOD	0	0		
TOTAL	**35**	**27**	**57%**	**43%**

Usage of Automatic vs. Override Settings - by Sector

The contrast between each of the sectors is not great. Fifty to sixty percent of the residents in each sector use the automatic settings versus the override mode on their programmable thermostats.

Is the programmable thermostat still being used with automatic settings and not overridden?				Sample Size: 62
	Summary		Percentage Summary	
SECTOR	Yes	No	% Yes	% No
MOBILE HOME	18	14	56%	44%
OWNER OCCUPIED	12	8	60%	40%
RENTAL APARTMENTS	5	5	50%	50%
TOTAL	**35**	**27**	**57%**	**43%**

Reasons for Using Thermostats in Override Setting - by City

The 27 people who said they override the automatic settings on their programmable thermostat were asked their main reasons for doing so. From these respondents, 52 answers were given. This averaged 1.92 responses per person. The primary reason was that they did not understand how to program the thermostat. Several "other" comments were collected in this survey question and included responses such as the thermostat having been installed incorrectly or people simply preferring to set it manually.

If no, what reasons caused you not to use the automatic settings/override it? Sample Size 27

	Summary				Percentage Summary			
CITY	Don't know how to program	Was not set correctly	Changed schedules	Other	% Don't know how to program	% Was not set correctly	% Changed schedules	% Other
BREA	4	5	1	4	29%	36%	7%	29%
IRVINE	0	0	0	1	0%	0%	0%	100%
MORENO VALLEY	11	7	2	6	42%	27%	8%	23%
PALM DESERT	3	4	1	1	33%	44%	11%	11%
SANTA MONICA	1	1	0	1	33%	33%	0%	33%
WEST HOLLYWOOD	0	0	0	0				
TOTAL	**19**	**17**	**4**	**13**	**36%**	**32%**	**8%**	**25%**

Reasons for Using Thermostats in Override Setting - by Sector

By sector, the same pattern of reasons for non-usage exists. However, the residents in apartments stated that they changed their schedules more often than those of the other two sectors.

If no, what reasons caused you not to use the automatic settings/override it? Sample Size 27

	Summary				Percentage Summary			
SECTOR	Don't know how to program	Was not set correctly	Changed schedules	Other	% Don't know how to program	% Was not set correctly	% Changed schedules	% Other
MOBILE HOME	11	11	1	5	39%	39%	4%	18%
OWNER OCCUPIED	4	4	1	4	31%	31%	8%	30%
RENTAL APTS	4	2	2	4	33%	17%	17%	33%
TOTAL	**19**	**17**	**4**	**13**	**36%**	**32%**	**8%**	**24%**

Fans

During the course of the energy tune-ups**,** some residents received a new standing fan and/or table fan. Using the database of installation information provided by the Energy Coalition, if a resident was noted as receiving this item, and that person was randomly contacted for this survey, he/she would be asked the question. Otherwise, the question was skipped.

Use of Fans - by City

Eighty-seven percent of the 107 people questioned who were provided with table, ceiling and/or standing fans declared that they had put them to use -- mostly during the hotter months of the year. Comparing responses by city, all of the Irvine and Palm Desert residents who answered this question used the fans given to them. The remaining cities were not far behind with an 80% to 86% rate of usage.

Have you installed and used the fan provided?			Sample Size: 107	
	Summary		Percentage Summary	
CITY	Yes	No	% Yes	% No
BREA	24	6	80%	20%
IRVINE	5	0	100%	0%
MORENO VALLEY	42	7	86%	14%
PALM DESERT	18	0	100%	0%
SANTA MONICA	4	1	80%	20%
WEST HOLLYWOOD	0	0		
TOTAL	**93**	**14**	**87%**	**13%**

Use of Fans - by Sector

The use of fans by sector shows slight percentage variations among the three sectors, yet no significant deviations from the 87% average.

Have you installed and used the fan provided?			Sample Size: 107	
	Summary		Percentage Summary	
SECTOR	Yes	No	% Yes	% No
MOBILE HOME	35	3	92%	8%
OWNER OCCUPIED	29	5	85%	15%
RENTAL APARTMENTS	29	6	83%	17%
TOTAL	**93**	**14**	**87%**	**13%**

Reasons for Non-Usage - by City

The 14 survey participants who answered "no" to the previous question were asked their reasons for not installing/using the fans provided to them. The survey participants averaged 1.28 reasons per person, totaling 18. Of the 7 people contacted in Moreno Valley who said they have not installed/used the fan, the majority gave "other" reasons. These reasons included the cold weather at the time of the survey (the survey was conducted during the months of December/January), not enough room for the fan, and not knowing how to assemble the fan.

If no, what reasons caused you not to install/use the fan provided to you? Sample Size: 14

	Summary				Percentage Summary			
City	Did Not Get To It	Gave It Away	Did Not Know How	Other	% Did Not Get To It	% Gave It Away	% Did Not Know How	% Other
BREA	1	1	0	4	17%	17%	0%	67%
IRVINE	0	0	0	0				
MORENO VALLEY	2	2	2	5	18%	18%	18%	45%
PALM DESERT	0	0	0	0				
SANTA MONICA	0	0	0	1	0%	0%	0%	100%
WEST HOLLYWOOD	0	0	0	0				
TOTAL	**3**	**3**	**2**	**10**	**17%**	**17%**	**11%**	**56%**

Reasons for Non-Usage - by Sector

When compared by sector, the three mobile home residents who stated they did not install/use the fan provided averaged 1.6 reasons. The five owner occupied residents and six rental apartment residents averaged 1.2 and 1.1 reasons for not installing/using the fan(s) provided. The mobile home participants showed the highest percentage of "other" reasons which are stated in the preceding paragraph.

If no, what reasons caused you not to install/use the fan provided to you? Sample Size: 14

	Summary				Percentage Summary			
SECTOR	Did Not Get To It	Gave It Away	Did Not Know How	Other	% Did Not Get To It	% Gave It Away	% Didn't Know How	% Other
MOBILE HOME	0	1	0	4	0%	20%	0%	80%
OWNER OCCUPIED	1	1	1	3	17%	17%	17%	50%
RENTAL APTS	2	1	1	3	29%	14%	14%	43%
TOTAL	**3**	**3**	**2**	**10**	**17%**	**17%**	**11%**	**56%**

Air Conditioning Usage Related to Fans

During the course of the energy tune-ups**,** some residents received a new, energy efficient standing fan and/or table fan. Fans were distributed to residents on the premise that the use of the fans would decrease air conditioning usage in the home, and thus save energy. Using the database of installation information provided by the Energy Coalition, if a resident was noted as receiving this item, he/she would be asked the question. Otherwise, the question was skipped.

Decrease A/C Use with Fan - by City

Only 45% of the ninety-four people questioned who received and used a fan from the program confirmed that they had used their air conditioning units less because of the fans. When comparing the cities, Santa Monica survey participants were 15% above the average, while West Hollywood survey participants were 7% below the average.

Do you find yourself using your A/C less since the installation of your fan? Sample Size: 94				
	Summary		Percentage Summary	
CITY	Yes	No	% Yes	% No
BREA	10	13	43%	57%
IRVINE	2	3	40%	60%
MORENO VALLEY	16	20	44%	56%
PALM DESERT	8	9	47%	53%
SANTA MONICA	3	2	60%	40%
WEST HOLLYWOOD	3	5	38%	63%
TOTAL	**42**	**52**	**45%**	**55%**

Decrease A/C Use with Fan - by Sector

Mobile home and rental apartment residents were much more likely to reduce their air conditioning use than owner-occupied residents.

Do you find yourself using your A/C less since the installation of your fan? Sample Size: 94				
	Summary		Percentage Summary	
SECTOR	Yes	No	% Yes	% No
MOBILE HOME	17	14	55%	45%
OWNER OCCUPIED	6	20	23%	77%
RENTAL APARTMENTS	16	13	55%	45%
TOTAL	**39**	**47**	**45%**	**55%**

Placement of Fans in the Household

The location of the newly acquired fan(s) was analyzed for savings calculations. Strategic location of these products in high usage areas of the residence increases the use of the product. This increases the probability that the customer will achieve greater energy savings if they use the fan instead of the air conditioner.

Location of Fans - by City

From the 93 survey participants who stated they use the fan(s), a total of 95 responses were given to the question about where they used their fan(s). This averaged to 1.02 answers per surveyed resident. The ideal location for most residents in the survey was the bedroom with 43%. "Other" locations consisted of people acknowledging that they kept moving the fan throughout their home as they moved about the house during the course of their day.

In which room(s) have you placed the fan(s) provided to you? Sample Size: 93

City	Living Rm.	Family Rm.	Dining Rm.	Bath Rm.	Bed Rm.	Kitchen	Other
BREA	9	3	1	1	6	1	3
% SUMMARY	38%	13%	4%	4%	25%	4%	13%
IRVINE	0	0	0	0	4	0	0
% SUMMARY	0%	0%	0%	0%	100%	0%	0%
MORENO VALLEY	13	2	1	0	23	4	4
% SUMMARY	28%	4%	2%	0%	49%	9%	9%
PALM DESERT	8	1	0	0	5	1	2
% SUMMARY	47%	6%	0%	0%	29%	6%	12%
SANTA MONICA	1	0	0	0	1	1	0
% SUMMARY	33%	0%	0%	0%	33%	33%	0%
WEST HOLLYWOOD	0	0	0	0	0	0	0
% SUMMARY							
SUMMARY	31	6	2	1	39	7	9
% SUMMARY	33%	6%	2%	1%	43%	8%	7%

Location of Fans - by Sector

Sector analysis reveals that the living room was the favored location of fan placement among surveyed mobile home residents with 44%. The bedroom was the most favored location in condominiums and apartments.

In which room(s) have you placed the fan(s) provided to you?						Sample Size: 93	
SECTOR	Living Rm.	Family Rm.	Dining Rm.	Bath Rm.	Bed Rm.	Kitchen	Other
MOBILE HOME	16	2	2	0	7	2	7
% SUMMARY	44%	6%	6%	0%	19%	6%	19%
OWNER OCCUPIED	4	4	0	1	18	4	0
% SUMMARY	13%	13%	0%	3%	58%	13%	0%
RENTAL APTS	11	0	0	0	15	1	2
% SUMMARY	38%	0%	0%	0%	52%	3%	7%
SUMMARY	31	6	2	1	39	7	9
% SUMMARY	**33%**	**6%**	**2%**	**1%**	**41%**	**7%**	**9%**

Importance of Energy Conservation

Aloha Systems analyzed the feedback given by residents in relation to their views of the importance of energy conservation.

Resident Response - by City

Out of 163 survey participants who responded to this question, 276 responses were recorded averaging 1.69 answers per resident. Saving money appears to be significantly more important to the respondents than environmental benefits. Some "other" comments included comments such as "It's important for everyone to save energy" or "I had never really thought about it."

Why is energy conservation important to you?				Sample Size:163
City	save $	help environment	prevent blackouts	other
BREA	21	9	3	11
% SUMMARY	48%	20%	7%	25%
IRVINE	13	6	1	1
% SUMMARY	62%	29%	5%	5%
MORENO VALLEY	76	17	5	16
% SUMMARY	67%	15%	4%	14%
PALM DESERT	24	12	1	7
% SUMMARY	55%	27%	2%	16%
SANTA MONICA	26	15	1	8
% SUMMARY	52%	30%	2%	16%
WEST HOLLYWOOD	1	1	1	0
% SUMMARY	33%	33%	33%	0%
SUMMARY	**164**	**60**	**12**	**44**
% SUMMARY	**59%**	**22%**	**4%**	**16%**

Resident Response - by Sector

By sector, apartment dwellers appeared to be somewhat more environmentally motivated than condominium or mobile home dwellers.

Why is energy conservation important to you?				Sample Size: 163
SECTOR	Save $	Help Environment	Prevent Blackouts	Other
MOBILE HOME	49	11	2	16
% SUMMARY	63%	14%	3%	21%
OWNER OCCUPIED	53	14	3	8
% SUMMARY	68%	18%	4%	10%
RENTAL APTS	62	35	7	20
% SUMMARY	50%	28%	6%	16%
SUMMARY	165	60	12	44
% SUMMARY	**59%**	**22%**	**4%**	**16%**

Prior Knowledge of Energy Efficient Technologies

The Six Cities Energy Project had an educational component attached to the residential tune-ups. During the tune-ups, contractors explained what the new product was, discussed the value of the new product, and gave instructions on how to use it. The following sections summarize the residents' prior knowledge of three energy efficient technologies.

Prior Knowledge of Compact Fluorescent Lights - by City

Out of the 206 responses we received to this question, 61% of the residents had prior awareness of CFLs, while 39% claimed no prior knowledge of CFLs before their tune-up.

Had you ever heard of CFLs before your tune-up?				Sample Size: 206
	Summary		Percentage Summary	
CITY	Yes	No	% Yes	% No
BREA	19	12	61%	39%
IRVINE	6	9	40%	60%
MORENO VALLEY	50	32	61%	39%
PALM DESERT	22	14	61%	39%
SANTA MONICA	27	13	68%	33%
WEST HOLLYWOOD	1	1	50%	50%
TOTAL	**125**	**81**	**61%**	**39%**

Prior Knowledge of Compact Fluorescent Lights - by Sector

When comparing the three sectors, the surveys show that the owner-occupied residents were the least knowledgeable with only 50% awareness. In comparison, the mobile home and rental apartment residents averaged 67% and 64% awareness, respectively.

Had you ever heard of CFLs before your tune-up?				Sample Size: 206
	Summary		Percentage Summary	
SECTOR	Yes	No	% Yes	% No
MOBILE HOMES	40	20	67%	33%
OWNER OCCUPIED	30	30	50%	50%
RENTAL APARTMENTS	55	31	64%	36%
TOTAL	**125**	**81**	**61%**	**39%**

Prior Knowledge of Fluorescent Torchieres - by City

Out of 96 responses to this question, 47% of the residents had heard of fluorescent torchieres prior to their tune-up, while 53% had not. Roughly the same statistics can be seen in the different cities.

Had you ever heard of torchieres before your tune-up?				Sample Size: 96
	Summary		Percentage Summary	
CITY	Yes	No	% Yes	% No
BREA	5	6	45%	55%
IRVINE	7	6	54%	46%
MORENO VALLEY	16	21	43%	57%
PALM DESERT	7	8	47%	53%
SANTA MONICA	9	9	50%	50%
WEST HOLLYWOOD	1	1	50%	50%
TOTAL	**45**	**51**	**47%**	**53%**

Prior Knowledge of Fluorescent Torchieres - by Sector

Inside each of the sectors, a slight variance in the amount of the people who heard about fluorescent torchieres can be seen. Mobile home and rental apartment residents were well above the average, with 67% and 58%, respectively. Owner occupied residents were below the average mark with 35% of those surveyed who had heard of these energy efficient lights.

Had you ever heard of torchieres before your tune-up?				Sample Size: 96
	Summary		Percentage Summary	
SECTOR	Yes	No	% Yes	% No
MOBILE HOMES	8	4	67%	33%
OWNER OCCUPIED	18	33	35%	65%
RENTAL APARTMENTS	19	14	58%	42%
TOTAL	**45**	**51**	**47%**	**53%**

Prior Knowledge of Programmable Thermostats - by City

Out of 111 respondents, 53% were aware of programmable thermostats prior to their energy tune-ups, while 47% did not know about them before. People who were not given programmable thermostats were not asked this question. Irvine and Santa Monica had the lowest levels of prior knowledge with only 38% and 20%, respectively. Palm Desert had the highest with 77%, presumably due to the fact that in this desert city most people are more accustomed to energy saving measures when it comes to air conditioning.

Had you ever heard of programmable thermostats before your tune-up? Sample Size: 111				
	Summary		Percentage Summary	
CITY	Yes	No	% Yes	% No
BREA	11	9	55%	45%
IRVINE	5	8	38%	62%
MORENO VALLEY	30	23	57%	43%
PALM DESERT	10	3	77%	23%
SANTA MONICA	2	8	20%	80%
WEST HOLLYWOOD	1	1	50%	50%
TOTAL	**59**	**52**	**53%**	**47%**

Changes in Lifestyle for Energy Conservation

As part of the behavioral transformation analysis, Aloha Systems surveyed residents on their behavioral changes they made after their energy tune-up.

Changes Made - by City

Out of 153 residents who responded to this question, 208 answers were recorded. The average number of responses was 1.35 per surveyed resident. The most commonly changed behavior, with 30% claiming it, was turning lights off more often. When answering this question, some residents were quick to point out that they have always conserved energy and therefore made no changes from the time of the energy tune-up. This accounts for the 26% of responses in the "no changes" category. The "other" changes made by most residents consisted of a higher degree of awareness and "I followed the recommendations of the contractors."

What types of changes (if any) have you personally made in regards to energy conservation?						Sample Size:153
City	use appliances less	turn lights off more often	thermostat set lower	more aware	no changes	other
BREA	0	10	1	0	5	10
% SUMMARY	0%	38%	4%	0%	19%	38%
IRVINE	1	4	1	0	3	3
% SUMMARY	8%	33%	8%	0%	25%	25%
MORENO VALLEY	12	21	1	4	31	23
% SUMMARY	13%	23%	1%	4%	34%	25%
PALM DESERT	3	8	2	3	8	9
% SUMMARY	9%	24%	6%	9%	24%	27%
SANTA MONICA	5	18	2	4	7	5
% SUMMARY	12%	44%	5%	10%	17%	12%
WEST HOLLYWOOD	0	1	0	1	0	2
% SUMMARY	0%	25%	0%	25%	0%	50%
SUMMARY	**21**	**62**	**7**	**12**	**54**	**52**
% SUMMARY	**10%**	**30%**	**3%**	**6%**	**26%**	**25%**

Changes Made - by Sector

By sector, there were no significant differences among the groups. Rental apartment residents surveyed used their appliances less and turn their lights off more often.

What types of changes (if any) have you personally made in regards to energy conservation?
Sample Size: 153

Method of Contact		Use Appliances Less	Turn Lights Off More Often	Thermostat Set Lower	More Aware	No Change	Other
MOBILE HOMES	Summary	4	10	2	0	21	21
	% Summary	7%	17%	3%	0%	36%	36%
OWNER OCCUPIED	Summary	2	15	2	8	9	19
	% Summary	4%	27%	4%	15%	16%	35%
RENTAL APTS	Summary	15	37	3	4	24	12
	% Summary	16%	39%	3%	4%	25%	13%
TOTAL	**Summary**	**21**	**62**	**7**	**12**	**54**	**52**
	% Summary	**10%**	**30%**	**3%**	**6%**	**26%**	**25%**

Spreading the Message to Friends and Family

Part of the concept underlying the Six Cities Energy Project is the idea that people will spread the word about conservation and energy efficiency to their friends and family. We asked several questions to assess the extent to which participants did this.

Spreading the Word - by City

Out of the 217 residents who responded to this question, an overwhelming 82% of them claim to have told their friends and family members about their energy tune-up, while only 18% of those who answered said they did not spread the word around. Brea had the highest positive response with 94%, and Palm Desert had the lowest positive response with 76%.

Have you told any friends/family members about your tune-up and energy saving devices? Sample Size: 217				
	Summary		Percentage Summary	
CITY	Yes	No	% Yes	% No
BREA	29	2	94%	6%
IRVINE	14	1	93%	7%
MORENO VALLEY	73	18	80%	20%
PALM DESERT	29	9	76%	24%
SANTA MONICA	31	9	78%	23%
WEST HOLLYWOOD	2	0	100%	0%
TOTAL	**178**	**39**	**82%**	**18%**

Spreading the Word - by Sector

The 64 mobile home and 62 owner occupied households polled also told friends and family about 84% and 94% of the time, respectively. The 91 rental apartment residents had told others slightly less frequently, about 73% of the time.

Have you told any friends/family members about your tune-up and energy saving devices? Sample Size: 217				
	Summary		Percentage Summary	
SECTOR	Yes	No	% Yes	% No
MOBILE HOME	54	10	84%	16%
OWNER OCCUPIED	58	4	94%	6%
RENTAL APARTMENTS	66	25	73%	27%
TOTAL	**178**	**39**	**82%**	**18%**

Direct Transformation - by City

Of the 213 people who responded to this question, 23% claim to know of freidns or family members who have purchased devices similar to those they received in the energy tune-up. About 69% stated that they knew that their friends or family members had not purchased similar devices, while 8% said they did not know. It is probable that a certain portion of the "no" category should actually be "don't know" because customers are less likely to know of a lack of action than they are of a positive action being taken.

Do you know of any friends/family members who bought these energy saving lights/other energy efficient technology because they saw yours? Sample Size: 213

	Summary			Percentage Summary		
CITY	Yes	No	Don't Know	% Yes	% No	% Don't Know
BREA	6	22	3	19%	71%	10%
IRVINE	6	9	0	40%	60%	0%
MORENO VALLEY	22	56	11	25%	63%	12%
PALM DESERT	7	29	1	19%	78%	3%
SANTA MONICA	7	29	3	18%	74%	8%
WEST HOLLYWOOD	1	1	0	50%	50%	0%
TOTAL	**49**	**146**	**18**	**23%**	**69%**	**8%**

Direct Transformation - by Sector

Owner occupied households reported the largest percentage of friends and relatives installing efficiency measures with 32%, while residents of mobile homes and apartments were closer to the overall average with 19% in each sector.

Do you know of any friends/family members who bought these energy saving lights/other energy efficient technology because they saw yours? Sample Size: 178

	Summary			Percentage Summary		
SECTOR	Yes	No	Don't Know	% Yes	% No	% Don't Know
MOBILE HOME	12	43	8	19%	68%	13%
OWNER OCCUPIED	20	40	2	32%	65%	3%
RENTAL APARTMENTS	17	63	8	19%	72%	9%
TOTAL	**49**	**146**	**18**	**23%**	**69%**	**8%**

Future Purchases of Energy Efficient Technologies

Survey participants were asked if they would be inclined to purchase further energy efficient technologies when the need arises. If the participant said no, they were asked a further question to analyze their feedback.

Willingness of Future Purchase - by City

Approximately 93% of the 207 respondents to this question said they would buy more energy efficient equipment in the future.

In the future, will you buy more energy-efficient lights/technology? Sample Size: 207				
	Summary		Percentage Summary	
CITY	Yes	No	% Yes	% No
BREA	27	2	93%	7%
IRVINE	13	2	87%	13%
MORENO VALLEY	82	6	94%	6%
PALM DESERT	32	2	94%	6%
SANTA MONICA	37	2	95%	5%
WEST HOLLYWOOD	2	0	100%	0%
SUMMARY	**193**	**14**	**93%**	**7%**

Willingness of Future Purchase - by Sector

Similarly, the various sectors were extremely willing to buy energy efficient technologies in the future.

In the future, will you buy more energy-efficient lights/technology? Sample Size: 207				
	Summary		Percentage Summary	
SECTOR	Yes	No	% Yes	% No
MOBILE HOME	55	4	93%	7%
OWNER OCCUPIED	55	7	89%	11%
RENTAL APARTMENTS	83	3	97%	3%
SUMMARY	**193**	**14**	**93%**	**7%**

Reasons for Unwillingness to Make Future Purchases

Of the 17 people who stated they would not purchase more energy saving devices in the future, their main reasons were related to a bad tune-up experience, a bad lighting experience, and the higher price for energy efficient technologies. These responses could have easily fit into the established categories in the tables below but people made a special point to add specific comments and were thus placed in the "other" category.

Reasons for unwillingness to make future purchases. Sample Size: 17

Method of Contact		Cost	Don't Like Them	Don't Think They Save Energy	Bad Experience From Program	Other
CALLS	Summary	1	1	2	1	8
	% Summary	8%	8%	15%	8%	62%
VISITS	Summary	1	0	0	0	3
	% Summary	25%	0%	0%	0%	75%
TOTAL	**Summary**	**2**	**1**	**2**	**1**	**11**
	% Summary	**12%**	**6%**	**12%**	**6%**	**65%**

Willingness to Buy "Energy Star" Product - by City

An overwhelming majority of the 194 people surveyed responded that they would buy an Energy Star appliance in the future if the need arose.

In the future, will you buy an "Energy Star" appliance? Sample Size: 194				
	Summary		Percentage Summary	
CITY	Yes	No	% Yes	% No
BREA	27	2	93%	7%
IRVINE	13	2	87%	13%
MORENO VALLEY	80	1	99%	1%
PALM DESERT	28	1	97%	3%
SANTA MONICA	35	3	92%	8%
WEST HOLLYWOOD	2	0	100%	0%
SUMMARY	**185**	**9**	**95%**	**5%**

Reasons for Unwillingness to Buy "Energy Star" in the Future - by City

Of those 9 people who stated they would not consider purchasing an Energy Star appliance in the future, seven gave a reason. The main reasons were cost and "other" reasons. The people who answered "other" stated that they were not in the market to buy a new appliance yet, or had just purchased new appliances and therefore answered "no" to the question.

Reasons for unwillingness to purchase an Energy Star appliance in the future? Sample Size: 9					
City	Cost	Do Not Like Them	Do No t Think They Save Energy	Do Not Save $$$	Other
BREA	0	0	0	0	3
% SUMMARY	0%	0%	0%	0%	100%
IRVINE	0	0	0	0	1
% SUMMARY	0%	0%	0%	0%	100%
MORENO VALLEY	1	0	0	0	0
% SUMMARY	100%	0%	0%	0%	0%
PALM DESERT	0	0	0	0	1
% SUMMARY	0%	0%	0%	0%	100%
SANTA MONICA	0	0	0	0	3
% SUMMARY	0%	0%	0%	0%	100%
WEST HOLLYWOOD	0	0	0	0	0
% SUMMARY					
SUMMARY	**1**	**0**	**0**	**0**	**8**
% SUMMARY	**13%**	**0%**	**0%**	**0%**	**89%**

Satisfaction with Energy Efficiency Tune-Up

The survey included questions that would be instrumental in gauging the residents' satisfaction with their tune-up experience.

Tune-up Satisfaction - by City

Ninety-four percent of the 227 people surveyed stated that they were generally satisfied with the energy efficiency tune-ups that they received in their homes. Santa Monica had the lowest satisfaction rate, but even that was 86%.

Were you pleased with your energy-efficiency tune-up? Sample Size: 227				
	Summary		Percentage Summary	
CITY	Yes	No	% Yes	% No
BREA	30	2	94%	6%
IRVINE	14	1	93%	7%
MORENO VALLEY	95	3	97%	3%
PALM DESERT	37	1	97%	3%
SANTA MONICA	36	6	86%	14%
WEST HOLLYWOOD	2	0	100%	0%
SUMMARY	**214**	**13**	**94%**	**6%**

Tune-up Satisfaction - by Sector

Tune-up satisfaction levels of the three categories shows a large majority of the people surveyed was highly pleased with the tune-up. Apartment residents had the lowest satisfaction rate of 92%.

Were you pleased with your energy-efficiency tune-up? Sample Size: 227				
	Summary		Percentage Summary	
SECTOR	Yes	No	% Yes	% No
MOBILE HOME	64	2	97%	3%
OWNER OCCUPIED	59	3	95%	5%
RENTAL APARTMENTS	91	8	92%	8%
SUMMARY	**214**	**13**	**94%**	**6%**

Rate of Satisfaction

To further analyze the residential rate of satisfaction, residents were asked to rate their level of satisfaction on a scale of one to five, one being completely dissatisfied and five being completely satisfied.

Ratings - by City

The 190 participants responded with an average satisfaction level of 4.5. Overall, 64% of the people stated they were completely satisfied and gave the program a "5." Nineteen percent of those surveyed were satisfied and gave the program a "4," and 10% of the participants were indifferent and had no definite opinion and gave the program a "3."

Please rate your level of satisfaction with the energy-efficiency tune-up from 1 to 5, 5 being completely satisfied and 1 being completely dissatisfied. Sample Size: 190						
	Rating					
CITY	1	2	3	4	5	AVERAGE
BREA	1	1	3	8	15	4.3
IRVINE	0	0	1	3	9	4.6
MORENO VALLEY	1	0	4	13	61	4.7
PALM DESERT	0	2	6	5	15	4.2
SANTA MONICA	2	5	2	8	20	4.1
WEST HOLLYWOOD	0	0	0	0	2	5.0
SUMMARY	**4**	**8**	**19**	**37**	**122**	**4.5**
% SUMMARY	**2%**	**4%**	**10%**	**19%**	**64%**	

Ratings - by Sector

The residents of the three sectors echoed the above results and responded with an average satisfaction level between 4.3 and 4.6.

Please rate your level of satisfaction with the energy-efficiency tune-up from 1 to 5, 5 being completely satisfied and 1 being completely dissatisfied. Sample Size: 190						
	Rating					
SECTOR	1	2	3	4	5	AVERAGE
MOBILE HOMES	1	0	3	10	36	4.5
OWNER OCCUPIED	1	1	3	8	36	4.6
RENTAL APTS	2	7	10	19	50	4.3
SUMMARY	**4**	**8**	**16**	**37**	**122**	**4.5**

What People Liked About the Tune-Up

To further analyze residential feedback, survey participants were asked to identify particular things about the program they liked.

Tune-up Likes

One hundred and forty people provided specific answers to the question "What things did you like about the tune-up?" (This question was asked to 167 people and 27 stated they were generally satisfied with the whole program.) Most of the positive responses focused on the equipment received and the fact that it was provided to them at no cost. People mostly commented on the brightness of the CFLs, ease of the use of the thermostats as well as the usefulness of the fans they received.

The courteousness of the contractors and the people who facilitated the program were the second most significant focus of the positive comments received. The majority of the comments referred to the contractor's "professionalism" and "courteousness."

A few people mentioned they liked the way the program reached out to the community and provided education and free-services. Also, some people just stated they generally liked the program and would like to receive future tune-ups in their homes.

The following table summarizes the most popular responses:

What things did you like about the tune-up?							Sample Size: 140
CITY	Free Stuff	Nice People	Learned About Energy	CFLs are Brighter	Thermo -stat	Fan	Other
BREA	7	5	2	0	0	0	16
%Summary	23%	17%	7%	0%	0%	0%	53%
IRVINE	3	2	1	0	0	0	10
%Summary	19%	13%	6%	0%	0%	0%	63%
MORENO VALLEY	23	13	5	5	5	0	28
%Summary	29%	16%	6%	6%	6%	0%	35%
PALM DESERT	9	6	1	1	1	2	8
%Summary	32%	21%	4%	4%	4%	7%	29%
SANTA MONICA	10	10	1	4	0	0	10
%Summary	29%	29%	3%	11%	0%	0%	29%
WEST HOLLYWOOD	0	2	1	0	0	0	2
%Summary	0%	40%	20%	0%	0%	0%	40%
SUMMARY	**52**	**38**	**11**	**10**	**6**	**2**	**74**
% SUMMARY	**27%**	**20%**	**6%**	**5%**	**3%**	**1%**	**38%**

The following are paraphrases of some of the comments received:

- I liked the lights and will purchase more if needed
- Lights are simple to use
- Bulbs are still lasting after 1yr
- No complaints because I need these lights, especially outside because there are dark areas near my house
- New fixture is pretty
- Didn't see any difference, which was good
- Lights were pretty good

- The contractors were very quick; took only 1/2 hour
- The respect, time and care that was given to my home
- The contractors were fast; very professional
- They were efficient
- The people were enthusiastic
- Liked the presentation in the lobby and by the people who installed the lights
- Good, informative advice
- Good intentions
- Liked the recommendations

- The program made me aware of other programs available to me
- Enjoyed the fact that they educate the public
- Great program, very educational
- I learned about other types of energy efficient fixtures
- I liked that the program exists and it is voluntary
- I like that they do this for people
- Residents take pride in helping the community
- Good idea for community
- Program was handled well, not like a poverty program or forced onto residents
- Program made me more aware of energy efficient appliances. I went out and bought new appliances for Christmas with energy savings in mind
- It's necessary for everyone to save energy
- Service was free!
- It's free and it helps save money
- Worth doing definitely
- What occurred at my house was great
- Well planned
- The program is customized to residents

What People Disliked About the Tune-Up

To further analyze residential feedback, survey participants were asked to identify particular things about the program they did not like.

Tune-up Dislikes

Of the 92 people who provided "general" comments, only 34 had negative ones. Thirty-three people provided specific answers to the question "What things did you dislike about the tune-up?" (This question was asked to 88 people; many were not asked the question because they had already indicated that there was nothing they didn't like about their tune-up.) The following are paraphrases of the comments received:

- Lights (CFLs) are too dim
- Lights (CFLs) are too bright
- Night lights are too dim
- Lights take too long to turn on; useless when moving about the house
- Some burned out in two weeks
- Blew out and almost ruined lamp
- Color of CFLs
- Bulbs look funny in ceiling fans
- Friend said bulbs don't last that long; skeptical about buying more
- Fan broke in two days
- Unable to reset thermostat; took two hours
- Wish we had old thermostat back
- Showerhead has too low pressure

- The contractors were late
- Installers were loud
- They didn't return with my water heater blanket
- Bulbs and thermostats not installed
- Had to assemble fan myself
- Says I got a fan, but I didn't
- Thermostat was bad and contractor wouldn't believe him
- Heater didn't work after thermostat installed; customer had to rewire it.
- Showerhead leaks
- Light fixture has a wire hanging out
- I told them not to change a certain lamp but they did anyway
- Fire alarm put in a poor place; goes off all the time
- Installer didn't know enough
- Installer was unpleasant when I asked for another light
- I thought my fanny pack was stolen and they got upset at me for suggesting it

- My expectations were not lived up to – they should do more
- Thought they would fix water leaks

- Didn’t do what they said they would -- no weather stripping. "Glorified nothing."
- I didn't get enough lights
- Homeowners should do this themselves; the program is a waste of money
- Shouldn't have energy rally in Palm Desert in the summer - snow birds gone
- My bill is still higher than what I'd like
- Their recommendations will cost a lot of money

Most of the negative responses focused on the equipment. The CFLs being too dim was the most common of these problems.

The contractors and the installation were the second most significant focus of negative comments. The comment that was mentioned most often was the lack of installation of light bulbs and assembly of fans. Complaints about thermostats were relatively common considering most people did not receive them.

A few people mentioned generic program issues; some of them were more aptly called “helpful suggestions” than “negative comments.” The issue of setting exaggerated expectations appears worth reviewing by the Energy Coalition and its contracting personnel. When contractors did not fix water leaks or install weather stripping, this seemed to trigger a sense of not getting what had been promised.

Future Tune-Ups

In order to further gauge residential satisfaction of their energy tune-up experience, Aloha Systems asked survey participants a hypothetical question to analyze their feedback.

Desire for Future Tune-Up - by City

Ninety-two percent of the 206 residents who responded to this question said they would want to have another energy efficiency tune-up if they were to move into a new residence.

If you moved to a new residence, would you want to have another energy tune-up there?			Sample Size: 206	
	Summary		Percentage Summary	
CITY	Yes	No	% Yes	% No
BREA	26	2	93%	7%
IRVINE	14	1	93%	7%
MORENO VALLEY	81	7	92%	8%
PALM DESERT	32	1	97%	3%
SANTA MONICA	35	5	88%	13%
WEST HOLLYWOOD	2	0	100%	0%
SUMMARY	**190**	**16**	**92%**	**8%**

Reasons for Not Desiring Future Tune-Up - by City

Of the 16 people who responded with a "no" to the question of desiring a tune-up if they moved, most had no intentions of moving from their homes or didn't have the money to move and therefore expressed their disinterest in future tune-ups.

Reasons why residents would not want future tune-ups. Sample Size: 13

	Summary			Percentage Summary		
CITY	Don't like them	Don't think they save energy	Other	% Don't like them	% Don't think they save energy	% Other
BREA	1	1	2	25%	25%	50%
IRVINE	0	0	0			
MORENO VALLEY	0	0	6	0%	0%	100%
PALM DESERT	1	0	1	50%	0%	50%
SANTA MONICA	0	0	1	0%	0%	100%
WEST HOLLYWOOD	0	0	0			
SUMMARY	**2**	**1**	**10**	**15%**	**8%**	**77%**

Small Business Tune-Ups

Introduction

The success of the small business energy tune-ups required a five-tiered evaluation approach to effectively evaluate the program. To have a solid understanding and awareness of installation procedures and protocol, Aloha Systems accompanied Catalina Ballast and Bulb and Ace and Sons Construction, Inc. on several small business tune-up "ride-alongs." Post-installation customer surveys were later conducted, as well as on-site visual verification inspections. Final database results obtained from The Energy Coalition were used to cumulatively total all installed lighting and other energy savings measures. Finally, because installation contractors were responsible for entering their company's tune-up results into the final database, comparison of hardcopy installation agreement forms and their entry into the final database were examined for any discrepancies.

"The Six Cities Energy Project will work with 250 small businesses in the 2002-2003 program years to implement 450 energy-efficient measures -- including lighting, thermostats, and miscellaneous measures – at these locations. For this customer segment, the Six Cities Energy Project will pay 75% of the project cost. This will result in a net annual energy savings of 2,736,000 kWh and capacity savings of approximately 312kW. The annual gas savings for each small business is projected to be 120 therms. Note that while all other Six Cities Energy Programs use the Energy Division's default net-to-gross ratio of 0.8, for small businesses that have been highly reluctant to participate in other programs, and since we can prove an extremely low free ridership level, the Coalition assumes a net-to-gross of .95 for small business activities."[1]

The measures installed in this sector are not significantly different from those being installed in the residential sectors. They are evaluated in a similar manner, based primarily upon the information provided by the installation contractors. Final data analysis shows 274 small business owners participated in the program. The Energy Coalition surpassed its projected goal of 250 by 24 participants.

The information contained in this section of the report is separate and unique from the data analyzed in the section following the "Executive Summary" – entitled "Lighting Measures." This section analyzes the direct implementation of energy-efficiency measures into small business units.

Ex-Ante *Evaluation*. The primary means of analyzing the effectiveness of the project is defined by its ability to distribute the total quantity of measures it set out to distribute. The energy efficiency measures implemented in small businesses are outlined in three categories – lighting measures, miscellaneous measures, and thermostats. These three categories were assigned per-measure kWh, kW, and therm values in the program spreadsheet. A "measure" is defined as installing any number of products of the appropriate type within an individual business. Each of the measures will be discussed in detail in its own subsections of this chapter.

[1] The Energy Coalition. *The Six Cities Energy Project Revised Program Implementation Plan,* CPUC Program Reference #232A-02. Page 10.

In all cases where measures were installed by its contractors, the cumulative results from these activities were retrieved from The Energy Coalition's master database.

Ex-Post *Evaluation*. Although rigid *ex-post* evaluation was not conducted, we do assess installations at a more detailed level that leads us closer to a true energy savings calculation than using a simple generic average for "lighting," and "miscellaneous" at a variety of small businesses. Additionally, although no end-use metering was required for this evaluation, we collected self-reported operating hours from customers during our process evaluation survey. We present "near-*ex-post*" values for the tune-ups by analyzing actual equipment installations and customer-reported operation information. These analyses are included in the respective subsections of this chapter.

Savings Summaries. The following tables present summaries for the small business savings goals and the *ex-ante* and *ex-post* estimates. The "goal" column presents the estimates from the PIP spreadsheet.

Electric Energy Savings, kWh/year				
Measure	**Goal (Gross)**	***Ex-Ante* (Gross)**	***Ex-Ante* % of Goal**	***Ex-Post* (Gross)**
Lighting	2,500,000	2,710,000	108.4%	1,307,253
Miscellaneous	200,000	542,200	271.1%	187,493
Thermostats	150,000	166,500	111.0%	120,000
Total Small Business	**2,850,000**	**3,418,700**	**120.0%**	**1,614,746**

Electric Demand Reduction, kW				
Measure	**Goal (Gross Connected)**	***Ex-Ante* (Gr Connected)**	***Ex-Ante* % of Goal**	***Ex-Post (Gr Coincident)***
Lighting	410	927	226.1%	289
Miscellaneous	82	185	225.6%	47
Thermostats	62	57	91.9%	0
Total Small Business	**554**	**1,169**	**211.0%**	**336**

Gas Energy Savings, therm/year

Measure	Goal (Gross)	*Ex-Ante* (Gross)	*Ex-Ante* % of Goal	*Ex-Post* (Gross)
Lighting	0	0	0	0
Miscellaneous	0	0	0	311
Thermostats	30,000	13,320	44.4%	9,600
Total Small Business	**30,000**	**13,320**	**44.4%**	**9,911**

The program clearly exceeded its goals in the small commercial tune-up sector. This is based on the *ex-ante* evaluation because more tune-ups were conducted than were planned. The *ex-post* evaluation shows lower numbers because not as many lighting devices were installed during each customer's tune-up as originally estimated and because non-lighting measures did not save as much energy as anticipated.

Process Evaluation. Following the discussion of the three "measures" (lighting, miscellaneous, and thermostats), we provide process evaluation and customer satisfaction analysis from the small business sector.

Lighting Measures

The Energy Coalition's implementation plan stipulated that 250 small businesses would receive lighting measures. At the conclusion of the program, out of a total of 274 small businesses that received energy tune-ups, 271 received various lighting measures. The demand reduction per unit (small business) is stipulated as 3.42 kW, with estimated annual hours of operation at 2,920 per unit. The annual energy savings per unit is stipulated at 10,000 kWh. Therefore the total *ex-ante* gross annual electricity savings of 271 small businesses receiving lighting is 2,710,000 kWh with a demand reduction of 927 kW.

The assumed net-to-gross ratio is 0.96 and the measure useful life is 10 years. The net annual savings are 2,601,600 kWh, and 890 kW. Over the ten-year useful life this amounts to 26,016,000 kWh.

Out of the 271 small businesses that received lighting measures, a total of 5,282 measures were distributed. This averages to 19.49 products per small business unit. The table on the following page delineates the breakdown of all lighting fixtures or equipment installed.

Measure	Brea	Irvine	Moreno Valley	Palm Desert	Santa Monica	**Totals**
11W cfl	65	0	56	9	9	**139**
15W cfl	38	111	104	339	97	**689**
20W cfl	0	0	0	0	17	**17**
23W cfl	0	0	14	1	24	**39**
30W cfl	64	25	132	91	1	**313**
15W R30/FL cfl	0	52	7	20	21	**100**
20W R40/FL cfl	0	27	15	79	97	**218**
Dimmable cfl	0	0	0	0	0	**0**
Led Exit Sign	6	11	81	17	29	**144**
Cfl Exit sign retrofit	0	0	0	0	0	**0**
4T1	3	3	1	5	8	**20**
Day 4T1	0	0	0	0	0	**0**
4T2	19	19	260	450	550	**1,298**
Day 4T2	0	0	0	13	13	**26**
4T3	21	21	42	1	42	**127**
Day 4T3	0	0	0	0	0	**0**
4T3D	4	4	8	0	0	**16**
Day 4T3D	0	0	0	0	0	**0**
4T4	84	84	351	389	232	**1,140**
Day 4T4	0	0	0	8	0	**8**
4T4D	16	16	17	73	28	**150**
Day 4T4D	0	0	0	1	0	**1**
8T1	0	0	1	1	8	**10**
8T1:4T1	0	0	0	0	2	**2**
8T2	0	0	32	87	355	**474**
8T2:4T1	0	0	30	21	7	**58**
Fluorescent Torchiere	6	6	1	14	11	**38**
Nightlight	0	0	0	32	0	**32**
Fluorescent Bath Light	7	7	78	45	16	**153**
Fluorescent Porch Light	0	0	18	25	0	**43**
Fluorescent Post/Yard Light	0	0	2	4	0	**6**
FluorescentCarport Light	0	0	7	7	7	**21**
Totals	**333**	**386**	**1,257**	**1,732**	**1,574**	**5,282**

The average operating time of the lights in the small business was 12 hours per day, or 4,380 hours per year. (See discussion on page B-16.) The table on the following page presents the annual energy savings of each measure based upon that average operating time.

Measure	Power Reduction	Per Unit Savings	Total Installed	**Totals**
11W cfl	29.0	127.02	139	**17,656**
15W cfl	45.0	197.10	689	**135,802**
20W cfl	55.0	240.90	17	**4,095**
23W cfl	77.0	337.26	39	**13,153**
30W cfl	95.0	416.10	313	**130,239**
15W R30/FL cfl	50.0	219.00	100	**21,900**
20W R40/FL cfl	82.0	359.16	218	**78,297**
Dimmable cfl	0.0	0.00	0	**0**
Led Exit Sign	28.0	245.28	144	**35,320**
Cfl Exit sign retrofit	0.0	0.00	0	**0**
4T1	25.5	111.69	20	**2,234**
Day 4T1	25.5	111.69	0	**0**
4T2	35.5	155.49	1,298	**201,826**
Day 4T2	35.5	155.49	26	**4,043**
4T3	49.5	216.81	127	**27,535**
Day 4T3	49.5	216.81	0	**0**
4T3D	49.5	216.81	16	**3,469**
Day 4T3D	49.5	216.81	0	**0**
4T4	56.0	245.28	1,140	**279,619**
Day 4T4	56.0	245.28	8	**1,962**
4T4D	56.0	245.28	150	**36,792**
Day 4T4D	56.0	245.28	1	**245**
8T1	53.0	232.14	10	**2,321**
8T1:4T1	53.0	232.14	2	**464**
8T2	77.0	337.26	474	**159,861**
8T2:4T1	77.0	337.26	58	**19,561**
Fluorescent Torchiere	282.0	1,235.16	38	**46,936**
Nightlight	0.0	0.00	32	**0**
Fluorescent Bath Light	90.0	394.20	153	**60,313**
Fluorescent Porch Light	77.0	337.26	43	**14,502**
Fluorescent Post/Yard Light	77.0	337.26	6	**2,024**
FluorescentCarport Light	77.0	337.26	21	**7,082**
Totals			5,282	**1,307,253**

The power reduction levels were estimated by assuming the 11, 15, 20, and 23W CFLs replaced 40, 60, 75, and 100W incandescents, respectively, and that the 30W CFL replaced an even mix of 100W and 150W incandescents. The T8 fluorescent fixtures were assumed to replace T12 fixtures with an even mix of energy-saving and "standard" bulbs and ballasts; this assumption is considered appropriate based on our observation of the types of business facilities receiving tune-ups and the general energy awareness of those caring for them.

This energy savings estimate is approximately half of that derived from the *ex-ante* methodology. The apparent reason for this is that the actual tune-ups installed fewer fixtures than had been anticipated in the program's planning.

Demand Reduction. For the most part, the lights installed in small businesses, other than the external lights (porch, post, and carport), operate during the day and contributed to coincident peak reduction. The following table delineates the demand reduction contribution of each of the fixtures installed:

Measure	Power Reduction	Total Installed	**Total kW**
11W cfl	29.0	139	**4.0**
15W cfl	45.0	689	**31.0**
20W cfl	55.0	17	**0.9**
23W cfl	77.0	39	**3.0**
30W cfl	95.0	313	**29.7**
15W R30/FL cfl	50.0	100	**5.0**
20W R40/FL cfl	82.0	218	**17.9**
Dimmable cfl	0.0	0	**0.0**
Led Exit Sign	28.0	144	**4.0**
Cfl Exit sign retrofit	0.0	0	**0.0**
4T1	25.5	20	**0.5**
Day 4T1	25.5	0	**0.0**
4T2	35.5	1,298	**46.1**
Day 4T2	35.5	26	**0.9**
4T3	49.5	127	**6.3**
Day 4T3	49.5	0	**0.0**
4T3D	49.5	16	**0.8**
Day 4T3D	49.5	0	**0.0**
4T4	56.0	1,140	**63.8**
Day 4T4	56.0	8	**0.4**
4T4D	56.0	150	**8.4**
Day 4T4D	56.0	1	**0.1**
8T1	53.0	10	**0.5**
8T1:4T1	53.0	2	**0.1**
8T2	77.0	474	**36.5**
8T2:4T1	77.0	58	**4.5**
Fluorescent Torchiere	282.0	38	**10.7**
Nightlight	0.0	32	**0.0**
Fluorescent Bath Light	90.0	153	**13.8**
Fluorescent Porch Light	0	43	**0.0**
Fluorescent Post/Yard Light	0	6	**0.0**
FluorescentCarport Light	0	21	**0.0**
Totals		5,282	**289.0**

The *ex-post* evaluation of coincident peak demand reduction is 289 kW gross. This is much lower than the 927 kW *ex-ante* value primarily because each business installation did not include as many fixtures as anticipated and the 3.42 kW/business estimate was not achieved.

Gas Savings. No gas savings were estimated for or achieved by the lighting measures.

Miscellaneous Measures

The Energy Coalition's implementation plan stipulated that 100 small businesses would receive "miscellaneous" efficiency measures. Out of the 274 small businesses that received an energy tune-up, 237 received miscellaneous efficiency measures. The demand reduction per unit (small business) is stipulated as 0.684 kW, with estimated annual hours of operation at 2,920 per unit. The annual energy savings per unit is stipulated at 2,000 kWh. Therefore the total *ex-ante* gross annual electricity savings of 237 small business units that received miscellaneous measures is 542,200 kWh with a demand reduction of 185 kW.

The assumed net-to-gross ratio is 0.96[2] and the measure useful life is 7 years. The net annual savings are 520,320 kWh and 178 kW. Over the seven-year useful life this amounts to 3,642,240 kWh.

Out of the 237 small business units that received miscellaneous efficiency measures, a total of 951 measures were distributed. This averages to 4.01 miscellaneous measures per small business unit. The following table delineates the grand total of all miscellaneous measures installed:

Measure	Brea	Irvine	Moreno Valley	Palm Desert	Santa Monica	**Totals**
Fluorescent Fixture Lens	0	0	3	24	21	**48**
AC Filters	2	0	2	0	1	**4**
Refrigerator Filters	0	0	0	0	0	**0**
Evap Cooler Filter	0	0	0	0	0	**0**
Ceiling Fan	3	0	134	25	0	**162**
Standing Fan	0	30	12	2	17	**61**
Door Strip	0	0	0	2	0	**2**
Showerhead	0	0	2	17	0	**19**
Aerator	19	0	16	63	0	**98**
Water Heater Wrap	0	0	1	0	2	**3**
Water Heater Strap	0	0	1	0	0	**1**
Smoke Detector Install	27	27	127	57	18	**256**
Totals	**51**	**57**	**298**	**190**	**59**	**654**

Ex-Post *Evaluation*. The 2,000 annual kWh savings per business receiving a measure is difficult to evaluate. Many of the items listed in the table above are safety related and do not contribute to energy savings. Others are gas measures that do not contribute to electricity savings.

[2] Some of the text uses 0.95 for this NTG ratio, but the CPUC spreadsheet uses 0.96. The difference is minor. In general we use spreadsheet numbers whenever there is a discrepancy that is not explainable or where neither seems more accurate than the other.

The 2,000 kWh/year estimate is within reason for a small business, given that it does indeed use the fans in order to reduce air conditioning load. Collecting information about the actual use of the fans was beyond the scope of this limited evaluation. Therefore, we will assume that the 2,000 kWh/year estimate is accurate for those businesses that received one or more ceiling or standing fans.

A total of 223 fans were given away. Some small businesses received more than one fan. A total of 58 businesses received ceiling fans and 35 businesses received standing fans. Two of these businesses received both kinds of fan. Thus a total of 91 businesses received fans of one or both types. Allocating 2,000 kWh/yr to these businesses results in an annual savings estimate of 182,000 kWh/yr. As in residential settings, the weatherization measures are not assumed to actually save energy. (See the residential section for additional information, research citations, and our commentary on this.)

The water heating measures save electricity because 50% of the water heaters were electric. The total savings are 5,493 kWh/yr, as detailed in the table on the following page. This brings the total electricity savings for the "miscellaneous" measures to 187,493 kWh/yr. This is approximately 94% of the program goal of 200,000 kWh/yr.

Water Heating Measures. The showerheads, faucet aerators, and water heater wraps save electricity in businesses with electric water heaters and save natural gas in businesses with gas water heaters. Of the 98 faucet aerators installed, 33 were installed where electric water heaters were indicated, 31 with gas water heaters indicated, and 34 in locations where the water heater type was not coded. We assume that all of the water heating measures were installed 50% on electric and 50% on gas water heaters.

Reliable savings estimates for these devices in small business settings are not known to be available, and measuring such values is beyond the scope of our analysis. We will use the savings estimates provided in the DEER database for residential applications. The savings for water heater wraps should be relatively similar in residential and small business settings. Aerators are presumably an entirely different situation, as usage could vary significantly. However, we believe the residential estimate to be as good an estimate as any to use in this analysis of a minor component of this program.

Electric energy savings, demand reduction, and therm savings estimates for the water heating measures can be found in the DEER Update[3], page 297. The per-unit values are summarized as follows:

Low-flow showerhead	179 kWh/yr	39 W	10 Th/yr
Faucet aerators	70 kWh/yr	15 W	4 Th/yr
Water heater blanket	242 kWh/yr	53 W	13 Th/yr

[3] Xenergy, Inc. *2001 DEER Update Study Final Report*, Ch.6, p. 117 [electric] and p. 124 [gas]. (Oakland, CA: Aug 2001.)

The DEER values presented are for either an electric water heater (which saves only the kWh and watt values listed) or a gas water heater (which saves only the therm values listed). Assuming the 50% electric and 50% gas water mix of the tune-up population, the *average* measure therefore saves the following amount of *both* gas and electricity:

Low-flow showerhead	89.5 kWh/yr	19.5 W	5.0 Th/yr
Faucet aerators	35.0 kWh/yr	7.5 W	2.0 Th/yr
Water heater blanket	121.0 kWh/yr	26.5 W	6.5 Th/yr

Miscellaneous Measure	Quantity	kWh/yr	kW	Therm/yr
Showerhead	19	1,700	0.4	95
Faucet Aerator	98	3,430	0.7	196
Waterheater Wrap	3	363	0.1	20
Grand Total		**5,493**	**1.2**	**311**

Demand Savings. It is unclear to what extent installed ceiling fans will save peak demand in hot climate zones. There is evidence that thermostats are set higher when the fans are operating. Assuming that a small business has a 5 kW air conditioner and that its cyclical operation is reduced from 100% to 90% during the hot on-peak period by setting the thermostat higher, a 500W demand reduction could be attributed to the ceiling fans. The 91 business that received ceiling fans thus have a combined demand reduction of 45.5 kW. An additional demand savings of 1 kW is attributable to the water heating measures in sites with electric water heaters.

Gas Savings. The gas savings for the "miscellaneous" measures are achieved through the water heating measures. This totals 311 therm/year as described above.

Thermostats

A distribution goal of 100 thermostats was set for the 2002-2003 program years. At the conclusion of the program, a total of 80 small businesses received a combined total of 111 thermostats. The demand reduction per unit (thermostat) is stipulated as 0.514 kW, with estimated annual hours of operation at 4,380 per unit. The annual energy savings per unit is stipulated at 1,500 kWh,[4] and 120 therms. Therefore the total *ex-ante* gross annual electricity savings of the 111 thermostats is 166,500 kWh with a demand reduction of 57 kW. The annual gas savings is 13,320 therms.

The assumed net-to-gross ratio is 0.96 and the measure useful life is 10 years. The net annual savings are 159,840 kWh, 55 kW, and 12,787 therms. Over the ten-year useful life this amounts to 1,598,400 kWh and 127,870 therms.

The 111 thermostats distributed to 80 small businesses averages to 1.39 thermostats per small business unit. The following table delineates the grand total of all thermostats installed:

Measure	Brea	Irvine	Moreno Valley	Palm Desert	Santa Monica	**Totals**
Thermostat	9	0	80	22	0	**111**

True evaluation of the energy savings from programmable thermostats is very difficult to conduct in any meaningful manner. This is the reason both for this evaluation's lack of measured *ex-post* savings for these measures and also for the scarcity of research in the literature. Even where utility program evaluations have addressed programmable thermostats in commercial settings, the research has focused on installation verification rather than savings calculation. Statements made about the energy savings of programmable thermostats are usually cloaked with significant caveats such as this quote from the Flex Your Power website, "Savings from using a programmable thermostat can be impressive. Recent studies show that proper usage of a programmable thermostat can cut a home or business' heating costs by approximately 25%. In the summer, such devices may shave cooling costs 15 to 25%."[5] Note the key words "proper use" and "can."

The DEER Study estimates annual energy savings of 326.9 and 350.5 kWh per year for pre-1978 houses in Climate Zones 8 and 10, respectively, and 97 and 130 therms per year for these same houses.[6] (These are the two climate zones represented by the six cities of this program.) It is difficult to argue that these houses are in any way representative of small businesses, though one would note that most of the small businesses receiving tune-ups were in the 1,000 to 2,000 square foot range.

Programmable thermostats save energy only to the extent that they control HVAC systems more stringently and conservingly than would the human occupants of the building.

[4] The spreadsheet lists 4,380 operating hours per year, but the kWh savings relates to the kW reduction by a factor of 2,920, the same operating hours assumed for the other small business measures. The 4,380 h/yr value appears to be a spreadsheet error.
[5] http://www.fypower.com/com/tools/products_results.html?id=100133
[6] Xenergy, Inc. *2001 DEER Update Study Final Report*. (Oakland, CA: 2001, chapter 6, page 4).

There are certainly situations where they could increase energy use. Examples of such increased use would include automatically turning on the air conditioning on a holiday when the business is closed and not being reprogrammed if an earlier closing time is established. There are several reasons why small business owners might not optimize the use of their programmable thermostats, including perceived customer satisfaction and employee disagreements about desirable temperature.

We believe the 1,500 kWh/year figure is a high estimate for the average business receiving a tune-up. While it is no doubt achievable in many of the facilities given proper and diligent use of the thermostat, there are many factors that prevent that from happening. When surveying small business tune-up recipients, we contacted 14 businesses who had received programmable thermostats. Three of those thermostats had not actually been installed by the contractor and were awaiting installation. Another four were being used manually.

That being said, because more sufficient information is not available, we will attribute 1,500 kWh/year to each business receiving one or more thermostats, rather than to each thermostat. The 111 thermostats were installed in 80 businesses. This amounts to 120,000 kWh/year annual savings in the "near-*ex-post*" evaluation.

Demand Savings. As discussed in the residential chapter, programmable thermostats are not estimated to reduce coincident peak demand. This is probably even more true of commercial applications than residential ones. We therefore set the *ex-post* demand savings to zero for the small business thermostats.

Gas Savings. The therm savings attributed to programmable thermostats seem more easily achievable. We will also attribute these savings of 120 therm/year to each business, for a total savings of 9,600 therm/year. This is significantly less than the goal because a thermostat was not installed in all of the businesses receiving tune-ups.

Small Business Survey

The survey component of this evaluation process originally planned for 25 telephone surveys of small business owners or managers, and approximately five on-site visits. The intent and methodology of these visits was the same as in the residential sectors. During the course of the evaluation process, The Energy Coalition and Aloha agreed to use on-site visits in place of the telephone surveys, thus bringing the total on-site visit goal to 30. We found it more beneficial to conduct on-site surveys than track down business owners on the telephone for questioning. We also planned to interview five eligible businesses that chose not to participate.

Aloha Systems surpassed its target goal of 30 participants and interviewed 32 small business participants in the survey and verification process of the energy efficiency tune-up program. The main goal of this evaluation process was to verify contractor's work and to gauge the participants' satisfaction with the energy efficiency tune-up they received. These surveys took place in January of 2004 and lasted approximately two weeks. Six non-participating businesses were also contacted as part of the evaluation process.

The Energy Coalition's database was used to contact the small businesses that received energy efficiency tune-ups. In the process of meeting our goal, 49 small business on-site interviews were attempted. Aloha Systems staff attempted to contact at least six small businesses within each city in order to form a representative sample for the surveys. Not every small business owner was able to complete the entire survey due to time and customer service constraints. Some businesses were closed, other people present at the time of our visit were unaware of the tune-up and could not comment on the program, and some were not interested in participating.

The objectives of the survey were to: (1) conduct visual verifications of the tune-up products received, (2) inquire about their hours of operation, (3) inquire about any behavioral changes and the community's response to the tune-up, and (4) survey the owner's satisfaction regarding the service they received.

Visual verifications of each small business were mainly conducted to ensure contractor and database accuracy in the number of energy efficient products installed. A brief questionnaire was used to collect information about lighting usage and to asses any behavioral changes in the small business since the tune-up. Behavioral changes were determined through inquiries about future energy efficiency upgrades to the business and/or owners' or employees' homes.

Finally, a brief opinion survey was given to the owners in order to assess the level of satisfaction with their tune-up experience. This was a ten-question written survey based on a rating system of 1 to 10, one being completely dissatisfied and 10 being completely satisfied. It also contained a "N/A" column. This survey was handed directly to the small business owner to complete. A copy of the survey is attached at the end of this document. Besides the visual verification, all three sections of interview were completed by the business owner or store manager.

The following sections discuss the results from the small business on-site interviews. They have been summarized in each of the four main categories. Following these summaries are the results from ten customer satisfaction questions.

Visual Verification

This portion of the evaluation was designed to conduct a visual verification of lighting measures, programmable thermostats, ceiling fans and the Energy Coalition's "Energy Champions" stickers and brochures at each small business. Visual verifications were conducted at 28 out of the 32 small businesses that participated in the evaluation. Four business owners were either too busy to participate in the verification or the equipment was not readily visible.

Of the 28 small businesses, 26 were found to have the correct number of lighting measures indicated by the Energy Coalition's database. To "pass" the inspection, the measures had to be installed and in use at the business. One of the businesses did not receive the same lights indicated in the database and another had removed some of the bulbs that were installed because they were too bright.

Out of the 14 small businesses that received programmable thermostats, 11 were found to be installed. Two follow-up questions regarding use of the programmable thermostat were used to determine usage. Four of the businesses that were using them stated they were using the programmable thermostat in the override setting or not at all because it was not hot enough outside. Eleven small businesses received ceiling fans from the contractors and seven of those businesses surveyed had them installed by the contractor.

Three businesses received programmable thermostats but the thermostats were not installed because the contractors told the business owners they were not qualified to install them in their particular business. Another four businesses were given ceiling fans to have them installed on their own. These four business owners still had the ceiling fans – and in some cases programmable thermostats – lying around in their boxes because they did not have the time or money to find an independent electrician to install them.

Both the "Energy Champions" stickers and brochures were handed out by the contractors on behalf of the Energy Coalition as marketing tools. "Energy Champions" are businesses that are recognized as being committed to energy efficiency and the Energy Coalition asks the business to display both the sticker and the brochures in the front of the business for advertising purposes. Thirteen of the 28 small businesses had their "Energy Champions" sticker clearly visible in the front window/door of their business. Another seven small businesses had visibly displayed the "Energy Champions" brochures they had received from the contractors in the front areas of their businesses.

Lighting Usage

In measuring the amount of time business owners would keep their lights on, four main factors had to be considered. These factors included: (1) the general hours of operation, (2) the time employees turn lights on before the business opens, (3) the time spent after normal business hours until the lights are turned off, and (4) the number of hours that janitorial or miscellaneous activities added to the hours of operation. The owner or manager was questioned about these factors as well as if any lights were left on 24 hours a day. The business hours listed on some windows were used to validate this information. Of the 32 small businesses evaluated, 24 provided lighting usage information about their businesses.

The average operating time of the lights was found to be about 12 hours. Five small businesses had their lights on twenty-four hours a day due to their normal business hours or because employees were in and out at unusual hours. Five business owners stated that they had their lights on before the business opened an average of about one hour and 11 business owners stated that they had their lights on after the business closed for an average of two hours. The remaining three businesses did not have their lights on except during business hours.

Six small businesses had janitorial crews that added an average of two hours to the time that the lights were on after normal hours. Nine of the small business owners stated that they normally left some or all of the lights on after everyone had left the building for reasons such as security, merchandising, or that the lights were wired to circuit breakers controlling coolers or other appliances.

Behavioral Changes Since the Tune-Up

In order to assess behavioral changes since the tune-up, a series of questions regarding future energy efficiency upgrades, energy conservation awareness, and community response were asked. Twenty-six small business owners participated in this part of the evaluation and were able to offer multiple answers. Four of the small businesses had made further energy efficiency upgrades to their businesses since the tune-up. All the upgrades made were based on the recommendations of the installation contractors. Four business owners felt that no more upgrades were necessary and two others did not have the time or money to invest in future energy retrofits. Nineteen of the 26 small businesses also stated that they are planning on making further energy efficiency upgrades in the future. The following table delineates the current upgrade status that 26 small businesses offered, some responding with more than one answer:

	Already Made Upgrades	No Further Upgrades Necessary	Not Enough Money/Time for Further Upgrades	Planning on Upgrades in the Future
SUMMARY	4	4	2	19
% SUMMARY	14%	14%	7%	66%

Fifteen of the small business owners stated that some of their employees had commented about the new lighting and other energy-efficient measures installed in their business since the tune-up. The majority of the comments were positive, although a few employees mentioned that the lighting changed the coloring of the room – most notably restaurant cooks and hair salon stylists. Roughly half of the small businesses that Aloha Systems visited did not have "walk-in" customers. Only one small business owner in Santa Monica stated that customers had mentioned the new lighting, only because it negatively changed the coloring in the restrooms. (The owner put in frosted glass covers to help solve this problem.)

Six of the business owners stated they have made changes to their homes since the tune-up to increase energy efficiency. One small business owner also knew of a customer that had made energy efficiency changes to their home as well. Three small business owners said their neighboring businesses had asked about their energy efficiency tune-up, and another nine business owners had told fellow businesses owners about the Energy Coalition's program.

In the course of the small business interviews, five owners mentioned they had received energy efficiency tune-ups and technology from sources like Southern California Edison in the past, and because of their experience were more than eager to participate in this program.

Non-Participating Small Businesses

In the course of evaluating why eligible small business owners declined to participate in the program, some answers were as simple as "we were closed at the time the contractors came door-to-door to introduce the program." A total of six small business owners were briefly questioned as to why they did not participate in the program.

In areas where city personnel mailed a notification letter to eligible small business owners, the owners claimed to have never received such a letter. It is very possible that they accidentally threw it away thinking it was "junk mail." In other cases, a language barrier prevented some business owners from participating. Some small business owners had rooms in which their ceilings were inaccessible to the contractors, while others declined to participate due to required lighting conditions. Lastly, some small business owners already had energy-saving retrofits conducted at their business, and therefore no further energy-savings were possible.

Another small business randomly visited had signed up for the program and received the Energy Champions sticker and brochures, but never received a tune-up. The contractors never returned to install the new lighting measures. The owner attempted several times to contact the contractor directly, but to no avail. This business was not listed in the Energy Coalition's Small Business Tune-up Database, despite the fact the owner filled out the contractor paperwork.

Small Business Satisfaction

The small business surveys helped measured the owner's satisfaction of their energy tune-up experience. A brief ten-question survey was directly handed to the owners. The survey questions had a rating system of one to five and "not applicable;" one being completely dissatisfied and five being completely satisfied. Twenty-five small business owners completed this portion of the survey and the results are presented below.

Courteousness and Respectfulness of the Contractors

Twenty-five small business owners answered this question about the courteousness and respectfulness of the contractors. The average rating was 4.72.

How courteous and respectful was the contractor?							Sample Size: 25
RATING	1	2	3	4	5	N/A	AVERAGE
SUMMARY	0	0	1	5	19	0	4.72
% SUMMARY	0%	0%	4%	20%	76%	0%	

Contractors Understanding of Small Businesses Needs

Twenty-five small business owners were questioned on the contractor's understanding of the individual needs of their businesses when installing the various energy-efficient devices. The average rating was 4.67.

How well did the contractor understand your needs?							Sample Size: 25
RATING	1	2	3	4	5	N/A	AVERAGE
SUMMARY	0	1	1	3	19	1	4.67
% SUMMARY	0%	4%	4%	12%	76%	4%	

Explanation of Services Provided by the Contractors

Twenty-five small business owners were questioned about the contractor's thoroughness in explaining the entire process and reasoning behind it. The average rating was 4.44.

How well did the contractor explain to you what they were doing and why?							Sample Size: 25
RATING	1	2	3	4	5	N/A	AVERAGE
SUMMARY	0	2	2	4	17	0	4.44
% SUMMARY	0%	8%	8%	16%	68%	0%	

Contractor's Choice of Vocabulary

Twenty-five small business owners responded to our question regarding their comprehension of the contractor's vocabulary and/or word choice during their tune-up. The average rating was 4.75.

Did this contractor use words that were easy for you to understand?							Sample Size: 25
RATING	1	2	3	4	5	N/A	AVERAGE
SUMMARY	0	0	1	4	19	1	4.75
% SUMMARY	0%	0%	4%	16%	76%	4%	

Contractor's Response to Small Businesses Questions and Concerns

Twenty-five small business owners were questioned about their satisfaction with the contractor's response regarding their concerns and questions about the energy tune-up. The average rating was 4.61.

How well did this contractor listen to your concerns and questions?							Sample Size: 25
RATING	1	2	3	4	5	N/A	AVERAGE
SUMMARY	1	0	1	3	18	2	4.61
% SUMMARY	4%	0%	4%	12%	72%	8%	

Adequate Time Frame for Contractor Consultation

Twenty-five small business owners were asked if they felt the contractor spent adequate time with them during the energy efficiency tune-up of their small businesses. The average rating was 4.32.

Did this contractor spend enough time with you?							Sample Size: 25
RATING	1	2	3	4	5	N/A	AVERAGE
SUMMARY	2	0	2	5	16	0	4.32
% SUMMARY	8%	0%	8%	20%	64%	0%	

Time the Contractors Spent with the Small Business Owners

Eighteen small business owners responded to this "fill-in" question about the amount of time the contractors spent consulting with them and installing the energy-saving devices. The 17 responses with a number averaged out to 3.68 hours, the maximum time being 7.3 hours and the minimum being 0.1 hours. One person responded with "too much" time.

Contractor Instruction about Use of Energy-Efficient Technology

Twenty-five small business owners responded to this question about their satisfaction with how well the contractors explained how to use their new fans, lighting and/or programmable thermostats. The average rating was 4.05. 12% stated "not applicable." The three small businesses in the 12% "N/A" category stated that they were not present during the contractor's visit(s) or that they did not receive any true instruction or information.

Did this contractor spend enough time with you?							Sample Size: 25
RATING	1	2	3	4	5	N/A	AVERAGE
SUMMARY	2	1	2	6	11	3	4.05
% SUMMARY	8%	4%	8%	24%	44%	12%	

Convenience of the Installation Process

Twenty-five small business owners were asked about the convenience of the installation process for their new energy-saving devices. The average rating was 4.54 out of a possible 5.0.

How satisfied were you with the convenience of the installation process?							Sample Size: 25
RATING	1	2	3	4	5	N/A	AVERAGE
SUMMARY	1	1	0	4	18	1	4.54
% SUMMARY	4%	4%	0%	16%	72%	4%	

Post-Installation Customer Service

Twenty-five small business owners responded to the survey portion regarding post-installation telephone customer service provided by the contractor's respective company. The average rating was 4.82. The majority, 56%, answered "N/A" because they had not contacted the contractor after the tune-up for any reason.

If you contacted the contractor by telephone, how satisfied were you with the customer service received?							Sample Size: 25
RATING	1	2	3	4	5	N/A	AVERAGE
SUMMARY	0	0	0	2	9	14	4.82
% SUMMARY	0%	0%	0%	8%	36%	56%	

Call Return Satisfaction

Nine small business owners called the contractors for post-installation customer service and requested a return call for assistance. The average satisfaction rating was 4.89 for the length of time waiting for the contractor to return the call.

If you left a message with the contractor by telephone, how satisfied were you with the length of time to receive a return call? Sample Size: 9							
RATING	1	2	3	4	5	N/A	AVERAGE
SUMMARY	0	0	0	1	8	0	4.89
% SUMMARY	0%	0%	0%	11%	89%	0%	

Overall Satisfaction with Energy Efficiency Tune-Up

Twenty-four small business owners responded to the last question on the small business survey regarding their overall level of satisfaction. The average rating was 4.63.

Overall, how satisfied are you with the service you received from the contractor? Sample Size:24							
RATING	1	2	3	4	5	N/A	AVERAGE
SUMMARY	0	1	1	4	18	0	4.63
% SUMMARY	0%	4%	4%	17%	75%	0%	

PEAK Student Energy Actions

Introduction

Evaluating the success of the 2002-2003 PEAK Student Energy Actions (PEAK) program required insight from multiple levels of school district personnel, students, and the parents/guardians of these students. The energy measures and activities PEAK incorporated into the Irvine, Santa Monica-Malibu, and Palm Desert school districts are extensive. (Moreno Valley Unified School District was brought on board late into the program after two-years of negotiations with school board officials. Although they are included in The Energy Coalition's Six Cities Energy Efficiency program, they did not participate in the survey or interview process of our evaluation analysis.) The program's energy savings largely rely on behavioral changes stimulated through student education and action. The heightened awareness of participating students to save energy is assumed to transcend to each student's household, as well as their school. In addition to these behavioral changes, PEAK gave each student a free compact fluorescent light (CFL) to take home, opportunities to be an "energy ambassador" through community activities, discounted CFLs for school fundraisers, and the green light to be the "energy police" at their campus.

"While electricity use varies dramatically among the six cities and the housing stocks represented in the project partnership, we assume that the average household consumes 500 kWh per month and thus 6,000 kWh annually. Furthermore, we assume that each participating student's household realizes a 10% energy savings – largely through behavioral changes stimulated through student program activities – for an average annual savings of 600 kWh for each of the 7,500 homes involved in the program. Note that we discount the 8,000 students to 7,500 homes to account for homes that have more than one student/child in the program. (Energy savings from past program activities have been as high as 30%.) We assume that the savings from PEAK Households will be 3.6 million net annual kilowatt-hours."[1]

"This savings is projected to last an average of five years, catalyzed with PEAK's symbolic gift to each student of a compact fluorescent lightbulb followed by the program's emphasis on smart energy management based largely on behavioral changes. We input a $150 per household average investment in energy management (for additional lights, Energy Star appliances, thermostats, shade trees, etc.) during the five years for the purpose of the cost-effectiveness calculations. As such the program will also result in total customer segment capacity savings of 411 kW plus gas savings of 225,000 therms per year."[2]

The *ex-ante* evaluation of the PEAK program is based primarily on the final student participation totals from each district and the number of CFLs distributed through the program. The number of participating students was not easy to define, partly because

[1] The Energy Coalition. *The Six Cities Energy Project Revised Program Implementation Plan*, CPUC Program Reference #232A-02. Page 12
[2] *Ibid.*

"participation" covered a range of instruction levels, and also because the school districts did not keep detailed records of which students participated. For the *ex-ante* approach, we evaluated the program based upon the Coalition's successful execution of contracts with school districts to implement the program for a given number of students. The details of each of these calculations are explained below in their respective subchapters.

The PEAK program also included a Saving Energy at School (SEAS) component that involved students in managing school energy use. Furthermore, The Energy Coalition provided additional technical services and funding to the school districts to help them reduce energy use in school facilities. This was implemented in the four school districts participating in the PEAK program. Information gathered from The Energy Coalition and personnel interviews combined to give an accurate evaluation of the benefits gained by each school district.

For the *ex-post* evaluate, we explored the levels of participation by students further, and relied on survey information to help determine how many of the students in the program actually involved their families and worked toward the goals. These details also are explained in the subchapters below.

In addition to the hard data, we also took into consideration the results from student, parent, and teacher surveys, as well as feedback from one-on-one interviews with principals and other school administrators. From the survey responses, we were able to gauge student and teacher satisfaction with the program, as well as parent/guardian understanding of energy conservation (pre- and post-PEAK). Most importantly, the results from these surveys indicate the level of behavioral change and impact PEAK students had in their household.

Savings Summaries. The following tables present summaries for the PEAK savings goals and the *ex-ante* and *ex-post* estimates. The "goal" column presents the estimates from the PIP spreadsheet.

Electric Energy Savings, kWh/year				
Measure	**Goal (Gross)**	***Ex-Ante* (Gross)**	***Ex-Ante* % of Goal**	***Ex-Post* (Gross)**
Student Households	4,500,000	4,753,200	105.6%	2,851,800
CFLs	825,000	1,260,600	152.8%	916,800
District Facilities	900,000	900,000	100.0%	900,000
Total PEAK	**6,225,000**	**6,913,800**	**111.1%**	**4,668,600**

Electric Demand Reduction, kW				
Measure	**Goal (Gross Connected)**	***Ex-Ante* (Gr Connected)**	***Ex-Ante* % of Goal**	***Ex-Post (Gr Coincident)***
Student Households	3,075	3,248	105.6%	260
CFLs	563	860	152.8%	275
District Facilities	308	308	100.0%	105
Total PEAK	**3,946**	**4,108**	**104.1%**	**640**

Natural Gas Savings, therm/year				
Measure	**Goal (Gross)**	***Ex-Ante* (Gross)**	***Ex-Ante* % of Goal**	***Ex-Post (Gross)***
Student Households	225,000	237,660	105.6%	142,590
CFLs	0	0	N/A	0
District Facilities	45,000	45,000	100.0%	45,000
Total PEAK	**270,000**	**282,660**	**104.7%**	**287,590**

The *ex-ante* savings estimate is 111% of the program goal, primarily because significantly more CFLs were distributed and slightly more students were signed up. The near-*ex-post* energy estimate, 4,668,600 kWh/yr, is lower than the goal because we took into account the partial instruction level in some schools and the survey results indicating that not all students took the information home to their families.

Student Households

Introduction and Process Difficulties. During the course of evaluating the PEAK program, we learned that the definition of a "PEAK student" is neither clear nor uniform. The PEAK curriculum itself is clearly defined. We had assumed that it was implemented uniformly, at least in intent, throughout the project. We learned that this is not the case. The participating school districts implemented the program with varying degrees of rigidity, and even at the individual teacher level we found significant variance.

The Program Plan states the following: "*The Coalition's PEAK Student Energy Actions program is a comprehensive curriculum that includes lessons, in-classroom activities, homework assignments, interactive simulation software, a web site, and more. The curriculum is fully correlated with California teaching standards for math and science. When a school district embraces PEAK – as has been the case in Irvine and Santa Monica – the program is integrated into the normal classroom activities. Math and science teachers are trained by the Coalition's PEAK Teacher Team (at "in-service" sessions) and then are responsible for teaching PEAK throughout the year. PEAK's 2002 Curriculum includes 24 lesson plans and is taught to 4th, 5th, 6th, and 7th graders (approximately 9-13 year olds) – essentially six lessons per school year. The lessons involve about 10 hours of classroom time for each grade level, reinforced with computer lab time and homework assignments.*" [3]

We have reviewed the PEAK curriculum and attended teacher training sessions. We believe that these are good materials and that they can successfully teach students about energy efficiency.

Some enthusiastic teachers took their students through the full program and enthusiastically presented the information. Others were enthusiastic but did not devote the intended amount of time to the program because of other educational requirements that competed for this time. Still others presented parts of the program but were not enthusiastic and treated it as a burdensome add-on required by the administration.

These are serious process issues that should be addressed by The Energy Coalition and the school districts in the future. Much of the opinion and attitude information gathered from the teachers and school administrators is presented in the following pages. During our evaluation of the 2004-05 program, we will be working closely with the Coalition both to help the remedy some of these issues and in order to better ascertain exactly what qualifies as "participation" from the standpoint of a student, teacher, school, or district.

Ex-Ante *Evaluation*. The Program Plan specifically states "*PEAK will be continued in the City of Irvine where nearly 2,000 students each year will be exposed to its energy management activities and lessons. In Santa Monica, and conservatively speaking, another 1,000 students each year will be introduced to the program. With the existing school districts currently on board, PEAK will be introduced to approximately 6,000 students over the two-year proposed program period. Assuming that PEAK is*

[3] The Energy Coalition. *The Six Cities Energy Project Revised Program Implementation Plan*, CPUC Program Reference #232A-02. Page 11

introduced in at least one of the four new cities during the program period, another 2,000 students will be exposed to the PEAK learning experience, for a total of 8,000 students and an estimated 7,500 homes when accounting for two-child families."[4]

We note that the phrase "be exposed to its energy management activities and lessons" is particularly broad and does not indicate that the students will actually complete the entire program. Obviously this has an effect on the ability of the program to induce energy savings at the students' homes. This, however, will be treated as part of the *ex-post* evaluation (and even there not fully addressed). We do not believe it enters into the *ex-ante* evaluation because there was not an up-front commitment by The Energy Coalition to put these students through the full extent of the program.

We quote directly from the agreement between The Energy Coalition and the Irvine Unified School District:[5]

"The Agreement In Principle covers the following goals for the school year 2002-2003:

1. The Coalition will provide the PEAK Student Energy Actions program at no cost for use in IUSD elementary schools as part of the Six Cities Energy Project in the 2002-2003 school year.
2. IUSD will integrate PEAK into its elementary schools for all 4th grade students during the 2002-2003 school year, initiating energy efficiency savings in approximately two thousand households and 22 schools in Irvine.
3. IUSD's Math and Science Curriculum Coordinator will work with the Coalition to develop a customized set of PEAK lessons that will assure that the energy efficiency focus of PEAK is taught to students for use in reducing energy use in their homes and at school.
4. The IUSD science specialists, math/science curriculum coordinator, and other designated teachers will receive training by the Coalition and its teacher consultants relative to the effective use of the curriculum, software, and website.
5. The Coalition will make its proprietary curriculum and software available to all IUSD students participating in the PEAK Student Energy Action program. Students will be provided PEAK software and lesson plans so that they can use PEAK at home to further energy efficiency educational benefits with their families. PEAK's educational and interactive website will also be available to students and their families.
6. The Coalition, in concert with the City of Irvine and Southern California Edison, will make a compact fluorescent lightbulb available to every student enrolled in the program to symbolize his or her family's opportunity to leverage greater savings through energy efficiency. Additional energy-efficiency bulbs may also be available for student fundraising activities.
7. The Coalition will link participating families with other Southern California Edison incentives for energy-efficient opportunities in student homes.

[4] Ibid.

[5] "Agreement in Principal between the Irvine Unified School District and The Energy Coalition," dated September 12, 2002, and signed by Dean Waldfogel, IUSD Superintendent, and John Phillips, TEC Executive Director. The actual document has bullets, which we present here as numbered paragraphs in order to clarify our discussion of them.

8. The Coalition will work with IUSD and Southern California Edison to develop appropriate rewards and incentives for exemplary student behavior in saving energy at home and at school. Teacher recognition will also be awarded.
9. As part of the Six Cities Energy Project, the Coalition will also support IUSD in saving energy and money at schools. For instance, the Coalition may continue to provide engineering assistance and management consulting to support school energy reduction activities. This work will complement ways that PEAK students can contribute savings through behavioral changes – like turning off unnecessary lights – to support IUSD's goals of reducing energy use on campus. Resulting changes will create savings that can be reinvested in IUSD school facilities for more sophisticated energy management.
10. The Coalition will continue to work with IUSD to develop a district-wide energy management strategic plan that may feature a shared-savings program such that verified energy and dollar savings are split between the school district for general purposes and the specific schools for reinvestment to leverage ever-greater efficiency gains.
11. While providing for complete student and family confidentiality, IUSD agrees that the Coalition, Southern California Edison, and the California Public Utilities Commission shall have access to PEAK results in order to document benefits and to highlight the REEI case study that will be built.
12. IUSD and the Coalition agree that at the end of the 2002-2003 school year they will review PEAK to determine its further use in sustaining IUSD's energy future."

The Energy Coalition and the Irvine USD have performed on all of these points. Dr. Shirilau personally attended the training workshop discussed in Paragraph 4, and found it very well presented. Many of the teachers were enthusiastic. Many asked questions indicating their interest. The training program involved hands-on work with simple battery-operated electric motors and light bulbs and explained the basics of electricity. It was evident that many teachers left the session with a much better understanding of this subject.

The IUSD conducted an evaluation of the training session and many of the teachers filled out simple evaluation forms when leaving the session. We gather that this is common practice at district training sessions. We contacted the school district and asked to get copies of these surveys, or at least the generic and de-personalized information gathered. We were disappointed that the school district would not provide us with this information, even upon assuring them that we would safeguard confidentiality and would not, if requested, pass along specific information to the Coalition.

While the duties of Paragraph 2 were technically fulfilled by the district, we believe that this paragraph is not sufficiently specific. "Integrate PEAK into its elementary schools" does not specify at what level, nor does it commit the teachers to instruct all students with the full program. Nonetheless, we have no reason to doubt that the school district did, at some level, "integrate" the program and reach approximately 2,000 households.

The agreements between the Coalition and the other school districts are essentially the same as the IUSD agreement quoted above, with the exception of the quantities of students and schools. The following table presents these quantities:

School District	# of students for 2002	# of students for 2003	Schools
Irvine*	2,100	2,100	22
Desert Sands	1,000	1,000	4
Santa Monica-Malibu	1,000	1,000	3
Moreno Valley	0	250	2
Totals	**4,100**	**4,350**	**31**

*The IUSD total includes 100 students each year in the summer school program.

The Irvine USD incorporated PEAK into twenty-three of its elementary and middle schools.

The Desert Sands USD incorporated PEAK into five schools located in Palm Desert: Palm Desert Middle, Carter Elementary, Lincoln Elementary, Ford Elementary, and Washington Elementary.

The Santa Monica-Malibu USD continued incorporating[6] PEAK into three schools located in Santa Monica: Adams Middle, Lincoln Middle, and Edison Elementary.

The Moreno Valley USD began participation in the PEAK program during 2003 and incorporated it at Sunnymead and Creekside Elementary Schools.

The Energy Coalition contracted with school districts to bring the PEAK program to 8,450 students during the Six Cities program period. This does not represent overlap (*i.e.*, the same student going through the program twice) because it is not taught in every grade. However, there is the possibility that a household will be counted twice because siblings could be included in the grand total. We find the Coalition's assumption – that 8,000 students represents 7,500 households – to be reasonable. Based upon that assumption, the PEAK contracts represent 7,922 households.[7]

The stipulated per-unit load reduction is 0.41 kW per household, and the annual energy savings is 600 kWh per household; natural gas savings of 30 therm/yr per household are also assumed. This results in a gross savings of 4,753,200 kWh/year, a connected load reduction of 3,248 kW, and gas savings of 237,660 therms per year.

[6] SMMUSD has been involved in PEAK for a number of years as a participant in the Regional Energy Efficiency Initiative (REEI) that pre-dated the Six Cities Program.

[7] We note that technically the agreements between the Coalition and the school districts actually say "households" when stating quantities; however, we interpret this as a technical misnomer and assume that "student" is the word that actually should have been in the agreement since a school district gears its programs to students in classrooms, not households.

The assumed net-to-gross ratio is 0.8 and the measure useful life is 5 years. The net annual savings are 3,802,560 kWh and 190,128 therms. Over the five-year useful life this amounts to 19,012,800 kWh and 950,640 therms.

"*Near*-Ex-Post" *Evaluation*. Two significant issues must be addressed to assess the actual energy savings achieved through the PEAK program. The first issue is whether the per-household savings estimates are valid for the home of a student who fully participated in the program. The second issue is what level of participation constitutes sufficient immersion in the concepts to effect any energy conservation at the student's home.

Full assessment of either of these components is beyond the scope of this evaluation. It was understood up-front that we would not have sufficient resources to accurately assess the savings of a fully participating household. The second issue relating to partial implementation of the program was not even understood as an issue until we were well into the evaluation process. Nonetheless, we will attempt to provide at least some insight into these issues.

We conducted a rather extensive survey of PEAK students and their parents. The details are presented in the remainder of this chapter. We are aware that this survey is only representative of those students who participated fully or nearly fully in the program. The survey was handed out through teachers, in part because school regulations about confidentially inhibit the less biased analysis that could be conducted by direct telephone or mail surveys. The same teachers who were interested in presenting the full program to their students were also, for the most part, the teachers who were most likely to assist us in the survey process.

The surveys showed that students learned about energy efficiency, with 78% of them reporting that they understood what energy conservation was after participating in the program. (We were unable to conduct a pre-participation survey because we did not have access to students prior to their participation in the program.) Approximately 64% of the students indicated that they enjoyed the program.

Unfortunately, only 64% of students reported being willing to tell their parents about energy conservation, with a similar portion (66%) telling them about CFLs. These proportions (like the understanding and enjoyment proportions) varied considerably by school district, with Santa Monica consistently being the highest and Desert Sands the lowest. It is not clear whether this difference is attributable to the district or to the individual teachers because the sample did not represent a full cross-section of teachers in each district. Interestingly, 61% of the students claimed their parents purchased CFLs, which appears to indicate that almost all of the parents told about them actually bought one.

Significantly fewer (36%) of the students told friends about energy conservation. Curiously, this number was actually higher in Desert Sands than in other school districts.

Most students claimed to have personally done something, with only a small portion saying they had done nothing. Multiple answers were sometimes received, and 55% claim to turn lights off more often.

The parent surveys also provided interesting information. A total of 800 were sent out and 188 were returned. They came from Santa Monica and Desert Sands only. On a scale of 1 to 10, the parents' claim of knowledge about energy conservation was 5.74 before their student participated in peak and 7.70 after their student participated. This is a significant increase and indicates that knowledge is transferred from PEAK students to their parents.

We must note an important bias here. We were not allowed direct access to parents and could only reach them through the students who were in turn reached through their teachers. It seems logical to assume that the parents who responded to the survey were among the 64% whose students actually told them about conservation. The students who didn't tell their parents about the PEAK program probably did not bring the survey home to them to fill out. Nonetheless, the survey does indicate an important asset of the PEAK program – that when students do involve their parents, the parents themselves learn more about conservation.

Furthermore, 80% of these parents claim to have made behavioral changes and 73% indicate that they have replaced incandescent bulbs with CFLs. Ninety-three percent of the parents believe that energy conservation is an important subject for students to learn at school, and 52% of the parents claim to have told family or friends about conservation.

We are unable to directly assess the validity of the 600 kWh or 30 therm annual savings or the 56 W peak reduction[8] attributed to PEAK participation. These numbers do seem to be reasonable for a house in which the parents and children are more energy-conscious. The number was estimated by The Energy Coalition based upon the assumption that the average household consumes 6,000 kWh annually and that PEAK participation could save 10%. The per-household consumption assumption was very reasonable. During 2003, the average SCE residential customer consumed 6,747 kWh.[9] Since we have no basis to adjust the 10% estimate, we will leave the per-household energy savings estimate at the original 600 kWh.

Thus we will multiply the number of participating students by the 0.638 value that represents the portion of students who claimed to speak with their parents in order to determine the near-*ex-post* savings estimates. In doing so, we still have not accounted for the students who really did not participate *fully* in the PEAK program because their teachers did not spend the full amount of time on it. These students were not among the sample who answered whether they talked to their parents because the surveys themselves were distributed by teachers.

The problem of partial implementation was far more pronounced in Irvine than in Santa Monica. Our assessment is that this is almost entirely based upon internal district

[8] This is the implicit per-household demand reduction contained in the text claim that 7500 households will reduce demand by 411 kW. It is significantly different than the "connected load" reduction used in the spreadsheet as a multiplier and reported in the *ex-ante* analysis. The connected load reduction is a meaningless number in and of itself.

[9] *Southern California Edison Company's Long Term Procument Plan Testimony before the Public Utilities Commission of the State of California*. Vol 1, p. 53. (Rosemead, CA: SCE, July 9, 2004). The report indicates that there were 4,030,373 residential customers and that the residential class consumed 27,194 GWh during 2003.

politics. It is not the fault of the Coalition and is not even directly related to energy conservation or teachers' interest in that subject. Mostly it has to do with too much to teach in too little time, and the push toward standardized test performance excellence. These tests do not assess students' knowledge of energy efficiency. (Perhaps they should.)

We discount the number of Irvine participants by an additional 0.75 factor. This factor is admitted arbitrary and probably conservative (*i.e.*, a lower number quite possibly represents the actual proportion of students who "fully participated" in PEAK.). Nonetheless, this value is more appropriate than not addressing the issue (an implicit discount value of 1.0) and less in need of rigid justification than a lower value. We hope that evaluation of the next years' program will address this issue with more certainty and, even more important, that the districts will address and resolve the problem.

The 8,450 students included 4,200 from Irvine. The 200 Irvine summer school participants are not discounted because these students clearly fully participated in the program. The 4,000 regular students are therefore reduced to 3,000, leaving a total number of 7,450 participating students.

This value of 7,450 is then multiplied by the 63.8% ratio to estimate that 4,753 parents presumably heard about energy conservation from their PEAK students. (Note that this value is not further discounted by the Coalition's reduction figure to account for multiple-student households. It only takes one sibling to tell the parents for the message to get through.)

Based upon the stipulated per-household savings, the 4,753 "fully informed" households achieve 2,851,800 kWh/year and 142,590 therm/year in electric and gas energy savings. They reduce peak demand by 260 kW.

Compact Fluorescent Lamps

The Six Cities Energy Project's goal was to distribute 8,000 CFLs through the PEAK program. Savings were directly attributed to these lights, and these savings were additional to the savings achieved through various other measures implemented by the PEAK students in their homes.

Ex-Ante *Evaluation*. Based upon data received from The Energy Coalition, the distribution results are as follows:

School District	# CFLs distributed
Irvine	6,400
Desert Sands	2,410
Santa Monica-Malibu	2,400
Moreno Valley	250
Total	**11,460**

The per-unit parameters listed in the spreadsheet for these CFLs are the same as those listed in the "Lighting Measures" chapter, and we concur that there is no reason to distinguish between the two methods of distributing the bulbs. The e*x-ante* and "near-*ex-post*" evaluations for these CFLs are discussed in much greater detail in the "Lighting Measures" chapter of this report. The follow discussion relies upon many of those details.

The demand reduction per unit (CFL) listed in the CPUC spreadsheets is 0.075 kW, with estimated annual hours of operation at 1,460 per unit. The annual energy savings per unit is stipulated at 110 kWh, for a total gross savings goal of 825,000 kWh/yr. The total *ex-ante* gross annual electricity savings of 11,460 CFLs is 1,260,600 kWh with a connected load reduction of 563 kW.

The assumed net-to-gross ratio is 0.8 and the measure useful life is 5 years. The net annual savings are 1,008,480 kWh, and 1,188 kW. Over the five-year useful life this amounts to 5,042,400 kWh.

"*Near*-Ex-Post" *Evaluation*. The "Lighting Measures" chapter discusses a number of studies regarding the operating hours of CFLs provided through energy efficiency programs. These values tended to range around 4 hours per day, although Aloha's survey of tune-up participants provided a customer-reported average of 6.5 hours per day. The PEAK students represent a much more generic housing stock than do the tune-ups. Therefore, we will use the 4 h/day operating estimate to assess the energy savings of the CFLs, rather than the 6.5 h/day used for CFLs installed in tune-ups.

We also believe that the 80% installation rate[10] observed in various other utility CFL distribution programs is appropriate. The assumptions result in an energy savings estimate of 80 kWh/yr per CFL distributed.

The 11,460 bulbs distributed through the PEAK program result in an annual energy savings estimate of 916,800 kWh. This is lower than the *ex-ante* estimate because we reduced the per-bulb savings estimate from 110 kWh to 80 kWh, primarily to account for the non-installation of 20% of the bulbs. It is higher than the goal because the extra bulbs distributed more than compensated for the reduced per-bulb savings.

Demand Reduction. It is important to note that the total connected load power reduction achieved through the lighting retrofits is *not* the coincident peak load reduction. There is an implicit demand reduction of 0.3 watt/kWh in the *DEER Update Study*.[11] The 916,800 kWh/yr estimated to be saved by the CFLs results in a demand reduction estimate of 275 kW based upon the DEER's demand reduction to energy savings ratio.

This value is much less than the value derived from the spreadsheet (*ex-ante*) but that value is presented as a connected load reduction and does not take into account the coincidence factor of actual light operation.

[10] This is not the same as the net-to-gross ratio. The 80% installation rate means that 4 out of 5 bulbs distributed is actually installed in a lamp, while the fifth bulb sits on a shelf. The 0.8 net-to-gross ratio means that one out of five customers who received bulbs would have actually gone out and bought them at full price had the program not been in place. The fact that both of these numbers are estimated at the same 80% value is a coincidence.

[11] This value can be determined by dividing demand reductions by energy savings for the various lighting types listed on p. 117 of Chapter 6.

School District Benefits

This section of the report deals with the evaluation of the Saving Energy at School (SEAS) component that involved students in managing school energy use. Furthermore, evaluation of additional technical services and funding provided by The Energy Coalition to the school districts will also be discussed. These components were implemented in the three school districts participating in the PEAK program and will be implemented in Moreno Valley. Information gathered from the Energy Coalition and personnel interviews combined to give an accurate evaluation of the benefits gained by each school district.

For each of the three participating school districts, [The Energy Coalition] assumes that each will cut its overall use by an average of 5% for a five-year period. [The Energy Coalition] projects that each of the three school districts will invest $50,000 during the program to save 300,000 gross kW annually, and 35 average kW, while also realizing gas savings on the order of 15,000 therms annually as well through the concentration of effort on effective energy management.[12]

Ex-Ante *Evaluation*. The primary means of analyzing the school district energy savings is defined by the program's ability to secure the total quantity of school districts it set out to reach. The implementation plan stipulated that three school districts would participate in the program. With the late addition of Moreno Valley Unified School District, the final quantity totaled four districts. However, the MVUSD was added so late in the program that it will not have any actual affect on school operations. It surely will achieve savings during the next program year.

The demand reduction per unit (school district) was stipulated at 102.74 kW, with 2,880 estimated annual hours of operation per unit. The annual energy savings per unit is stipulated at 300,000 kWh and 15,000 therms. The three school districts result in a total annual savings of 900,000 kWh and 45,000 therms, and a total load reduction of 308 kW.

The net-to-gross ratio is 0.8. Therefore, the total annual savings of the three school districts is 720,000 kWh, with an annual savings of 36,000 therms. Over a five-year period, this translates to 3,600,000 kWh of energy savings, and 180,000 therms.

"*Near*-Ex-Post" *Evaluation*. The validity of the per-district savings assumptions was not assessed other than to review them for reasonableness. We consider them reasonable averages, although clearly understand that the savings in any given district will depend upon that district's usage, efficiency, and implementation, including the number of schools at which the effects were implemented.

The school district savings are achieved through three groups of people – students, faculty, and staff. In general, staff, including facilities personnel, have primary responsibility for energy conservation. One of the goals of PEAK is to bring the students

[12] *Revised Program Implementation Plan*, p. 13

and faculty into this process. To that extent, savings are achieved primarily at the individual schools at which PEAK instruction takes place.

However, the PEAK program also includes working closely with facilities personnel at the district level. Clearly energy awareness induced within these personnel will translated into savings at all of the schools, including those not participating in the PEAK program, and even including those schools located outside the city limits of the participating cities. Providing energy savings estimates at the individual school level is more complex than it might first appear and was not part of this evaluation.

Aloha Systems conducted interviews with various operational personnel as part of the evaluation process of school district benefits. Interviews were conducted face-to-face with personnel from two of the three school districts. These interviews included an operations manager and a district coordinator of curriculum. Notes from these interviews are included in the final subsection of this chapter.

All participants were asked a total of ten pre-determined questions which served as a guideline for the interview. Although some questions were pertinent to their district's PEAK activity, some questions such as PEAK milestones and recommendations were asked to everyone. The interviews touched on a variety of issues relevant to the benefits gained from participation in the program.

From these interviews it is clear that PEAK does affect district-wide and facilities department operations. Thus we report *ex-post* savings that are equivalent to the *ex-ante* savings. We believe that additional and more detailed analysis of the actual school savings may be warranted in future evaluations.

The power reduction values listed in the *ex-ante* savings are not coincident peak demand savings, but rather multipliers used in the spreadsheet that are roughly equivalent to "connected load" of an energy-using device. We believe that the 35 kW demand reduction per school district is reasonable, and therefore assign the *ex-post* demand savings the same 105 kW reduction as the goal.

PEAK Student Responses

Aloha Systems contacted staff members listed as PEAK teachers and/or coordinators from the Santa Monica-Malibu, Irvine, and Desert Sands Unified School Districts to help facilitate the distribution of 800 student surveys among the three districts. Kathy Marvin, a PEAK teacher for Irvine Unified School District, helped distribute 200 surveys to students at Northwood and Brywood Elementary Schools. Tammy Kemp, a PEAK Coordinator for Desert Sands Unified School District, distributed 300 surveys to students at Lincoln Middle School. Linda Cady, a PEAK teacher at John Adams Middle School in the Santa Monica-Malibu Unified School District, also helped distribute 300 surveys to PEAK students at her school. The results are individually significant given the diversity of grade levels surveyed.

Student Response - by District

A total of 439 students completed and returned their surveys to their teacher. This table shows the percentage summary of surveys received from their respective district.

Which school district are you from?					Survey Size: 439
Summary			Percentage Summary		
IUSD	DSUSD	SMMUSD	% IUSD	% DSUSD	% SMMUSD
160	114	165	36.4%	26.0%	37.6%

Students Grade Levels

From the 439 surveys received, 50% of the respondents who answered this question were 5th graders.

What grade are you in?									Survey Size: 439
Summary					Percentage Summary				
4th	5th	6th	7th	N/A	% 4th	% 5th	% 6th	% 7th	% N/A
52	219	1	163	4	11.8%	49.9%	0.2%	37.1%	0.9%

Student Grade Levels - by District

The teachers who helped distribute the surveys within their respective district were asked to randomly distribute the surveys to students who had completed a PEAK curriculum. No other guidelines were given.

What grade are you in?						Survey Size: 439
District		4th	5th	6th	7th	N/A
IUSD	Summary	52	106	0	0	2
	% Summary	32.5%	66.3%	0.0%	0.0%	1.3%
DSUSD	Summary	0	113	0	0	1
	% Summary	0%	99.1%	0%	0%	0.9%
SMMUSD	Summary	0	0	1	163	1
	% Summary	0%	0%	0.6%	98.8%	0.6%

Student Understanding of Energy Conservation after PEAK Class

From the 439 surveys received, 78% of the students said they understand what energy conservation is after taking the PEAK class. Because the survey was given after the students had already completed the PEAK class, we did not feel that meaningful information would be obtained regarding students energy conservation knowledge before taking the class.

Do you understand what energy conservation is after taking the PEAK class?					Survey Size: 439
Summary			Percentage Summary		
Yes	No	N/A	% Yes	% No	% N/A
344	34	61	78.4%	7.7%	13.9%

Student Understanding of Energy Conservation after PEAK Class - by District

In regards to energy conservation, students were asked a “yes” or “no” question regarding their level of understanding after taking the PEAK class. Although the overall percentage was 78, when analyzed by district, SMMUSD ranks first with 94%. Second with 86% is IUSD. Although DSUSD had a low “yes” response of 45%, it still outweighs the “no” response of 11%.

Do you understand what energy conservation is after taking the PEAK class?						Survey Size: 439
	Summary			Percentage Summary		
District	Yes	No	N/A	% Yes	% No	% N/A
IUSD	138	13	9	86.3%	8.1%	5.6%
DSUSD	51	13	50	44.7%	11.4%	43.9%
SMMUSD	155	8	2	93.9%	4.8%	1.2%

Student Enjoyment of PEAK Program

Out of the 439 respondents, 64% of the students enjoyed participating in the PEAK program.

Did you enjoy participating in the PEAK program?					Survey Size: 439
Summary			Percentage Summary		
Yes	No	N/A	% Yes	% No	% N/A
283	89	67	64.5%	20.3%	15.3%

Student Enjoyment of PEAK Program - by District

Overall, students in their respective district indicated that they enjoyed the PEAK program. All positive responses outweighed the small percentage of negative response which ranged from 11% to 32%. Positive response ranged from 43% to 79%.

Did you enjoy participating in the PEAK program?						Survey Size: 439
	Summary			Percentage Summary		
District	Yes	No	N/A	% Yes	% No	% N/A
IUSD	127	23	10	79.4%	14.4%	6.3%
DSUSD	49	13	52	43.0%	11.4%	45.6%
SMMUSD	107	53	5	64.8%	32.1%	3.0%

Student Willingness to Tell Family Members about Conservation

Out of the 439 respondents, 64% said they have told someone in their family about the importance of energy conservation.

Have you told anyone in your family about energy conservation? Survey Size: 439					
Summary			Percentage Summary		
Yes	No	N/A	% Yes	% No	% N/A
280	127	32	63.8%	28.9%	7.3%

Student Willingness to Tell Family Members about Conservation - by District

Analyzed by district, with a 87% positive response, the students at John Adams Middle School in the SMMUSD are more willing to tell family members about energy conservation. On the other hand, the students at Lincoln Middle School in the DSUSD are not as willing to tell family members. They had a greater percentage of negative response with 44% versus the 35% positive response.

Have you told anyone in your family about energy conservation? Survey Size: 439						
	Summary			Percentage Summary		
District	Yes	No	N/A	% Yes	% No	% N/A
IUSD	96	59	5	60.0%	36.9%	3.1%
DSUSD	40	50	24	35.1%	43.9%	21.1%
SMMUSD	144	18	3	87.3%	10.9%	1.8%

Student Willingness to Tell Parents/Guardians about CFLs

Out of the 439 responses, 66% of the students have told their parents/guardians about CFLs.

Have you told your parents/guardians about compact fluorescent lights? Survey Size: 439					
Summary			Percentage Summary		
Yes	No	N/A	% Yes	% No	% N/A
289	126	24	65.8%	28.7%	5.5%

Student Willingness to Tell Parents/Guardians about CFLs - by District

SMMUSD had the highest percentage of positive response with 79%. The students from Northwood and Brywood Middle Schools in the IUSD combined to reach 59% positive response. The students at Lincoln Middle School in the DSUSD responded with 56% telling their parents/guardians about CFLs.

Have you told your parents/guardians about compact fluorescent lights? Survey Size: 439						
	Summary			Percentage Summary		
District	Yes	No	N/A	% Yes	% No	% N/A
IUSD	94	59	7	58.8%	36.9%	4.4%
DSUSD	64	36	14	56.1%	31.6%	12.3%
SMMUSD	131	31	3	79.4%	18.8%	1.8%

Students Who Said Parents/Guardian Purchased CFLs

Out of the 439 responses, 61% of the students said their parents/guardians did purchase CFLs after learning about them from their son/daughter.

Have your parents or guardians bought any of these lights? Survey Size: 439					
Summary			Percentage Summary		
Yes	No	N/A	% Yes	% No	% N/A
268	150	21	61.0%	34.2%	4.8%

Students Who Said Parents/Guardian Purchased CFLs - by District

District response ranges from 52% to 68% of students who know their parent/ guardian purchased CFLs because of their involvement in the PEAK program.

Have your parents or guardians bought any of these lights? Survey Size: 439						
	Summary			Percentage Summary		
District	Yes	No	N/A	% Yes	% No	% N/A
IUSD	84	69	7	52.5%	43.1%	4.4%
DSUSD	72	30	12	63.2%	26.3%	10.5%
SMMUSD	112	51	2	67.9%	30.9%	1.2%

Students Who Told Friends about Energy Conservation

Out of the 439 responses, 36% said they have told their friends about energy conservation, while 59% said they have not.

Have you told any friends about energy conservation?					Survey Size: 439
Summary			Percentage Summary		
Yes	No	N/A	% Yes	% No	% N/A
160	258	21	36.4%	58.8%	4.8%

Students Who Told Friends about Energy Conservation - by District

When analyzed by district, DSUSD scores the highest positive response with 51%.

Have you told any friends about energy conservation?						Survey Size: 439
	Summary			Percentage Summary		
District	Yes	No	N/A	% Yes	% No	% N/A
IUSD	36	118	6	22.5%	73.8%	3.8%
DSUSD	58	43	13	50.9%	37.7%	11.4%
SMMUSD	66	97	2	40.0%	58.8%	1.2%

Students Who Told Friends about Compact Fluorescent Lights

Out of the 439 responses, 34% said they have told friends about CFLs, while 62% said they have not.

Have you told any friends about compact fluorescent lights?					Survey Size: 439
Summary			Percentage Summary		
Yes	No	N/A	% Yes	% No	% N/A
148	270	21	33.7%	61.5%	4.8%

Students Who Told Friends about Compact Fluorescent Lights - by District

By district, the students at Lincoln Middle School in the DSUSD scored the highest positive response with 48%.

Have you told any friends about compact fluorescent lights? Survey Size: 439						
	Summary			Percentage Summary		
District	Yes	No	N/A	% Yes	% No	% N/A
IUSD	44	108	8	27.5%	67.5%	5.0%
DSUSD	55	47	12	48.2%	41.2%	10.5%
SMMUSD	49	115	1	29.7%	69.7%	0.6%

Students Who Said Their Friends Bought CFLs

Given that 148 students said they have told their friends about CFLs, it seems as students who did not tell their friends about CFLs still answered this question with a "no" answer instead of circling "N/A." A general assessment would indicate that out of the 148 students who answered "yes" to the previous question, 100 students know that the friend(s) they told did buy a CFL, and that 48 students should have answered "no."

If [you told friends about CFLs], have any of your friends bought any of these compact fluorescent lights? Survey Size: 439					
Summary			Percentage Summary		
Yes	No	N/A	% Yes	% No	% N/A
100	161	178	22.8%	36.7%	40.5%

Students Who Said Their Friends Bought CFLs - by District

District responses range from 16% to 35% for students who said they know of friend(s) who bought CFLs.

If [you told friends about CFLs], have any of your friends bought any of these compact fluorescent lights? Survey Size: 439						
	Summary			Percentage Summary		
District	Yes	No	N/A	% Yes	% No	% N/A
IUSD	26	97	37	16.3%	60.6%	23.1%
DSUSD	40	14	60	35.1%	12.3%	52.6%
SMMUSD	34	50	81	20.6%	30.3%	49.1%

Student Energy Conservation at Home

Four-hundred and thirty-nine students responded when asked what they do at home to conserve energy. Altogether, 571 answers were received. Thirteen of those answers made up two percent of students who said they do nothing at home to conserve energy. Five percent of the students did not answer the question. Turning off the lights scored the highest number of answers with 55%.

What do you do at home to conserve energy?						Survey Size: 439	
	Turn off lights when leaving room	Turn off appliances	Minimize Energy Usage	Other	N/A	Do nothing to conserve energy	Gave more than one answer
Summary	314	82	66	67	29	13	104
% Summary	55.0%	14.4%	11.6%	11.7%	5.1%	2.3%	

Student Energy Conservation at Home - by District

When analyzed by district, it is interesting to note that SMMUSD had the highest "other" score with 17%. This may indicate that the students in this district have looked "beyond the box" to find unique ways in reducing energy spending at home.

What do you do at home to conserve energy?							Survey Size: 439	
District		Turn off lights when leaving room	Turn off appliances	Minimize Energy Usage	Other	N/A	Do nothing to conserv e energy	Gave more than one answer
IUSD	Summary	134	37	28	18	3	4	49
	% Summary	59.8%	16.5%	12.5%	8.0%	1.3%	1.8%	
DSUSD	Summary	63	10	6	9	21	5	0
	% Summary	55.3%	8.8%	5.3%	7.9%	18.4%	4.4%	
SMMUSD	Summary	117	35	32	40	5	4	55
	% Summary	50.2%	15.0%	13.7%	17.2%	2.1%	1.7%	

Student Energy Conservation Activities at School

Out of the 439 surveys received, 33% of the students said they turn off the lights to help conserve energy at school. A large majority of the students gave an "other" response. The top two "other" responses were recycling and using energy efficient technologies such as motion sensors or solar panels; 35% of the students did not answer this question.

What do you do at your school to conserve energy?							Survey Size: 439
	Turn off Lights	Turn off Computer	Conserve water	Decrease A/C usage	Other	N/A	Gave more than one answer
Summary	157	36	2	15	100	166	32
% Summary	33.0%	7.6%	0.4%	3.2%	21.0%	34.9%	

Student Energy Conservation Activities at School - by District

When analyzed by district, turning off the lights was the number one answer students gave in all three districts. Students in the DSUSD and the SMMUSD were less likely to answer this question indicated by the 44% and 49% "N/A" results.

What do you do at your school to conserve energy?								Survey Size: 439
District		Turn off Lights	Turn off Computer	Conserve Water	Decrease A/C usage	Other	N/A	Gave more than one answer
IUSD	Summary	86	19	1	12	38	30	19
	% Summary	46.2%	10.2%	0.5%	6.5%	20.4%	16.1%	
DSUSD	Summary	35	11	1	3	14	50	0
	% Summary	30.7%	9.6%	0.9%	2.6%	12.3%	43.9%	
SMMUSD	Summary	36	6	0	0	48	86	13
	% Summary	20.5%	3.4%	0.0%	0.0%	27.3%	48.9%	

PEAK Student Comments

Home and School Conservation

The following comments were accumulated from answers the students gave to the questions "What do you do at home to conserve energy?" and "What do you do at your school to conserve energy?" They have been sorted by district and their respective school and have been paraphrased.

Comments - IUSD, Northwood Middle School

At Home

- I turn off the water when I leave the room
- I use candles more than electricity
- I don't keep the refrigerator open too long
- Instead of lamps I use flashlights and for TV I use puppets

At School

- Our school has automatic lights!
- Our school lights turn off after 5 minutes if you sit still
- If my teacher tells me to turn off the lights, I turn them off
- We only turn one switch on for the classroom
- I don't use the automatic pencil sharpener
- I sharpen pencils with my teeth

Comments - IUSD, Brywood Middle School

At Home

- I unplug things if I'm not using them
- I have a timer on my washer
- Use Energy Star light bulbs and turn off lights
- We use compact fluorescent lights
- I turn off lights when not using them. I also turn off the water switch

- I don't play with the light switches
- We don't turn on the air conditioner when we don't need it
- We are very careful now
- I remind my brother to turn off his room's light when I catch him forgetting
- We turn appliances off when done, and don't use electricity too much
- We only use air conditioning when it's really, really hot

At School

- I recycle at school to conserve energy
- We have a power monitor
- I use mechanical pencils so I don't use electric pencil sharpener
- We throw garbage away
- We don't use all the lights

Comments - SMMUSD, John Adams Middle School

At Home

- I don’t watch as much TV as I used to
- We don’t use all the lights in the classrooms
- My mom bought some new lights to save energy
- We use compact lights in our home
- I hit my brother if he doesn’t turn the lights off
- I tell my family to save energy
- We recycle our cans at home
- Tell my sister to save electricity
- Use CFLs at home. Do PEAK at school
- Play outside more now that’s its warmer
- Turn off water
- I tell my family to try to use the things less
- We use energy saving light bulbs, but the fluorescent light is very dreary and not very bright
- Stop watching t.v. and playing video games as much. We did a project about it
- Turn off TV when not using it

- We switched light bulbs. Not leaving the lights on during the day while at school
- I don't watch TV till 4:00pm anymore because in my house we watch a lot of TV and it's not good
- My parents tell me to ride my bike
- My mom and dad do
- We walk to school to save gas
- My mom wants an Energy Star refrigerator

At School

- My teacher uses only half of the lights
- We're not allowed to touch the lights in the classroom
- Teachers control everything in the school.
- We participate in the PEAK project
- We learn about saving energy
- I learned how to save energy and money
- We open the blinds instead of all the lights on
- We use those weird lights
- Do the PEAK stuff
- Recycle
- Use fluorescent lights at home and school
- Learn about watts
- Use fluorescent lights at school
- Learn about electricity
- Do homework at school instead of home
- Turn off a faucet if it is not in use and it's on
- Do the PEAK project every year
- Turn off lights, use CFLs and learn about conservation
- Nothing, the teacher does it
- We use super bulbs
- At school, don't have a lot of things plugged in
- I tell the teacher to not have all the lights on
- We use solar panels at our school

PEAK Parent/Guardian Response

In order to analyze the market transformation success of the PEAK program, Aloha Systems surveyed the parents/guardians of the students who participated in the PEAK curriculum. Parent surveys were distributed to the students to give to their parent/guardian. Out of 800 surveys that were sent out, Aloha Systems received 181 responses.

Parent Response - by District

The response from each district varied significantly.

Where did the survey come from?					Survey Size: 181
Summary			Percentage Summary		
IUSD	SMMUSD	DSUSD	% IUSD	% SMMUSD	% DSUSD
0	121	60	0%	66.9%	33.1%

Parent Understanding of Energy Conservation before PEAK

A total of 181 parents/guardians answered this question regarding their level of energy conservation understanding pre-PEAK. In this rating system, "1" designates low, and "10" designates a high level of understanding.

Before your child's participation, your understanding of energy conservation was ___? Survey Size: 181											
RATING	1	2	3	4	5	6	7	8	9	10	N/A
TOTAL	20	5	6	11	28	24	18	31	10	9	19
AVERAGE: 5.74											

Parent Understanding of Energy Conservation before PEAK - by District

A total of 43 parents/guardians in DSUSD answered this question regarding their level of energy conservation understanding pre-peak. In this rating system, "1" designates low, and "10" designates a high level of understanding. A total of 119 parents from SMMUSD answered this question.

Before your child's participation, your understanding of energy conservation was____? Survey Size: 181													
	1	2	3	4	5	6	7	8	9	10	N/A	Total	Average
DSUSD Summary	13	2	2	5	3	4	3	5	2	4	17	43	**4.67**
SMMUSD Summary	7	3	4	6	25	20	15	26	8	5	2	119	**6.13**

Parent Understanding of Energy Conservation after PEAK

A total of 181 parents/guardians answered this question regarding their level of energy conservation understanding post-PEAK. In this rating system, "1" designates low, and "10" designates a high level of understanding.

After your child's participation, your understanding of energy conservation is ___? Survey Size: 181											
RATING	1	2	3	4	5	6	7	8	9	10	N/A
TOTAL	10	1	1	3	10	6	19	34	41	33	23
AVERAGE: 7.70											

Parent Understanding of Energy Conservation after PEAK - by District

The parents understanding of energy conservation after the Peak Program rose according to the average when compared with the average before their child's participation in the Peak Program.

After your child's participation, your understanding of energy conservation is ____? Survey Size: 181													
	1	2	3	4	5	6	7	8	9	10	N/A	Total	Average
DSUSD Summary	10	1	1	4	4	1	4	4	4	10	21	43	**5.88**
SMMUSD Summary	0	0	0	3	6	5	15	30	37	23	2	119	**8.24**

Parent Behavioral Changes at Home

From the 181 surveys received, 80% have made behavioral changes resulting in energy conservation, 16% have not made any changes.

Have you made any behavioral changes in your household resulting in energy conservation? Survey Size: 181					
Summary			Percentage Summary		
Yes	No	N/A	% Yes	% No	% N/A
144	29	8	79.6%	16.0%	4.4%

Parent Behavioral Changes at Home - by District

From the surveys received from the DSUSD district, 63% have made behavioral changes resulting in energy conservation, 25% have not made any changes. At SMMUSD district 88% have made changes, while 12% have not made any changes.

Have you made any behavioral changes in your household resulting in energy conservation? Survey Size: 181						
	Summary			Percentage Summary		
District	Yes	No	N/A	% Yes	% No	& N/A
DSUSD	38	15	7	63.3%	25.0%	11.7%
SMMUSD	106	14	1	87.6%	11.6%	0.8%

Parents Who Changed Old Light Bulbs to CFLs

From the 181 surveys received, 73% have changed incandescent light bulbs to compact fluorescents, while 26% have not changed.

Have you changed any of your incandescent light bulbs to compact fluorescents?					Survey Size: 181
Summary			Percentage Summary		
Yes	No	N/A	% Yes	% No	% N/A
133	47	1	73.5%	26.0%	0.6%

Parents Who Changed Old Light Bulbs to CFLs - by District

From the 60 surveys from DSUSD district, 72% have changed incandescent light bulbs to compact fluorescents, while 28% have not. From the 121 surveys from SMMUSD district, 74% have changed incandescent light bulbs to compact fluorescents, while 25% have not changed.

Have you changed any of your incandescent light bulbs to compact fluorescents?						Survey Size: 181
	Summary			Percentage Summary		
District	Yes	No	N/A	% Yes	% No	% N/A
DSUSD	43	17	0	71.7%	28.3%	0.0%
SMMUSD	90	30	1	74.4%	24.8%	0.8%

PEAK's Impact on Parent's Home Energy Efficiency

From the 181 surveys received, 80% believe their child's participation in the PEAK program has made their home more energy efficient. 13% answered "no."

Do you believe your child's participation in the PEAK program has made your home more energy efficient?					Survey Size: 181
Summary			Percentage Summary		
Yes	No	N/A	% Yes	% No	% N/A
144	24	13	79.6%	13.3%	7.2%

PEAK's Impact on Parent's Home Energy Efficiency - by District

From the 60 surveys from DSUSD district, 58% believe their child's participation in the PEAK program has made their home more energy efficient, while 22 % answered no. From the 121 surveys from SMMUSD district, 90% believe their child's participation in the PEAK program has made their home more energy efficient, while 9% answered no.

Do you believe your child's participation in the PEAK program has made your home more energy efficient?						Survey Size: 181
	Summary			Percentage Summary		
District	Yes	No	N/A	% Yes	% No	% N/A
DSUSD	35	13	12	58.3%	21.7%	20.0%
SMMUSD	109	11	1	90.1%	9.1%	0.8%

Parent Opinion on PEAK's Importance at School

From the 181 surveys received, 93% think energy conservation is an important subject for student to learn at school, while 5% don't think so.

Do you believe that energy conservation is an important subject for a student to learn in school?					Survey Size: 181
Summary			Percentage Summary		
Yes	No	N/A	% Yes	% No	% N/A
169	9	3	93.4%	5.0%	1.7%

Parent Opinion on PEAK's Importance at School - by District

From the 60 surveys from DSUSD district, 90% believe energy conservation is an important subject for a student to learn at school, 5% answered no. From the 121 surveys from SMMUSD district, 95% believe energy conservation is an important subject for a student to learn in school, 5% answered no.

Do you believe that energy conservation is an important subject for a student to learn in school?						Survey Size: 181
	Summary			Percentage Summary		
District	Yes	No	N/A	% Yes	% No	& N/A
DSUSD	54	3	3	90.0%	5.0%	5.0%
SMMUSD	115	6	0	95.0%	5.0%	0.0%

Parent Willingness to Tell Friends/Relatives about Energy Conservation

From the 181 surveys received, 52% have told friends or relatives about energy conservation as a result of the program, 46% have not.

Have you or your student told any of your friends or relatives about energy conservation as a result of this program? Survey Size: 181					
Summary			Percentage Summary		
Yes	No	N/A	% Yes	% No	% N/A
94	83	4	51.9%	45.9%	2.2%

Parent Willingness to Tell Friends/Relatives about Energy Conservation - by District

From the 60 surveys from DSUSD district, 38% have told friends or relatives about energy conservation as a result of this program, 55% have not. From the 121 surveys from SMMUSD district, 59% have told friends or relatives about energy conservation as a result of this program, 41% have not.

Have you or your student told any of your friends or relatives about energy conservation as a result of this program? Survey Size: 181						
	Summary			Percentage Summary		
District	Yes	No	N/A	% Yes	% No	% N/A
DSUSD	23	33	4	38.3%	55.0%	6.7%
SMMUSD	71	50	0	58.7%	41.3%	0.0%

Parent Energy Conserving Activities at Home

From the 181 surveys received, 30% turn off lights when leaving room to reduce energy.

What have you done around the house to reduce energy use as a result of your child's involvement in the PEAK program? Survey Size: 181

	Install CFLs	Turn lights off when leaving room	Turn off appliances	Minimize energy usage or during off-peak hours	Water Con-servation	Install other measures	Adjust Heat & A/C	Other	N/A
Summary	49	100	37	8	6	7	6	15	39
% Summary	14.9%	30.4%	11.2%	2.4%	1.8%	2.1%	1.8%	4.6%	11.9 %

Parent Energy Conserving Activities at Home - by District

Both the DSUSD and SMMUSD district turning off the lights was the most common way the participants reduced energy around the house.

What have you done around the house to reduce energy use as a result of your child's involvement in the PEAK program? Survey Size: 181

District		Install CFLs	Turn off lights	Turn off appliances	Minimize energy usage / off-peak hours	Water Con-servation	Install other measures	Adjust Heat & A/C	Other	N/A	Gave more than one answer
DSUSD	Summary	12	13	8	0	4	2	0	3	28	6
	% Summary	28.6%	31.0%	19.0%	0.0%	9.5%	4.8%	0.0%	7.1%	N/A	
SMM USD	Summary	37	87	29	8	2	5	6	12	11	56
	% Summary	19.9%	46.8%	15.6%	4.3%	1.1%	2.7%	3.2%	6.5%	N/A	

PEAK Parent Comments

Home Conservation

The following comments were accumulated from answers the parents gave to the question "What have you done around the house to reduce energy use as a result of your child's involvement in the PEAK program?" All comments received were from the parents in the SMMUSD.

<u>At Home</u>

- I changed 60 watt bulbs to 15 watt bulbs
- "We have not only changed our light bulbs to fluorescents, but we are also more aware of how carelessly we leave on the lights or the TV. We are trying to turn things off the minute we don't need them. SO simple but it works!"
- I take shorter showers.
- I un-plug household appliances when not in use
- We got fluorescent lights which are actually quite cool!
- We reduced playtime on DVD game; installed vinyl windows
- We are shopping for new appliances
- Installed dimmers to reduce energy
- We're not using TV as night-light
- We use candles more often
- We unplug electronics/appliances that are not being used
- Watch less TV
- We changed some frequently used light bulbs for more energy efficient ones
- "Because of doing this my electricity bill went down."
- We have become more conservative
- We replaced 6 halogen bulbs with 60 watt energy saver bulbs in our kitchen and try to turn off the lights more often
- "We changed 5 incandescent light bulbs to compact fluorescents. All 5 members of our family are very aware of turning off the lights when we leave a room
- We have attempted to contact Southern California Edison for information on obtaining fluorescent light bulbs
- We have always been an energy conscious household as awareness of conservation heightened during & after PEAK program.

- "We've reminded our daughter that she can make a difference in our energy use by turning off appliances and lights when not in use -- and since she can read the electric bill, she's more likely to comply
- "I have worked with my children to turn the lights or appliances off in the house when they aren't in use
- Fortunately, we are all aware of saving energy…saving oil…saving money…saving our environment." "Please bring back an anti-litter campaign in the schools

PEAK Teacher Response

During the course of the PEAK survey process, it became evident that teacher's feedback was necessary in gauging the levels of success within the school districts. Although a teacher survey was not required as part of the evaluation plan, Aloha Systems decided to distribute a short questionnaire to teachers via email. This email was followed up with a letter sent by mail. Many of the responses vary in opinion. All names have been modified to hide their identity.

A list of PEAK teachers was received from The Energy Coalition and used to email a survey to all designated teachers in the Irvine, Desert Sands, and Santa Monica-Malibu Unified School Districts. All teachers received a voicemail notification to respond to the email survey. In addition, if we did not receive a response after two weeks, a follow-up letter was sent requesting their feedback to the survey.

A month after the initial surveys were sent, 22 teachers responded to our survey out of 128, or 17% of the survey pool. The following table gives the breakdown of responses by district:

District	# of teachers who received survey	# of teachers who responded to survey	# of schools per district	# of schools represented by teacher response
IUSD	87	13	23	9
SMMUSD	25	5	5	3
DSUSD	16	3	4	2
Unknown	0	1	0	0
Totals:	**128**	**22**	**32**	**14**

The feedback received from teachers was diverse and informative. Out of the 22 surveys received, 10 teachers mentioned they liked the program, while three stated they did not. Teachers liked the program for various reasons. The following excerpts are the most common answers received:

- "Brings excitement to new curriculum."
- "…found the curriculum very successful in helping students to understand electricity and magnetism."
- "…found the material very helpful."
- "I think it is a fantastic program."
- "Every time I would mention that we were going to do a PEAK lesson excitement would fill the room."
- "I feel the curriculum is more advanced than anticipated and the materials/supplies are very good to have."

The main cause for dislike of the program seems to stem from the lack of time teachers have in the classroom. Seven teachers out of twenty-two made a direct reference to this problem. Many seem so overwhelmed with reaching state standards and fulfilling other school requirements that they feel resentment when told to incorporate a new program. One teacher stated "Unfortunately there is a great deal of pressure from my district to stick with only the material in our textbooks in order to achieve high standardized test scores." In addition, some teachers seem to lack a sense of ownership of the program. In a certain school district, the program information is filtered through so many administrative channels that by the time PEAK reaches a teacher, it lacks direction, explanation, and a plan of action. One teacher said "The only time I remember hearing about PEAK was when the school secretary called all the 4th grade science teachers and said there is a bag of red t-shirts that say PEAK on them." Some teachers also lack the foundational knowledge to confidently and properly teach the PEAK lessons because science was never their forte.

In addition, the results also show 8 teachers feel the program encourages students to be more energy efficient; 7 teachers claim to be more energy efficient at home, while 3 teachers claim to be more energy efficient at school; 4 teachers said they have yet to start the program; and three teachers claim they were never involved in the program.

Requests for supplies were made by 5 of the 22 teachers. These requests may signify a breakdown of communication somewhere along the administration-to-teacher information trail. There seems to be a need to clarify correct administrative contacts for these teachers.

The following comments were accumulated from teacher response to the survey. All comments have been kept as originally sent by the teacher, however the names have been deleted and grammatical errors have been corrected.

Responses from Irvine Unified School District

IUSD #1
I am aware of the peak program and I think it is a fantastic program.

So much is being asked of teachers these days that it is hard to fit everything in.

The answer is yes, yes, yes. Students at this age are very impressionable and this will make a difference in our world. I do think this will encourage students to be more energy efficient. They are the energy police.

IUSD #2
Do you feel PEAK is successful?
Yes, though I was not the one who taught science at our grade level.

Do you have the time to implement the curriculum in its entirety or have you modified it to fit your schedule?
It was modified to fit the schedule.

Was the orientation helpful?
The orientations are always helpful.

Have you initiated energy saving activities at your school resulting from lessons learned from the PEAK program?
Yes, all computers are turned off every night, and on occasion we only use half the lights in the classroom.

Have you become energy efficient in your own home?
My wife and I do our best, we rarely use our heater, and do not light rooms we are not in. We also enjoy using candle light when we can.

What kind of energy conservation activities did you or your students participate in?
We used the computer program and discussed the usage of different appliances. We had discussions on how we can all conserve energy at home, and what can happen if we don't.

Do you think PEAK has encouraged students to be more energy efficient?
It has definitely made them more aware of using energy at home.

IUSD #3
I am not involved in this program. I think you were given my name by mistake.

IUSD #4

Are you aware of the term "PEAK" program (a.k.a. "electricity curriculum")? If so, what are your feelings regarding the program?

I was at a district wide training for 4th grade! Thank you for supplying the hands-on material!

What are the difficulties and/or advantages teachers face in adding a new curriculum?

Brings excitement to new curriculum. Finding time to actually integrate it and teach it.

Do you think students will become "ambassadors of energy conservation" if they learn about it in school?

Yes, and with parents support they are ambassadors as well.

Do you think PEAK will encourage students/teachers to be more energy efficient in their homes?

Yes! Thank you for the light bulbs given to each house hold and are excited to see if their monthly electric bill can be lowered.

Would it be possible to send us some more flashlight light bulbs? (15 more). The kids love the circuit unit but found several bulbs burned out.

IUSD #5

Are you aware of the term "PEAK" program (a.k.a. "electricity" curriculum)? If so, what are your feelings regarding the program?

Good Program, but hard to implement without the proper supplies.

What are the difficulties and/or advantages teachers face in adding a new curriculum?

Lack of supplies to do the labs such as batteries, light bulbs, magnets, wires, battery holders, etc.

Do you think students will become "ambassadors of energy conservation" if they learn about it in school?

Perhaps it must be reinforced at home by the parents.

Do you think PEAK will encourage students/teachers to be more energy efficient in their homes?

Perhaps, if they internalize the lessons. Maybe if they hear about conservation repeatedly, it will sink in.

IUSD #6

I am an elementary science teacher.

I teach an age-appropriate hands-on fourth grade unit in electricity, which includes discussions of the need for energy conservation.

I do not use PEAK as part of my program.

I am not impressed with the curriculum or the software.
I think it is invasive to ask parents to go over electricity bills with their children.
I applaud the interest in making students good energy consumers, but I do not believe that the PEAK program is worthy of the time and resources needed to implement it.

IUSD #7
I have not received the PEAK materials from the district and have not started the unit. I won't be able to answer your survey until the end of this trimester.

IUSD #8
I went to the program last year and found the material very helpful. The problem is that with the new science book, I don't have time to do the lessons that I had in the past. We are overwhelmed with testing and other requirements coming from everywhere. I will try to fit some of this material into our study of electricity.

IUSD #9
This year our 4th grade energy lessons fall in the 3rd trimester, so we have not yet implemented them. I am using the low energy light bulbs in my home, and our school is trying to be energy efficient by turning off room and hall lights when away from the room. I hope to apply parts of the curriculum in my classroom.

IUSD #10
I did not receive the materials for the PEAK program. I would like a copy of them so that I may include my students in the program. Thanks.

IUSD #11
The only time I remember hearing about PEAK was when the school secretary called all the 4th grade science teachers and said there is a bag of red t-shirts that say PEAK on them. I never went to go get them. I did however receive materials such as lights and software, but didn't know where they came from.

In Irvine there was a Science Specialist Program, but now regular classroom teachers have to teach science. The district finally bought these teachers books last year.

The teachers are not getting the most efficient communication from the district. The district and teaching staff haven't figured out who's doing what.

I think the difficulty in maintaining a program like PEAK is the fact that there is already so much curriculum.

I think the advantages are that IF it aligns to the science standards, then it would help. Also, schools have carry-over value with students, so whatever they learn in the classroom will also translate to their home.

IUSD #12

The PEAK program in my opinion is like a piece of gum you can't get off your shoe. It just won't go away due to ???? Maybe the funding it receives from ????

Do you feel PEAK is successful?
No the program is not "successful", as measured by ???

Do you have the time to implement the curriculum in its entirety or have you modified it to fit your schedule?
No, there was no extra time to implement the program with all the standards we do have to teach,

Was the orientation helpful?
What orientation?

Have you initiated energy saving activities at your school resulting from lessons learned from the PEAK program?
We save energy anyway but not as a result of the program.

Have you become energy efficient in your own home?
We have always been energy efficient at home.

Do you think PEAK has encouraged students to be more energy efficient?
NO

IUSD #13

PEAK is not fully integrated into the curriculum because teachers are driven by the standards set forth by the State. They don't have time because of all the standards they have to reach. We use the supplies provided by the PEAK program to incorporate when they are on a section such as "electricity," but basically we don't have time in the class to fully integrate it.

Responses from Santa Monica-Malibu Unified School District

SMMUSD #1

Do you have the time to implement the curriculum in its entirety or have you modified it to fit your schedule?

I am not sure by what is meant by entirety. We are working on this project as a long term science fair project here the students have to save energy over a 4 month period. We did not do any of the labs that went with the program though.

Was the orientation helpful?

Somewhat.

Have you initiated energy saving activities at your school resulting from lessons learned from the PEAK program?

No, only at the students' homes.

Have you become energy efficient in your own home?

Of course!

What kind of energy conservation activities did you or your students participate in?

Only the energy saving ones they do at home. Although there was an after school seminar done by one of our other teachers where we had students go around to businesses in Santa Monica and explain energy conservation. That was a great opportunity.

Do you think PEAK has encouraged students to be more energy efficient?

Yes, I think that they are more aware of their energy usage than before. I think that is the most important part is being more aware. Hopefully when they start paying the electric bill things will change too!

SMMUSD #2

I am not involved with this project. I have Earth Science Curriculum, and I have not ever been involved, I believe.

SMMUSD #3

Do you feel PEAK is successful?

I did PEAK last year and found the curriculum very successful in helping students to understand electricity and magnetism.

Do you have the time to implement the curriculum in its entirety or have you modified it to fit your schedule?

I have not received additional supplies to implement the program this year, but do not have time either.

Was the orientation helpful?
The orientation was VERY helpful. In addition, we were treated to a delicious meal and given a stipend for our time. These two components were helpful in getting me to the orientation after a long day of work.

Have you initiated energy saving activities at your school resulting from lessons learned from the PEAK program?
I am fortunate to have _____ who is a very active in addressing energy consumption at our school. I think it would be interesting if our school could implement some kind of program using only 1/2 the number of fluorescent light bulbs.

Have you become energy efficient in your own home?
Yes, I am much more conscious of the electricity decisions I make.

What kind of energy conservation activities did you or your students participate in?
We compared the different watts used by different appliances, but did not have time to do home monitoring.

Do you have an interesting story regarding PEAK?
Students were very amazed that they got free light bulbs and CDs. They also could not believe how much "energy efficient" light bulbs cost.

Do you think PEAK has encouraged students to be more energy efficient?
I think it helped my students become more knowledgeable about something they use everyday and help them understand that energy costs money/natural resources.

SMMUSD #4

Thank you for taking such an interest in following up on your program and showing such vigor in pursuing the results. Unfortunately, some of the names on your list are not involved with the program. At _____Middle School, we are aligned with the State of California Science Standards which has us teaching Life Science (basically biology) in the 7th grade. We do not cover any electricity, etc. Any email on this program I have immediately deleted because I am not involved. Unfortunately, the district just gave you all the science teachers names and emails. Can you please remove my name, [Teacher] name, and [Teacher] name since we all teach the biology curriculum?

SMMUSD #5

In regards to the PEAK program...I went to the training, I got paid, I got the materials including the CFL's and the software...but to be honest with you I have not been using the program with my students. I did an energy unit using other materials. I am not that great on the computer so I had one of the individuals (Blair) from last year come out and he tried to help me...so the end of the year hit and I only recently looked at the materials again. So there you have it....I just wanted to shoot straight with you, maybe next year I will dedicate myself to looking at the materials again.

Responses from Desert Sands Unified School District

DSUSD #1

My name is [Teacher] and I participated in the PEAK program last year at my school site in Palm Desert. The kids and I found the lessons and hands-on activities to be very engaging. The unit came with easy to follow lesson plans and a wealth of materials for each activity. Every time I would mention that we were going to do a PEAK lesson excitement would fill the room. Many of the parents mentioned that their children did put into practice many of the conservation ideas mentioned in the lessons within the classroom. This year I am not using PEAK because electricity is not a standard with the curriculum for my grade level. Unfortunately there is a great deal of pressure from my district to stick with only the material in our text books in order to achieve high standardize test scores.

DSUSD #2

I think PEAK is a great program. I feel the curriculum is more advanced than anticipated and the materials/supplies are very good to have. The curriculum is very complete and accurate and does a better job explaining electricity than most of her text books. Teacher education in science would be helpful because some teachers are afraid to teach a subject they do not know much about. I am looking forward to a big PEAK program in May.

In the DSUSD, 65% of the students are Hispanic and 12% speak other languages.

I recommend that instead of tape and wires supplied with the material packets, replace them with alligator clips. They are less messy and would make better connections.

DSUSD #3

Do you feel PEAK is successful?
Yes, it has a great unit that is aligned to the 4th grade standards.

Do you have the time to implement the curriculum in its entirety or have you modified it to fit your schedule?
No, I only teach the unit that pertains to our standards.

Was the orientation helpful?
Very

Have you initiated energy saving activities at your school resulting from lessons learned from the PEAK program?
Not yet

Have you become energy efficient in your own home?
Yes

What kind of energy conservation activities did you or your students participate in?
Changing light bulbs, turning off lights.

Do you think PEAK has encouraged students to be more energy efficient?
Yes

Response from Undetermined District

Unknown #1
1. It has increased awareness in students.
2. I modified to fit my schedule.
3. The orientation extremely helpful
4. We have already been focusing on energy savings at home
5. There is a greater use of fluorescent lights at home

Administrative Personnel Interview Response

Aloha Systems conducted interviews with various administrative personnel as part of the evaluation process of the PEAK program. Interviews were conducted face-to-face with personnel in each of the three school districts. They included interviews with principals and curriculum coordinators.

All participants were asked a total of ten pre-determined questions which served as a guideline for the interview. Although some questions were pertinent to their district's PEAK activity, some questions such as PEAK milestones and recommendations were asked to everyone. The interviews touched on a variety of issues relevant to PEAK's perceived status in these districts, its successes and roadblocks, and unique characteristics within each school district that set each one apart from the other. The following are summaries of those interviews:

INTERVIEW #1

After contacting multiple principals in the district, he seemed to be the only one that knew PEAK by name and that had a personal interest in meeting someone else who knew about the program. After meeting him, it turns out that he is working with (a teacher) and the facility operations director to facilitate PEAK's evolution into the classroom. He is planning a principal's meeting in April to get other schools on board with the concept.

Current Energy Conservation Activities

At the get-go, he mentioned that his school is starting a new recycling program. They are teaming up with a recycling group in a nearby city. His interest in this program and his embellishment of the topic gave me the feeling like I was some sort of all-encompassing environmentalist who was there to check up on all his "green" activities. He mentioned that the school has light sensors installed, and the computers are set up to shut down at 5:00 p.m.

Future Energy Activities

He said schools are usually wide open to ideas, and the principals have channels on campus to initiate new ideas into action. Programs that save money tend to have district support.

Electric Bill and Budget

He said that the school's electric bill goes to the district and that only recently he has seen copies of it. This district has a bilateral budget situation in that there are two budgets, yet neither budget can be used for the other. If the facility operations budget uses less money because of energy saving activities, that won't in turn add any monetary benefits to the classroom/teacher budget. He said with regard to saving money on the

school's electric bill, "the savings are not beneficially tangible to the school due to the way the budget is set up."

He mentioned that the governor may be able to change all this. Arnold wants to do some restructuring on the way education is funded.

Student Response

The biggest influence to a student's response is dependent on "the message they get from the teacher." A teacher's personal endorsement of a program can make or break the level of enthusiasm students will have for a particular subject.

Perceived Teacher Response

In this school district, many elementary schools had a budget for "appointed" science teachers. A student will typically stay with their primary "multiple subject" teacher for every subject, but will attend a special class with a science teacher who is fully capable of teaching the course. Because of current budget cuts, many multiple subject teachers have now had to include science into their curriculum…a feat many teachers are not capable of doing. This translates into teachers spending less time on science and more time on subjects they are more comfortable with. Add to this dilemma a PEAK course that focuses on teaching electricity, and you have yourself a program that will never get off the ground. This is a major "gap" in this district's educational system. To teach science well, you need a lot of time, energy, and background knowledge. Most science teachers in 4th, 5th, and 6th grade are lacking knowledge. Their focus has been elsewhere until the budget cuts forced them to teach science any way they can.

He also mentioned that many teachers who are aware of the PEAK program (aka "electricity course") may see it as only an optional teaching instrument and may not view it as a mandatory requirement.

A program like PEAK needs to be "cultivated" among teachers. There is not a widespread trait to willfully incorporate new protocols into their current curriculum.

Standards of Teachers

He mentioned that the demands on teachers are pretty high. There is an emphasis on State and Federal standards. This emphasis equals to pressure, which then translates to the principals. As a principal, in regards to the priority a program like this has, initial thoughts are "Are students going to reach standards…or cut energy costs?"

Principal Involvement / Outlook

A principal deals with a lot of variety in their job. They sometimes do not have the time to address "another" program that is trying to take root at their school.

He says that depending on the campus, some principals may see reluctance by the teachers to integrate this program.

Characteristic of City

This city has an interesting community. He has noticed some interesting observations:

- Parents planning college is an emphasis in elementary school
- At a certain level, the community must "look" good
- On a list of priorities, saving money on a light bulb is not very high.

Implementation Concerns of Principal

"How am I going to approach it without pushing people [teachers] over the edge?" That was a question he raised to me when I asked him his opinion on the best way to get teachers involved with PEAK. The teachers are already bombarded with standards. At the elementary school level, teachers nurture a classroom environment that is "good," they emphasis and teach qualities of sharing. These are things teachers don't want to do, but must address and deal with on a daily basis.

The fourth grade is where teachers need to lay the foundation for preparing the student to tackle the academic demands set forth by the State. All 8th graders must pass algebra before they move on. In light of a teacher's day, how will they be able to take PEAK on?

Electricity is introduced to students in the 4th grade. That's where the connection to PEAK can happen.

Recommendations

PEAK may "dovetail" with a pre-existing recycling program. The idea of having a separate "club" may thin out the current parent/volunteer pool. There are Community Service Clubs at certain schools in which parent volunteers help lead and direct energy conservation projects. Maybe PEAK can mesh with a club like this instead of trying to be a separate living entity. Schools are already strapped for extra clubs.

INTERVIEW #2

When I first spoke to this principal, she asked for an explanation of the PEAK program and afterwards said she needed to speak to the PEAK teachers first, then call me back. She followed-up the next day and said only one teacher remembered the orientation, and that none of them have implemented the curriculum. She said it sounds like a great program, but unfortunately the teachers don't have the time for it.

INTERVIEW #3

This interview was conducted with the principal and a school curriculum coordinator. The primary focus of the meeting was to hear their personal feedback on the PEAK program from an administrative point of view. They claim all 4th and 5th grade students are aware of the PEAK program in the schools designated as PEAK schools.

Cooperation of Energy Coalition

They stated that the Energy Coalition "bends over backwards to accommodate." New teachers who didn't have an opportunity to attend the PEAK Teacher Orientation were individually brought up to speed by Blair Anderson and Anastasia Beckett of the Energy Coalition. There are consistent email notices that keep everyone up to date on the latest news. On top of all this, they are most excited that the materials in the program "correlate to the standards" of the school district.

Umbrella of Conservation

The PEAK program "fits nicely into the umbrella" of other supplemental programs that already exist at each school. With programs feeding off each other, it gives new programs like PEAK a strong foothold to flourish with pre-existing program monitors.

ELD Curriculum Takes Priority

English Language Development (ELD) is a necessary facet of instruction at these schools in which 75% of its students qualify for "free and reduced lunch." A high percentage of students speak very little English and there is a great emphasis on improving their development in this area. Because of this, some teachers may not be able to teach certain lessons from the PEAK curriculum because they need to spend more time teaching basic language skills.

Recommendations

Literature components would be nice to tie the curriculum of PEAK with their "Accelerated Reader" program. The Accelerated Reader (AR) Program provides teachers and children a fun and exciting way to promote reading at home and in the classroom. A wide variety of books are marked with various colors in the school libraries to indicate that they are AR books. The colors designate their level of reading difficulty. Students may read AR books and take the associated ten question computerized test to earn points toward milestone incentives. In addition to students improving their language skills, AR can enhance what the PEAK program is teaching as well.

A privacy issue came up when the students were asked to bring in a copy of their parent's electric bill as part of the PEAK curriculum. Many parents objected to this request. "It's a "cultural thing." Some parents have falsified their addresses to have their children attend a certain school, while others simply do not trust this information in school hands.

Unique Qualities of PEAK

There is an "oh cool!" reaction from the students in regards to the free CFLs they received in their supply packets. It is also the first program that combines "education with fundraising." Two fundraisers were very successful because the students learned the long-term value of energy saving compact fluorescent lights, and in turn passed those savings along to those people who bought the CFLs in the community.

Conclusion

Overall, the program is fantastic. They summed it up best when they described the three characteristics they like best about the Energy Coalition and PEAK:

- Program is wonderful
- Very accommodating
- They do anything they can to get materials out there

INTERVIEW #4

I met with this principal and curriculum chairman to discuss their views on PEAK's success in their district. From the start, a feeling of confidence, enthusiasm, and pride was evident in the interview. With the city support, there is a special community attachment to this program. The energy crisis and blackouts experienced by California helped PEAK become a valuable commodity for this district. "If we can economize without affecting normal lives, it's an awakening for others to jump on board."

PEAK's curriculum is looked upon as an "addendum to what the teachers already do." How do you get real-world data, and how do you calculate data? You need to know more all the time. Through PEAK, they are able to take real-world science, calculate it, (which makes it more interesting), and compare it with each other. No other program has made a symbiotic connection between a math and science class until PEAK.

Characteristics of Student Population

This school has a 48% minority enrollment consisting of a high immigrant influx. Most of these students live in "rent control" communities in which the rent will never go up. This program makes a difference for these kids. The parents love the fact that teachers are getting the message out that energy conservation saves money and that learning can be fun and interesting. PEAK also takes learning one step further and helps teach kids fundamental real life issues. Though PEAK's community involvement, students are empowered by the program to act as the catalyst in recruiting small business owners into the program.

The students had a lot of fun in the small business tune-ups. The teachers found out that the kids were really nice, neat kids. Their interactions in the community were very pleasant. If PEAK wasn't there, they would have never had the chance to show that. They were given a unique opportunity and challenge, and rose to the occasion. This program also gives the city and school systems a mechanism to work together. The next step is to take the energy efficiency ideas home. This step has already been reached by many students.

Ryan is a student who told his family to make his home an "Energy Star" house. The house has since been retrofitted with energy-saving technologies and has saved lots of money.

Everyone at this school has "definitely bought into this whole thing." They believed in the integration of math and science. Connecting both classes through a "core meeting" makes coordinating the lessons very easy to do. Prior to PEAK, math teachers were using abstract numbers, not any more. Through the program, students are realizing "what makes sense." They are rearranging their rooms so lamp light is used more efficiently. They are also turning off their home computers when not in use.

School Changes

Many teachers are now only using a single bank of lights from the double-bank ballasts currently installed.

This school will be receiving solar panels as part of its successful participation in the PEAK program. It will be considered a "focus school" for others to follow. New meters will be installed on these panels to collect data for classroom use. "We have been the Energy Coalition's guinea pigs to try new things, and we enjoy that."

PEAK is a force for the science department as well as the whole school. This program has gotten the principal involved in the success of the program, its students, and the community. She has gone to some community events.

A determining factor in any program's success is answered by the question "What's the cost going to be?" Teachers can be very selective of programs. Although the school currently has three programs, they each work independently from each other, yet they are all scientifically based. Teachers have ownership of the new PEAK curriculum. They can pick and choose how to use the lessons to best suite their class.

Recommendations

More workshops are needed to help teachers understand how to incorporate PEAK into their lesson plans. Questions such as "How do you use it?" and "'How much time do you spend on it?" need to be addressed in order for teachers to feel confident in delivering its message to the students. Teachers also need to realize the cultural change element of PEAK. Once teachers get on board with PEAK's vision for change at school, home, and community, they will understand why it needs to start with them and their classroom.

Facilities/Operations Director Interviews

INTERVIEW #1

The purpose of this meeting was to gain an understanding of how PEAK took root and flourished in the district.

Initial Reaction

When he first heard about the PEAK program, his gut reaction was "I thought we were already doing this." It wasn't until a school board member insisted he meet with PEAK (Ted Flanigan) that he realized it was different than any other program he had encountered. In reviewing the program, he felt the main strength of PEAK was Ted's willingness to meet and help build a strong partnership of understanding and cooperation with the district. He also felt the Energy Coalition had "fortuitous timing" with its concept and the district's desire to kick energy conservation in gear.

Evolution of PEAK

During the first year of PEAK's inauguration, all the science specialists who taught fourth, fifth, and sixth graders were trained as PEAK teachers. During the second year, because of budget cuts, those science specialists were dropped and the classroom teachers had to take on the new challenge of teaching a subject they knew little about. In striving to keep the existence and success of PEAK alive and flourishing, these classroom teachers were then trained to incorporate PEAK into their lesson plans. Ted and his team helped train the faculty who would be responsible for implementing the curriculum. Ted recognized the strengths of the "high performing" district and hired people to expand it. Since completing its third year, the program has expanded to include a summer PEAK program involving 80 students, field trips, and PEAK clubs.

Administrative Standpoint

"Standards define curriculum" was the response given when asked the question "Are teachers so focused on the 'standards of the state' that they would be hesitant to incorporate PEAK?" He went on to say that since PEAK was customized to fit the science and math lessons, most teachers would find the curriculum and materials helpful in reaching the standards set forth by the state.

Thanks to the Energy Coalition…

He was extremely grateful for the behavioral information gained from data loggers courtesy of the Energy Coalition. He said that the data loggers were placed at strategic sites in the district. From the data, he learned that motion sensors were tripping

due to air conditioners, custodians were leaving the lights on, and hamsters would trip on the lights. He claimed his district now has a goal to cut its overall energy use by 10%.

Recommendations

The software doesn't give students the option of taking into consideration the costs associated with home appliances being plugged in or not. He said an item such as Nintendo have a plug that once inserted into the wall socket, will use up a considerable amount of electricity even when the machine is turned off. Many kids (and adults) don't realize this.

He is also concerned that the message is not broad enough. He feels it "needs to broader than turning off the switch." "Kids need to understand about other energy wasting things as well."

INTERVIEW #2

This meeting took place with two district personnel. They described the everyday operational problems they face in their desire to cut energy costs, and the importance of the PEAK program's unique watchdog and behavior-altering characteristics that enhance their district's cooperative efforts in helping reduce energy spending.

Energy Management Perspective

He described energy management as a "nightmare" in the district. The problem with trying to manage it is the fact that there is no one to manage it after hours. They are trying to get EMS systems in place, but the diverse behavioral issues at the school sites complicate the desire to pre-program operational times. One example of this is a heated pool that is used by four schools. Right now, they can't even get the last group who uses the pool to put the pool cover back on. They've had other companies look at the possibility of cogeneration systems, but that route did not appeal to them. They don't want to feel like guinea pigs. In regards to energy management, he mentioned that they don't want to fight small battles like coffee pots or inefficient microwaves. They want to fight hours of operation. He feels with the integration of the PEAK program, more students will "step-up to the plate" and be those "after-hour eyes" needed to pinpoint energy wastes.

Benefits Gained from PEAK

They were more than happy to show us the new data loggers they received from The Energy Coalition. They described how they will use the software to pinpoint energy wastes in their district and attack the problems head-on.

Importance of PEAK

At the Board of Education level, he said "when a kid stands in front of the board, it makes a huge impression." The board is more willing to listen and consider the recommendations made by a student presentation than a faculty member presentation. That is why PEAK is important. It gives students the knowledge that change needs to happen and they have the ability to make that change in their lives, their homes, the community they live in, and their school district. The program is also important to get kids influencing teachers.

Enthusiasm for PEAK

No one can dispute the excitement and enthusiasm he has for the PEAK program. When he talks about PEAK, the intensity in his voice changes as if he was describing the feeling of winning the lottery. This is the only program that actually ties student curriculum with operational goals. He feels all the positives largely outweigh any negatives the PEAK program has.

Operational Difficulties Faced

At the operational level, there is a big problem with attacking red-flag energy wastes when they occur. By the time the electric bills are evaluated, the activity that caused the red-flag may have ended. Also, because of the time it takes to analyze each school's energy usage, there are not enough hours in the day to analyze all the data beyond a superficial level. Many energy anomalies may not be detected. Lastly, he asked "How do we get the data to the source that's using it?"

Conclusion

Overall, they could not have said more to describe their enthusiasm for the PEAK program. It is a unique program that changes behavior. This change is what he feels will help his department combat the idleness people have felt in being energy conscious, and create a new sense of empowerment among kids and adults to make a difference and actively do something about it.

Municipal Facilities

Introduction

Municipal facilities were another prime focus of The Energy Coalition's 2002-2003 Six Cities Energy Project. The Energy Coalition assisted the various cities by helping them develop "energy plans" to reduce their city's energy use and costs in a way that was unique and custom-designed to their city. Information received from The Energy Coalition will be the primary means of analysis to evaluate the energy savings of the municipal facilities involved. This information includes product distribution information from events including community rallies and a design charrette workshop (some of which were attended by Aloha Systems personnel). Also, interviews with city government officials were conducted to assess the success of the initiatives in each city as well as provide recommendations for future growth of the program in their respective city.

"*The Energy Coalition and the Six Cities Energy Project partners will work with municipal facilities to cut energy use throughout city government, notably in city halls, as well as community centers, libraries, police and fire stations, etc. For the 2002-2003 program years, the Six Cities Energy Project has earmarked $20,000 per city to focus on municipal energy use and to work with public works officials and others on developing or revising each city's energy plans with a focus on energy efficiency and sustainable energy management. We assume that municipal government participation will result in an average savings of 2.5% over a five-year period for municipal facilities. Therefore we assume gross savings of 1,000,000 kWh per year per city for the larger four cities, and about 400,000 kWh each for Brea and West Hollywood, the much smaller Mentorship Program cities. This will also result in average net capacity savings of over 450 kW. We project gas savings of 250,000 therms per year*."[1]

Through The Energy Coalition's funding initiative, cities were able to stage mass distributions of compact fluorescent lights (CFLs), fluorescent torchieres and educational materials on a community-wide basis. In order to introduce the program to city personnel, The Energy Coalition held rallies and team leader meetings that initially distributed CFLs. At city-wide CFL sales and "Buck-a-Bulb" events, CFLs were made available to citizens and city staff for purchase at discounted prices. Fluorescent torchiere "trade-ins" encouraged citizens to bring their old, unsafe halogen torchieres to their local civic center and exchange it at no charge for a safer and more energy-efficient fluorescent torchiere. In some cases, personnel from The Energy Coalition and various cities visited senior centers to conduct informational sessions about energy conservation and distributed CFLs as well.

[1] The Energy Coalition. *The Six Cities Energy Project Revised Program Implementation Plan*. CPUC Program Reference #232A-02. Page 10.

The city of Brea held four city-wide CFL distribution events as well as torchiere trade-in events that exchanged older, inefficient torchiere models for new fluorescent ones. The city of Irvine staged three city-wide CFL events in which numerous CFLs were distributed to citizens because of The Energy Coalition's funding and involvement within the city. Some of Moreno Valley's citizens attended eight city-backed events in which CFLs and fluorescent torchieres were distributed. In addition, residents of Palm Desert participated in five community events that distributed CFLs and fluorescent torchieres. The city of Santa Monica sponsored four events in which CFLs were distributed to its residents. Finally, the city of West Hollywood backed a city-wide sale that distributed CFLs into the community. The lights provided through these events are evaluated as part of the "lighting measures" section.

Two cities went even further with their commitment to energy efficiency. Within the city of Brea, Energy Coalition funding allowed for two full-time employees to be allocated to the city's energy efficiency causes. Palm Desert created a new position in its governmental structure, the Department of Energy Management, which now handles all of the city's energy issues in one central position.

The Energy Coalition also assisted cities in becoming more energy-efficient in the project by sponsoring a "design charrette" workshop, held in February of 2003. The design charrette connected engineers knowledgeable about energy-efficient building measures with city planning officials, who were eager to incorporate new ideas into the development of new municipal facilities. At this event, Palm Desert officials incorporated several energy-efficient measures devised from their city's design charrette. They are currently in the process of completing their new civic center and have included lighting measures as well as solar panels and solar water heaters. The city of Palm Desert has also invested some of its own time and money into educating its employees about these new innovations as a result of the charrette. The other cities have also taken steps to utilize these design charrettes in the future design of their municipal buildings. Rob Prodonovich, Aloha Systems' vice president, attended the design charette and reported that it was well planned and provided a valuable information exchange.

Ex-Ante *Evaluation*. The primary *ex-ante* means of analyzing the municipal facilities energy savings is defined by the program's ability to work with the total quantity of municipal governments it set out to reach. The energy savings calculations of large cities are different compared to the energy savings calculations of smaller cities.

The implementation plan stipulated that four large cities would participate in the program. The Energy Coalition reached its goal with the following cities: Irvine, Moreno Valley, Palm Desert, and Santa Monica. The demand reduction per unit (large city) is stipulated at 342.47 kW, with estimated annual hours of operation at 4,380 per unit. The annual energy savings per unit is stipulated at 1,000,000 kWh, and 50,000 therms. Therefore the total *ex-ante* gross annual electricity savings of all four large cities is 40,000,000 kWh with a "load reduction" of 1370 kW. The annual gas savings is 200,000 therms.

The implementation plan also stipulated that two small cities would participate in the program. The cities of Brea and West Hollywood were enthusiastically brought on

board. Due to other priorities within the city of West Hollywood, had to withdraw itself from the program and could not continue participating in the 2004-05 extension. However, prior to that, West Hollywood was one of the most aggressive cities in addressing its own facilities. Through the program, the city was able to obtain a professional energy audit of its city hall and other facilities. The demand reduction per unit (small city) is stipulated at 171.23 kW, with estimated annual hours of operation at 4,380 per unit. The annual energy savings per unit is stipulated at 500,000 kWh, and 25,000 therms. Therefore the total *ex-ante* gross annual electricity savings of the two small cities is 1,000,000 kWh with a "load reduction" of 342 kW. The annual gas savings is 50,000 therms.

The total municipal savings therefore are 5,000,000 kWh/yr and 250,000 therms per year, with a "load reduction" of 1,712 kW.

The assumed net-to-gross ratio is 0.8 and the measure useful life is 5 years. The net annual savings are 4,000,000 kWh and 200,000 therms. Over the five-year useful life this amounts to 20,000,000 kWh and 1,000,000 therms.

Near-Ex-Post *Evaluation*. A detailed review of the energy savings attributed to municipal participation is clearly beyond the scope of this limited evaluation project. At one time there had been plans for more direct implementation within municipal facilities. These would have been measures such as lighting or HVAC improvements that would have resulted in measurable savings results. However, funds were found more useful in establishing personnel-oriented energy efficiency functions.

We did directly observe evidence that this has increased energy awareness in cities. Allocating staff resources to deal with energy efficiency brings knowledge, awareness, and focus to the efforts. Other city employees know who to ask, and the people they ask then know the energy efficiency information or at least where to find it. In the course of our evaluation project we have had the opportunity to meet many elected officials who gained new knowledge, interest, and enthusiasm about energy efficiency.

Events for city employees, such as providing CFLs for one dollar, were very well received. This generated an awareness of energy efficiency at all levels and in all departments within the local government. Many of the city's energy coordinators reported enhanced efforts to conserve within the city's own buildings. This is presumably carried out in employee homes as well.

The interest generated in city councils about enhanced energy efficiency codes for new construction could lead to substantial savings in the long term. Many of the participating cities are in high-growth areas. Moreno Valley and Palm Desert have both discussed requiring some portion of residential construction to have solar photovoltaic panels, giving builders incentives to install it, or passing ordinances that would limit the ability of homeowners' associations to restrict solar installations.

We believe the savings estimates for the "municipal facilities" are reasonable. If all aspects of indirect savings are accounted, the savings estimates may be low. If one were to limit estimated savings solely to hardware installations in government buildings, the estimates are high. A middle road approach seems appropriate, and we adopt these

estimates for our "near-*ex-post*" analysis. The *ex-post* estimates are the same as the *ex-ante* estimates for municipal facilities.

The power reduction values listed in the *ex-ante* savings are not coincident peak demand savings, but rather multipliers used in the spreadsheet that are roughly equivalent to "connected load" of an energy-using device. We believe that the 450 kW demand reduction discussed in the text is reasonable, and therefore assign the *ex-post* demand savings the same 450 kW reduction as the text's goal.

Evaluation Interviews. Aloha Systems staff conducted on-site interviews with city government officials in February of 2004. These interviews were designed to elicit the overall assessment of the Six Cities Energy Project in their cities. The questions were crafted to provide constructive criticism for the project. The questions also were used to garner helpful ideas for the future from the people who implemented The Energy Coalition's energy conservation plan directly. Two mayors as well as two team leaders were interviewed in Brea, Palm Desert, and Moreno Valley. Interviews with officials in the cities of Irvine, Santa Monica, and West Hollywood were not conducted for various reasons. One team leader's level of participation in Energy Coalition events within his city presented a conflict of interest, and another team leader responsible for his city's participation in this phase of the project was no longer employed by that city.

Interviews with mayors were specifically sought out as they are the policy setters for the city and were involved in the creation of a custom-fitted energy plan with their team leaders. Each city's team leader acted as a liaison between the city and The Energy Coalition. When crafting a city's energy plan, the team leader would assist the mayor and The Energy Coalition in custom tailoring the project to their specific needs. For example, Moreno Valley created the "PowerWise" logo. PowerWise represents not only the efforts of The Energy Coalition towards greater energy conservation, but also existing and future programs sponsored by the city of Moreno Valley to increase continuity in marketing events and tune-ups.

To sustain morale and recognize the efforts of the cities team leaders and mayors, The Energy Coalition named them "Energy Champions." The Energy Champions award program was designed to recognize and thank the people who made the Six Cities Energy Project work in each city. Special award functions were held to commemorate and highlight their contributions to this program. The "Energy Champions" logo has since evolved to recognize the unprecedented efforts of installation contractors, property managers, and all other people who have "gone beyond the call of duty" in promoting the Six Cities Program.

Full synopses of the interviews conducted are presented at the end of the following sections.

Savings Summaries. The following tables present summaries for the municipal facilities savings goals and the *ex-ante* and *ex-post* estimates. The "text" column presents the estimates contained within the Revised PIP document. The "goal" column presents the estimates from the PIP spreadsheet.

Electric Energy Savings, kWh/year				
Measure	**Goal (Gross)**	***Ex-Ante* (Gross)**	***Ex-Ante* % of Goal**	***Ex-Post* (Gross)**
Total Municipal	**5,000,000**	**5,000,000**	**100.0%**	**5,000,000**

Electric Demand Reduction, kW				
Measure	**Goal (Gross Connected)**	***Ex-Ante* (Gr Connected)**	***Ex-Ante* % of Goal**	***Ex-Post (Gr Coincident)***
Total Municipal	**450**	**1,712**	**100.0%**	**450**

Gas Energy Savings, therm/year				
Measure	**Goal**	***Ex-Ante***	***Ex-Ante* % of Goal**	***Ex-Post***
Total Municipal	**250,000**	**250,000**	**100.0%**	**250,000**

Indirect Benefits. A variety of indirect benefits were achieved by bringing civic leaders into the energy efficiency team. These benefits included:

- Civic leaders becoming vocal proponents of energy efficiency
- Government buildings becoming public examples of efficiency
- Councils considering stricter building codes or other benefits for incorporating enhanced energy efficiency into new construction
- City employees becoming energy evangelists
- Solar power being promoted within the cities.

The mayor of Moreno Valley is perhaps the most salient example. He has recently installed photovoltaic panels on the roof of his house. He is very proud of this and readily gives out his address for people to drive by and see them. His house is easy

to find. The panels are readily visible, yet at the same time they are well-designed and blend very well into the neighborhood. It is a true showcase for renewable energy and efficiency.

The mayor paid for this installation himself and undertook it on his own accord. We specifically asked the mayor what role the Six Cities Energy Project had in this decision to install solar panels. He explained that prior to the Coalition speaking to the city about the program he had no real knowledge or specific interest in energy efficiency. He became a convert through the program, learned more about the subject, about the other incentive programs for solar power, and about the importance of both conservation and renewable energy.

The mayor is vocal and charismatic and is an active businessman in the community as well. He is well respected and known. Through his enthusiasm others are in turn made aware of these subjects.

Interview Notes

City of Brea

Interview with Mr. John Beauman, Mayor and Mr. Eric Nicoll, Director of the Economic Development Department

Aloha Systems staff first started by explaining the purpose for the interview, and that Aloha was selected by the CPUC to do a "performance audit" on this program. Mr. Nicoll asked a few questions about the work that Aloha Systems does and then went on to explain how Brea became involved with the Six Cities project.

Background Information

Mr. Nicoll said Irvine recommended Brea to become involved. He met with Ted Flannigan and after their meeting he felt the program "was too good to be true." Eric was very skeptical that a state-funded program promoting energy efficiency would have a "direct benefit" to seniors and low-income families. "I was very excited, but in disbelief."

Through Brea's Economic Development Department, they knew exactly where to put the money, and had the full cooperation of the City Council and allocated two city employees to the project: Maggie Lee and Laura Halcom. Mayor Beauman felt that in order to have continuity within the city "a councilmember should be involved…. Sets a [positive] tone for the program by being involved." That is also why the program did not go through the Maintenance Department like other programs because it made more sense to show mayoral support with this program.

City Events

Mayor Beauman said the significance behind the October 2002 'buck-a-bulb" sale for city employees sale was the education. Every customer would receive a flyer explaining what it is and why it saves money and energy. If a resident allows these CFLs into their house now, they would be more willing to buy more in the future. "Until people start understanding why it's important, they will not change."

Without the Energy Coalition, the energy-efficiency renovation of a historical building (the police museum) would never have happened. This was an ideal time to benefit the public and the city. The Energy Coalition helped replace and upgrade fans and motion sensors. They went beyond scope of work as set forth by plan.

We note that the Brea Museum and Heritage Center was formally dedicated on July 2, 2004. The 74-year-old structure provides residents with a connection to their past but also serves as a model of energy efficiency. The remodeled museum has an HVAC system with a 14 SEER and even uses special CFLs in the original chandeliers.

Community Response

The seniors are fully behind the program. Mayor Beauman received a letter from one resident "raving" about the program. It was very complementary of city staff and the Energy Coalition's contractors. "Seniors compare notes. One letter is probably reaffirmed by others in the complex. This in turn means that one letter is fairly representative of one complex." The mobile home communities and senior apartment communities have greatly enjoyed the residential tune-ups. Feedback regarding residential tune-ups and the renovation of the police museum has been very positive.

Brea was the first city to roll out the small business program. Small business tune-ups needed a little more tweaking though, but according to Mayor Beauman "Brea was able to fix the problem and succeed." The way it was marketed was not well received. By telling small businesses that they will receive $1,000 in energy upgrades, business owners focused on the contractor reaching the incentive of $1,000 rather than on the energy efficiency upgrades they were receiving. They are very responsive to commitments. By "re-tooling" the marketing focus, it does not put a false impression that every business will receive exactly $1,000. They have "tuned-up the small business tune-up plan of action and will continue them."

City Personnel Response

Eric Nicoll likes the Energy Coalition's flexibility. "They have made energy districts that cater to the lower-income residents such as seniors and mobile home residents." Mr. Nicoll sees The Energy Coalition as an aggressive non-profit organization and likes it. The direct benefit to the residents and small business owners sets this program apart from any utility sponsored program.

Mr. Nicoll recommends for future funding that energy plans should be based upon a city's specific make-up and tailor programs that target those specific problem areas. They really like what they're doing for small business and residents, but mid-sized businesses are a large sector of the city's make-up. Brea wants to focus on more of the mid-sized businesses. Mr. Nicoll mentioned that "interestingly, mid-sized businesses get over-looked….we are looking at ways to address these mid-sized businesses," especially manufacturing centers. These businesses have three main concerns: workers' compensation insurance, labor, and energy costs. According to the mayor, most businesses have left California because of these three reasons. If Brea can help with energy costs and the legislation to lessen workers' compensation insurance costs, they can help prevent the businesses from moving elsewhere. Contact with these mid-sized businesses is top on Brea's priorities list.

Mr. Nicoll mentioned that Virginia Nicols, an Energy Coalition employee, has been extremely helpful in organizing and implementing Brea's programs. "She's also very helpful because she is bilingual." In regards to initiating action within the city, she takes on 80% of the lead, but the city is very receptive in taking on responsibility. She also doesn't just "pawn it off" to the city.

The mayor will highlight this program in his State of the City address. Mayor Beauman also mentioned that the city puts out a monthly newsletter called the *BreaLine*,

which supports incoming contributions. It highlights programs such as the Six Cities Energy Project, so more people can become involved. He said the program has been very well received. From the beginning, Mayor Beauman has felt this program was a good one and that everyone needed to be encouraged to participate.

PEAK Outlook

Brea has yet to get on board with the PEAK program. The Brea school board is independent of the city. Mayor Beauman said "we are two parallel cooperative spirits, but there is a total separation of powers." Due to staffing constraints, they did not get on board.

Future of the Program in Brea

In 1999-2000, Brea implemented most of its energy changes within the city's facilities. The City of Brea hopes to continue to expand this program and hold its first "Fluorescent Torchiere Trade-In" soon. Mayor Beauman feels that energy efficient upgrades "will be a lot easier for the next generation to make changes with the new technology." "It's a generational thing. Kids are more adept to new technologies….The younger generation will recycle."

City of Moreno Valley

Interview with Mr. Kevin M. Gaines, Management Analyst II

Aloha Systems personnel first explained the purpose for the interview with the various city officials to Kevin Gaines, and that Aloha Systems is an evaluation, measurement and verification (EM&V) contractor appointed by the CPUC as an independent third party to evaluate the Energy Coalition's Six Cities Energy Project. Mr. Gaines began the interview by explaining his capacity in facilitating Moreno Valley's involvement with the plan and where Moreno Valley stands.

Background Information

Mr. Gaines is a legislative analyst and manages the City of Moreno Valley's special projects. He was basically handed the project by the city's former mayor and current councilman, Bill Baitey. Kevin had no prior knowledge about the Energy Coalition or Moreno Valley's involvement in energy efficiency measures. He currently spends about 15% of his time on energy tasks by planning events, coordinating media communications of the program and its logistics, and fielding responses from the community[2].

The City of Moreno Valley quickly recognized the need not only for The Energy Coalition's program, but also for a city-backed "brand" of energy-efficient education. Moreno Valley created the "PowerWise" brand and logo to add their own touch so that the community would be more open to changing their attitudes and behaviors about energy efficiency, and also to have something that would last longer than the Six Cities Energy Project.

Municipal Facilities Planning

Moreno Valley is currently trying to get involved with the construction of new buildings in the area and would like to see more energy conscious development codes. Councilman Baitey has already outfitted his own home with solar energy photovoltaic cell panels to provide a visible example of Moreno Valley's commitment to energy conservation. Bill Baitey and Kevin Gaines hope that this type of energy efficient development will attract more affluent citizens to Moreno Valley. Mr. Gaines has been working with Dr. Mike Brown, a consultant to The Energy Coalition, to look for ways to ease energy conservation measures into the city's building codes. He also attended The Energy Coalition's Design Charrette workshop.

[2] Kevin Gaines has since been hired by The Energy Coalition to work as a full-time manager for the 2004-05 program.

City Events

Moreno Valley conducted three very successful fluorescent torchiere "trade-ins" at the city civic center. Due to the overwhelming response to the first two, Mr. Gaines decided to make the final event extend throughout one week in mid-February. Extensive marketing via flyers and MVTV public service announcements were made to promote these events. Mr. Gaines felt that while these events were successful, they consumed large amounts of his time.

In June of 2003, there were two energy workshops scheduled that were not successful. At each, only three citizens attended. Mr. Gaines called them "disasters." He felt that the marketing was lacking and that the flyers were too "artsy" and confusing to the community. However, Mr. Gaines would like to try these workshops again in the future and use the MVTV to mass market them.

Moreno Valley has also facilitated two "Buck-a-Bulb" sales for its municipal employees that were well received.

Community Response

A large portion of the Moreno Valley population watches MVTV, the community cable access channel run by the city. Mr. Gaines has found this a powerful marketing tool for the PowerWise program and has received feedback from people that say they like the flyers and MVTV announcements with specific reference to the energy efficiency programming.

Mr. Gaines has heard great things from the people who received residential tune-ups from The Energy Coalition's contractors. He stated the only complaint was the amount of time the contractors required from the residents. From the feedback he has received, Mr. Gaines felt that when people are tied to a specific city event or personal contact, they are more likely to encourage their friends, neighbors, and/or family to open their minds to energy efficiency education. Mr. Gaines had not received any feedback from participants in the small business tune-ups at the time of the interview in mid-February. Mr. Gaines stated that the city of Moreno Valley had given participating small businesses "Energy Champions" certificates and awards from the executive director of the Moreno Valley Chamber of Commerce.

City Personnel Response

Mr. Gaines said that the city workers were "fired up" and "jazzed up" about energy conservation and the "Buck-a-Bulb" sales. They refer to Mr. Gaines now as the "light bulb guy." The response has been positive to these events and the fluorescent torchiere trade-ins. Mr. Gaines felt that the city personnel were "inquisitive" and that many are residents of Moreno Valley so they have a personal stake in the success of the city's initiative. Mr. Gaines has also recruited some city staff to take part in MVTV programming and in making the public service announcements for PowerWise events. This has caused the city to devote more funding to programming of MVTV.

PEAK Outlook

Mr. Gaines stated Moreno Valley has four schools in one of its pre-determined energy districts, but they are not "too sold" on the whole project or the idea of energy districts, and there has been no real motivation for the PEAK program in these four pilot schools. As far as the school districts' facilities, they have had problems with rising energy costs before and sought out an energy services company (ESCO) for consulting. Currently, Moreno Valley School District is in litigation with the ESCO for problems arising with retrofits and thus it is hard to encourage further retrofits from another unknown entity such as The Energy Coalition.

Future of the Program in Moreno Valley

Mr. Gaines felt that this first round of The Energy Coalition's Six Cities Energy Project was great for introducing the concept to the community and city officials. He and the city council have begun to develop a comprehensive energy plan with new priorities. The first focus being to get the city government all organized with respect to the energy plan. The second new focus will be to use The Energy Coalition's grant where citizens live, i.e. in residential developments. Mr. Gaines said Moreno Valley would like to see more savings by tailoring the residential construction to residents of the hotter climate and also energy-efficient commercial development in the future. The final new focus will be greater city council involvement and making the Energy Coalition's project more known and supported among its members.

City of Palm Desert

Interview with Mr. Bob Kohn, Director of Special Programs; Director of Energy Management

Aloha Systems personnel first explained the purpose for the interview with the various city officials to Bob Kohn, director of Special Programs, and that Aloha Systems is an evaluation, measurement and verification (EM&V) contractor appointed by the CPUC as an independent third party to evaluate the Energy Coalition's Six Cities Energy Project. Mr. Kohn began the interview by explaining his capacity in facilitating Palm Desert's involvement with the plan and where the city stands.

Background

Bob Kohn oversees the city franchises and Palm Desert's stakes with SCE, Waste Management, cable companies, public art, community gardens, bus shelters and after school programs as well as field customer feedback. Mr. Kohn stated that about 25% of his time is spent on energy management duties and that all energy related matters are routed to him for review.

Palm Desert became involved with The Energy Coalition's Six Cities Energy Project in 2001 when Bob Johnson, a former staff person of The Energy Coalition, wanted to include cities with different climates in the program. The Palm Desert City Council approved the plan as did the people at the Public Works Department. Mr. Kohn is very pleased with the Coalition and stated that Palm Desert would never have been able to conduct the small business and residential tune-ups without its help, even if the city had the financial backing to do it.

Municipal Facilities Planning

Mr. Kohn stated that The Energy Coalition has been a tremendous help in the construction of the new phases of the Public Works building. With the help of the design charrette orchestrated by The Energy Coalition set up for the Six Cities Energy Project, Palm Desert has become much more supportive of mandated energy efficient design and development ordinances. Mr. Kohn has been able to brainstorm several areas in which Palm Desert can conserve energy in new buildings, including the new Public Works building. This new phase of the civic center will include solar panels, efficient water heaters, and state of the art lighting measures.

Mr. Kohn said the median age of the population in Palm Desert is 48 years of age and that these people have more money and are more energy-conscious than residents of many other communities. However, there have been a few hitches in the city's plans to create new ordinances that require homes and buildings to be energy efficient. For example, a new Super Sam's Club is being constructed in Palm Desert, but there are no energy-efficient measures required and none have been voluntarily instituted.

Residential communities are also providing resistance due to the strict codes, covenants and regulations (CCR'S) of the homeowner associations. One subdivision tried to ban satellite towers, but the Federal Communications Commission overruled this ban. Solar photovoltaic panels are banned or need association approval and their sizes and placement are restricted, a major deterrent for their purchase. Palm Desert has considered mandating solar panels or providing enhanced rebates outside of what SCE and other utilities already provide, and providing possible assistance for people with their air conditioning units. Mr. Kohn would like to see the College of the Desert become more energy conscious by placing solar panels on the parking structure and roofs of their buildings.

City Events

Mr. Kohn mentioned that Palm Desert has facilitated several successful community-wide events like the two "City CFL Sales" in October of 2002, the Spring Fest in April of 2003, and the "Holiday Light Up" fluorescent torchiere trade-in held in December of 2003. City employees also visited senior centers in order to reach the people in the city who could benefit from energy efficient measures the most. The city also sponsored a sale of solar panels to the community in which about six hundred 50 Watt panels were sold at cost. The city also had one "Buck-A-Bulb" sale for city employees in October of 2002 that was very successful. Mr. Kohn also mentioned that the city sends out a newsletter entitled *The Bright Side* and that most people in Palm Desert are already energy conscious.

Community Response

Mr. Kohn felt that the community was very receptive to the events that Palm Desert sponsored with the help of The Energy Coalition. Mr. Kohn said the fluorescent torchiere trade-in brought in all sorts of people and that most of the people were surprised about how many ways they could save money and conserve energy. This event was received very well.

He feels the city's website on energy management needs to be improved because he gets several calls relating to energy. He would like to see information about utility-sponsored rebates, solar irrigation controls, solar pool pumps, and solar power added to the website.

Mr. Kohn has received several positive comments from small business owners who participated in the tune-ups. He said several people have been very thankful and have sent letters of appreciation to the City Council. Mr. Kohn said it was hard to tell how apartment dwellers viewed the tune-ups as he has not heard any feedback from them. Mobile home residents have been very thankful, but stated they have not noticed a large drop in their utility bills since the tune-ups. Mr. Kohn said this is most likely due to the fact that air conditioning inhibits large savings in Palm Desert's climate. Mr. Kohn and some people have stated that they would like to use a local contractor instead of the

foreign ones designated by The Energy Coalition. Mr. Kohn felt it would work better having a contractor closer to Palm Desert.

City Personnel Response

Mr. Kohn stated that it is probably time to do another "Buck-A-Bulb" sale because most people wanted to buy more. He said that 100 out of 162 employees participated and that most were aware of the energy savings but that the price was too good to pass up. Some of the employees told him that they did not like the CFLs or they did not fit their light fixtures. The candelabra lights were very popular. Some people told their friends and family about the sale and their new CFLs.

PEAK Outlook

The PEAK Project has been fairly successful in Palm Desert and that most of the schools have incorporated the curriculum into its classrooms. The funding from The Energy Coalition has allowed Palm Desert to create after school programs for children and has helped Palm Desert with fringe fundraising and in obtaining other outside funding. Mr. Kohn felt that the students who participate in PEAK know a lot of about energy conservation.

Future of the Program in Palm Desert

Mr. Kohn has several ideas and plans for the new energy plan that will be created in the next year to best utilize The Energy Coalition staff and the funding that the Six Cities Energy Project provides to Palm Desert. The goal for Mr. Kohn is to see that solar power becomes more of a priority in the valley. He would like to see Palm Desert offer help to people with the utility rebate process with regards to solar paneling because it is very cumbersome and confusing.

Mr. Kohn also stated that he would like to see The Energy Coalition work more closely with the utilities like SCE because it would benefit Palm Desert and everyone. SCE only does necessary and mandated things for cities, and Mr. Kohn would like to see Ted Flaningan and the Coalition pay more attention to this area. Mr. Kohn would also like to see a change in the management structure of the Coalition. He feels that one manager for no more than four cities would be more helpful than having to work with several people.

Mr. Kohn would like to see Palm Desert work more with Dr. Mike Brown, an Energy Coalition consultant, attend more design charrettes, and work with homeowners' associations to include them in the city's energy plan for the coming year. More mandates for solar panels and other energy efficient designs are desired. Mr. Kohn also would like to see more local contractors doing tune-ups, rather than outside ones.

Palm Desert will continue to be heavily involved and interested in the efforts of The Energy Coalition in its city. Already, the city has seen drastic improvements in

operations and savings. For example, the city used to have inefficient vending machines in every building which created an annual 7% loss for Palm Desert. Mr. Kohn stated that all of these vending machines have been made energy efficient and now turn a 7% annual profit for the city.