EVALUATION, MEASUREMENT, AND VERIFICATION OF PACIFIC GAS & ELECTRIC'S PY 2002 LOCAL SCHOOL RESOURCES AND ENERGENIUS® PROGRAMS

Final

Submitted to Pacific Gas and Electric Company

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1 Executive Summary

Pacific Gas and Electric Company (PG&E) contracted with Ridge & Associates, in conjunction with Vanward Consulting and Equipoise Consulting Inc. (R&A Team), to examine the effectiveness of the PY2002 Energenius Program and School Resources Program and to accomplish the California Public Utility Commission's Evaluation Measurement &Verification objectives for these two local information-only programs. The main components of this evaluation include a market characterization of the schools sector and evaluations of the Energenius and School Resources Programs.

1.1 Market Characterization

The market characterization of the schools segment was provided to PG&E as a separate report on March 20, 2001[1]. (The full report is included in Appendix F.) We present here a high-level summary of this report in order to provide a context for this evaluation. There are a variety of conclusions that can be made regarding the California schools market segment.

- There is a drastic need for additional classrooms owing to increased enrollments and reduced class sizes. Failure to take advantage of energy efficient options when new facilities are built/added would represent a significant missed opportunity.
- Because of reduced school funding over the last 20 years, there is also a dire need for major repairs and renovation of existing buildings. This is the case despite the passage of Proposition 1A[2]. As with new construction, failure to take advantage of energy efficient options when renovations are made represents a significant missed opportunity.
- The magnitude of the current California budget crisis has only exacerbated this situation.
- The market barriers facing schools include information-search costs, performance uncertainty, organizational practices, and high first costs. Organizational practices and high first cost may be the greatest barriers.

1.2 Energenius® Program (EP)

Below are the key findings regarding the EP, which provides gas and electric energy conservation along with safety and water conservation information to schoolchildren in grades 1 through 8. Because of late decisions by the California Public Utilities Commission (CPUC) on the 2002 programs, the official period for program year (PY) 2002 was from June 1 to December 31, 2002.

1.2.1 EP Goal Achievement

Table 1-1 presents the original goals of the EP and levels of achievement.

[1] The basic character of the market has changed little since 2001. The only important update addresses the current budget crisis in California.

[2] In November 1998, California voters approved Proposition 1A, which authorized $9.2 billion in bonds, with $6.7 billion earmarked for K-12 schools and the remainder for higher education. Over the next four years, the money was used for new construction ($2.9 billion), class size reduction ($0.7 billion), and other needs ($1 billion).

Table 1-1. Table PY 2002 EP Goals and Performance

Measures	PY 2002 Goal	PY 2002 Achievement	Percent of Goal
Number of EP Student Kits Delivered	10,000	20,447	204%
Direct Mailings to Hard-To-Reach Districts	500	2,819	564%

Clearly, the EP met or exceeded all of its goals outlined in the implementation plan. In addition, during this same period, there were 1,336 EP Teacher Kits sent to 333 teachers at 260 participating schools.[3]

1.2.2 Impacts

- Teachers felt that the EP materials were helpful, held their students' attention, were easy to incorporate into their curriculum, and that their overall quality was very good.
- Teachers felt very strongly that the EP affected their students' attitudes, knowledge, and behavior.
- Overall the EP was well received. The vast majority of the teachers rated the EP as "Excellent" or "Very Good".
- Nearly 66 percent of respondent teacher indicated they are "Very Likely" to teach another PG&E-sponsored energy efficiency program.
- More than 69 percent of respondent teachers indicated they are "Very Likely" to recommend the Energenius Program to other teachers.
- Across all EP components, students exposed to the EP materials experienced statistically significant increases in knowledge as measured by the pre-tests and post-tests.
- Over 71 percent of the teachers devoted more than 4 hours to the EP.
- Overall, the teachers felt the pilot test of the Home Energy Efficiency Survey (HEES) was very successful.
- Participating schools are evenly spread throughout the PG&E service territory.

1.2.3 Recommendations

- If PG&E wants to understand this Program's potential for resource acquisition, efforts should be made to measure the energy savings in the homes of the students as a result of the EP.
- The home energy survey component should be expanded and evaluated more rigorously.
- Pre-test and post-test data should be collected and entered into a database on an on-going basis.

[3] Note that from January 1, 2002 though May 31, 2002, there were 12,510 EP Student Kits sent to participating schools bringing the total for all of 2002 to 32,957. During this same period the EP distributed 688 EP Teacher Kits.

1.3 School Resource Program (SRP)

Below are the key findings regarding the SRP. As with the EP, PY2002 officially covered the period from June 1 through December 31, 2002, not the entire 12 months.

1.3.1 SRP Goal Achievement

Table 1-1 presents the original goals of the SRPP and levels of achievement.

Table 1-2. Table PY 2002 SRP Goals and Performance

Measures	PY 2002 Goal	PY 2002 Achievement	Percent of Goal
Number of Workshops by 12/31/02	4	11	275%
Conduct Energy Audits in Two Schools Districts by 12/31/02	2	7	350%
At Least Two School Districts Receiving Energy Audits Must Be Hard-To-Reach	2	6	300%

In addition, pilot tests of the Energy Patrol were conducted at three schools.

1.3.2 Impacts

- In general, the school administrators, teachers, facility managers, and custodians who attended the workshops reported that the organization of the workshops was good, as was the quality of the information presented.
- In follow-up interviews, 100 percent of those who attended the SRP-sponsored financial workshop indicated they had used some of the information or changed some of their behavior *or* planned to use some of the information or change some of their behavior within the next 12 months.
- In follow-up interviews, 100 percent of those who attended the SRP-sponsored teacher workshop indicated they had used at least some of the information or changed some of their behavior *or* planned to use some of the information or change some of their behavior within the next 12 months.
- The SRP successfully implemented the Energy Patrol (where students conduct a teacher-led audit of their school) in three schools.
- On average, if the school implemented the measures from the energy audits, the schools were estimated to save 7.9% of their annual electric energy usage, with a median of 7.3% and a range from 0.4% to 17.3[4]%.

[4] Savings estimates were based on quality-control reviews of the benchmarking studies and energy audits conducted by the SRP. As part of this review, we assessed the energy savings potential due to any low-cost and capital cost measures that were recommended as a result of the audit. Our review resulted in some changes in SRP estimates.

- Of the four schools with potential savings from natural gas and *if* the schools were to implement the measures from the energy audits, the average therm reduction would have been 6%, with a median of 3.8% and range from 2.1% to 14.5%.[5]
- SRP continues its efforts to convince participating school districts to adopt an energy conservation/efficiency curriculum.
- The one energy partner, Rebuild America, felt that their involvement was positive. They agree that their involvement benefited the schools, provided some public-relations value to their respective organizations, and saw some opportunities for synergy between the SRP and other energy efficiency/conservation programs in California. They also plan to continue their involvement with the SRP.

1.3.3 Recommendations

- Efforts should be made to expand and more carefully evaluate the impact of the energy patrols.
- Because the SRP is an information-only program, there is currently no requirement to estimate kWh, kW, or therm impacts. However, greater efforts should be made to verify the accuracy of the estimates contained in the benchmarking studies and energy audits since customers are making decisions about efficiency investments based upon this information.
- Participant names, mail addresses, and e-mail addresses should be regularly input into a program-tracking database. These data should include:
  - Workshop participant
  - Workshop teachers
  - Participating schools and key personnel
- An improved program-tracking database will be required to support future evaluations. For example, information regarding all services received by each school, the date(s) these services were delivered, and any estimated savings would be useful.
- A more comprehensive case study analysis should be done at the West Contra Costa Unified School District (WCCUSD). Part of this analysis should address the extent to which the WCCUSD model can be replicated in other school districts.

[5] A technical review of these reports was beyond the scope for this evaluation. Percentages provided are taken directly from the prepared reports.

2 Introduction

The 2002 School Resources Program (SRP) and Energenius® Program (EP) are information-only energy efficiency programs. The SRP is specifically designed to reduce the barriers schools face in adopting energy efficiency measures. The EP encompasses several elements designed to aid schools in addressing energy efficiency needs and improving the overall energy efficiency of schools within participating school districts. The EP is designed to educate students and their parents on energy efficiency and electric and gas safety. The EP helps shape their behavior in the home, in school, and at work through grade appropriate educational materials that are distributed to teachers and their students.

The California Public Utility Commission (CPUC) has ordered independent evaluation, measurement, and verification (EM&V) studies for all utility local programs according to the guidelines laid forth in the November 2001 Energy Efficiency Policy Manual. Accordingly, Pacific Gas and Electric Company (PG&E) contracted with Ridge & Associates, in conjunction with Vanward Consulting and Equipoise Consulting Inc. (R&A Team), to examine the effectiveness of the 2002 SRP and EP and accomplish the CPUC's EM&V objectives for information-only programs. To these ends, the R&A Team addressed the following evaluation objectives:

- Providing up-front market assessments and baseline analysis, especially for new programs
- Provide on-going feedback, and corrective and constructive guidance regarding the implementation of the programs.
- Measure indicators of program effectiveness, including the testing of assumptions that underlie the program theory and approach, and changes in individual awareness and behavior due to the programs.
- Assess the overall levels of performance and success of the programs.
- Help to assess whether there is a continuing need for the programs and make recommendations for possible modifications or improvements.

More detailed discussion regarding these topics is provided in Sections 3 and 4.

All EM&V plans, in addition to discussing and meeting the objectives above, were required to include the components listed in Table 2-1. Because the SRP and the EP are information-only programs, only the non-shaded components of Table 2-1were addressed in this evaluation.

Table 2-1. Components of an EM&V Plan

Baseline Information
• Determine whether or not baseline data exist upon which to base energy savings measurement. Existing baseline studies can be found on the California Measurement Advisory Committee website (http://www.calmac.org/) and/or the California Energy Commission website (http://www.energy.ca.gov/). Detailed sources of baseline data should be cited.
• If baseline data do not exist, the implementer will need to conduct a baseline study (gather baseline energy and operating data) on the operation(s) to be affected by the energy efficiency measures proposed.
• If the baseline data do not exist and the implementer can show that a baseline study is too difficult, expensive or otherwise impossible to carry out prior to program implementation, the contractor should then provide evidence that baseline data can be produced or acquired during the program implementation. This process should then be detailed in the EM&V plan.
Energy Efficiency Measure Information
• Full description of energy efficiency measures included in the program, including assumptions about important variables and unknowns, especially those affecting energy savings.
• Full description of the intended results of the measures.
Measurement and Verification Approach
• Reference to appropriate IPMVP option.
• Description of any deviation from IPMVP approach.
• Schedule for acquiring project-specific data.
Evaluation Approach
• A list of questions to be answered through the program evaluation.
• A list of evaluation tasks/activities to be undertaken during the course of program implementation.
• A description of how evaluation will be used to meet all of the Commission objectives described above.

The next section provides an in-depth discussion of our approaches to meet the stated objectives of the study for the EP and SRP. At a high level, our evaluation entailed process related activities including in-depth interviews of participants and program staff and an assessment of feedback on workshop and program satisfaction. This aspect of the study also entailed an extensive review of program information and databases in order to describe the program and document program activities and accomplishments. The second aspect of the evaluation entailed impact-related activities including follow-up participant surveys to assess changes in behaviors and attitudes as well as pre-/post-tests of EP student participants to assess changes in knowledge gained about energy efficiency, and electric and gas safety. We also performed quality-control reviews of the benchmarking studies and energy audits conducted by the SRP. As part of this review, we assessed the energy savings potential due to any low-cost and capital cost measures that were recommended as a result of the audit.

For each Program, we first describe the major components and provide a theory of how the program was supposed to be implemented and why the program was expected to achieve its objectives. We then go on to present the EM&V methods used to evaluate each program.

Note that in the evaluation of the PG&E 2000-2001 Energy Treasure Hunt Program (ETHP) and the Energenius® Program (EP), a market characterization of the schools sector was conducted (see Appendix F for the full report). This market characterization involved a review of the literature and existing data. We have updated this market characterization to address the issues raised by the California Budget crisis.

3 The Energenius® Program

We begin by describing the Energenius® Program and providing the logic model that guided this evaluation.

3.1 Energenius® Program Description

The Energenius® Program (EP) provides gas and electric energy conservation along with safety and water conservation information to schoolchildren in grades 1 through 8. More specifically, the EP:

- provides basic education to students that help shape their energy use behavior and practices that persist throughout their adult life, and
- teaches students how to conserve energy in their homes and increases their parents' awareness about energy.

There are three basic components to the EP: 1) curriculum, 2) teacher training, and 3) on-line home energy audit. Each is discussed below.

3.1.1 Curriculum

There are five curriculum components to the EP with each directed to a specific topic and grade level. They are: 1) Energenius® Primary Safety Program, 2) Primary Energenius® Program (Habits), 3) Intermediate Energenius® Program (Measures), 4) Intermediate Energenius® Safety Program, and 5) Bill Buster Program.

School districts and teachers request these materials over the Internet or by telephone. The materials include the following components and learning objectives:

- **Energenius Primary Safety Program** (grades 1-3) has the following 14 learning objectives:

  1. Students will be able to state two or more reasons why safety rules are important.
  2. Students will be able to repeat 12 safety rules in their own words.
  3. Students will be able to read or "picture read" and describe the actions occurring on the 12 Home Safe Home Activity Sheets.
  4. Students will be able to retell, in their own words, the safety rules that are included on the calendar.
  5. Students will be able to tell why the safety rules on the calendar are important.
  6. Students will be able to tell what they can safely do at home around electricity and natural gas.
  7. Students will be able to tell why energy conservation tips are important.
  8. Students will be able to identify the two most common forms of energy found in homes – electricity and natural gas.
  9. Students will be able to explain ways of using energy safely and efficiently.
  10. Students will be able to demonstrate by responses to safety questions their understanding of the safety rules.

11. Students will be able to develop their own Home Safe questions and answers based on the Energenius Safety Program.
12. Students will be able to recall and explain safety rules that they have learned in the Energenius Program.
13. Students, with their parents' or guardians' assistance, will be able to read and complete the Energenius Safety Check List.
14. Students will be able to tell in their own words what they learned by completing the Energenius Safety Check List.

- **Primary Energenius Program - Habits** (grades 1-3) has the following 12 learning objectives:

1. Students will be able to identify two sources of energy in the home – electricity and natural gas.
2. Students will be able to give examples of energy waste.
3. Students will be able to give examples of energy-saving activities.
4. Students will be able to explain why energy should be used wisely.
5. Students will be able to retell in their own words the energy-efficient messages that are included on their calendar.
6. Students will be able to tell why these tips on saving energy are important.
7. Students will be able to tell what they can personally do to save energy in their own homes.
8. Students will be able to recite three or more safety rules found on the calendar.
9. Students will be able to identify the two most common forms of energy found in households – electricity and natural gas.
10. Students will be able to identify three or more wasteful and/or dangerous energy habits.
11. Students will be able to explain ways of conserving energy and using energy wisely.
12. Students will be able to identify wasteful energy habits described in the Energenius *Habits See and Check Activity.*

- **Intermediate Energenius Program - Measures** (grades 4-5) has the following 13 learning objectives:

1. Students will be able to identify two sources of energy in the home – electricity and natural gas.
2. Students will be able to analyze and give examples of energy waste and energy-saving measures.
3. Students will be able to give reasons and explain why energy should be used wisely.
4. Students will be able to explain why keeping energy where it is needed is one way not to waste energy.
5. Students will be able to analyze and identify five or more physical features of a home that waste energy.

6. Students will be able to describe a range of fix-its that will help to create a more energy-efficient home.
7. Students will be able to describe the two most common forms of energy found in households – electricity and natural gas.
8. Students will be able to identify five wasteful and dangerous energy habits shown in the video.
9. Students will be able to analyze how energy-saving information changed Scott's (the character in the EP materials) behavior.
10. Students will be able to apply what they've learned about home safety and energy conservation to their school setting.
11. Students will be able to identify wasteful energy habits in the home.
12. Students will develop their own solutions to reduce energy waste in the home.
13. Students will be able to give reasons why it is important not to waste energy (environmental and economic).

- **Energenius Intermediate Safety Program** (grades 4-5) has the following 18 learning objectives:

1. Students will, by identifying six safety rules, complete a *Scriptbook* activity.
2. Students will identify ways to prevent getting electrical shocks.
3. Students will develop a list of conductors and insulators and describe the differences between the two.
4. Students will identify and describe common household hazards that cause electric appliances to malfunction.
5. Students will explain at least two safety rules associated with the proper use of electric appliances.
6. Students will list at least three safety rules on how to keep safe around electrical utility equipment.
7. Students will define "combustion" and name three things that can cause the combustion of natural gas.
8. Students will identify the smell associated with natural gas leaks.
9. Students will describe three rules to follow if they were to detect a gas leak in their home.
10. Students will describe the three factors that are needed to ignite and sustain a fire.
11. Students will state at last three safety rules for preventing fires in the home.
12. Students will state at least three safety rules for putting out household fires.
13. Students will be able to identify various resources, including emergency telephone numbers, for dealing with home emergencies.
14. Students will state three or more safety rules for staying safe in the kitchen.
15. Students will identify potentially hazardous situations in various rooms of the household and state appropriate safety rules for avoiding these dangers.
16. Students will produce a roller movie that demonstrates how safety rules apply to real world situations.

17. Students will demonstrate and apply their knowledge of safety rules, as they participate in creating a team safety movie.
18. Students will list ten or more safety rules covered in this program.

- **Bill Buster Program** (grades 6-8) has the following 20 learning objectives:

1. Students will identify the energy they use every day.
2. Students will estimate their own energy use and record this data in the Energy Survey.
3. Students will be able to describe the following energy sources: natural gas, geothermal energy, hydroelectric power, fossil fuels, nuclear, solar, and wind.
4. Students will be able to explain how each energy source generates the energy they use every day.
5. Students will be able to define the terms *renewable resources* and *nonrenewable resources* and give examples of each.
6. Students will be able to list the ways that they (and their families) can be more energy efficient.
7. Students will be able to describe in words and/or diagram what kilowatt-hours means.
8. Students will be able to compute the amount of electricity used for various activities using the Energy Calculator.
9. Students will be able to identify ways they can save electricity.
10. Students will be able to describe how heat energy from natural gas is measured.
11. Students will be able to describe in words and/or an illustration what therms means.
12. Students will be able to compute the amount of therms needed for various activities using the Energy Calculator.
13. Students will be able to identify ways that they can save natural gas.
14. Students will be able to identify the relationship between their own energy use and the information on their personal energy statements.
15. Students will be able to calculate from the personal energy statement their energy use and energy savings over an extended period of time.
16. Students will be able to analyze, interpret and apply the information on their personal energy statement to various activities.
17. Students will be able to describe two additional sources of energy – recycling and efficient energy use.
18. Students will be able to identify reasons that they are sources of energy.
19. Students will be able to understand their personal energy statements and describe the changes in their energy use.
20. Students will be able to describe various ways personal energy behaviors affect the environment.

3.1.2 Teacher Training

Teachers were introduced to the EP curriculum materials through workshops that were offered through the SRP. These workshops were also designed to educate teachers about energy, energy patrols, and share a number of efficiency and conservation activities for the classroom.

3.1.3 On-Line Audit

During 2002, the EP began the design of a new component that involved the use of the PG&E on-line energy audit, the Home Energy-Efficiency Survey (HEES). Curriculum was developed to introduce teachers and students to the HEES to encourage students in grades 3-5 to apply what they learned about energy use in the classroom to their own homes. The HEES component was developed as an online[6] extension to the Energenius® Measures Program but could also be used as a standalone classroom program. In the Energenius® Measures Program, students learn about energy, how to use it efficiently, and how to take personal actions that can make a difference for the environment — all in a classroom setting. The Home Energy Survey Component established the following eight learning objectives:

1. Students will associate energy use with cost
2. Students will learn that there are seasonal differences in energy use
3. Students will be able to cite energy saving options for different seasons of the year
4. Students will understand the relationship between appliance use and energy costs
5. Students will be able to identify the appliances that use the most energy in their homes
6. Students will name ways of saving energy in the use of appliances
7. Students will apply energy saving methods to their particular homes
8. Students will appreciate that some energy saving methods are easier to adopt than others.

The idea was that the teachers would learn how to navigate the PG&E website in order to launch and complete the energy audit. The teachers would also learn how to read and interpret the audit report sent to them by PG&E that contains an explanation of their energy use and recommendations for reducing their energy use. These teachers would then pass on these skills to their students, who, with some involvement on the part of their parents, could complete the audit at their school or in their homes. The information provided through the on-line home energy audit was expected to increase one's knowledge of energy efficiency leading to changes in attitudes and behavior with respect to energy efficiency measures and practices and eventually to reductions in energy use. During the fall semester of 2002, three teachers pilot-tested the software.

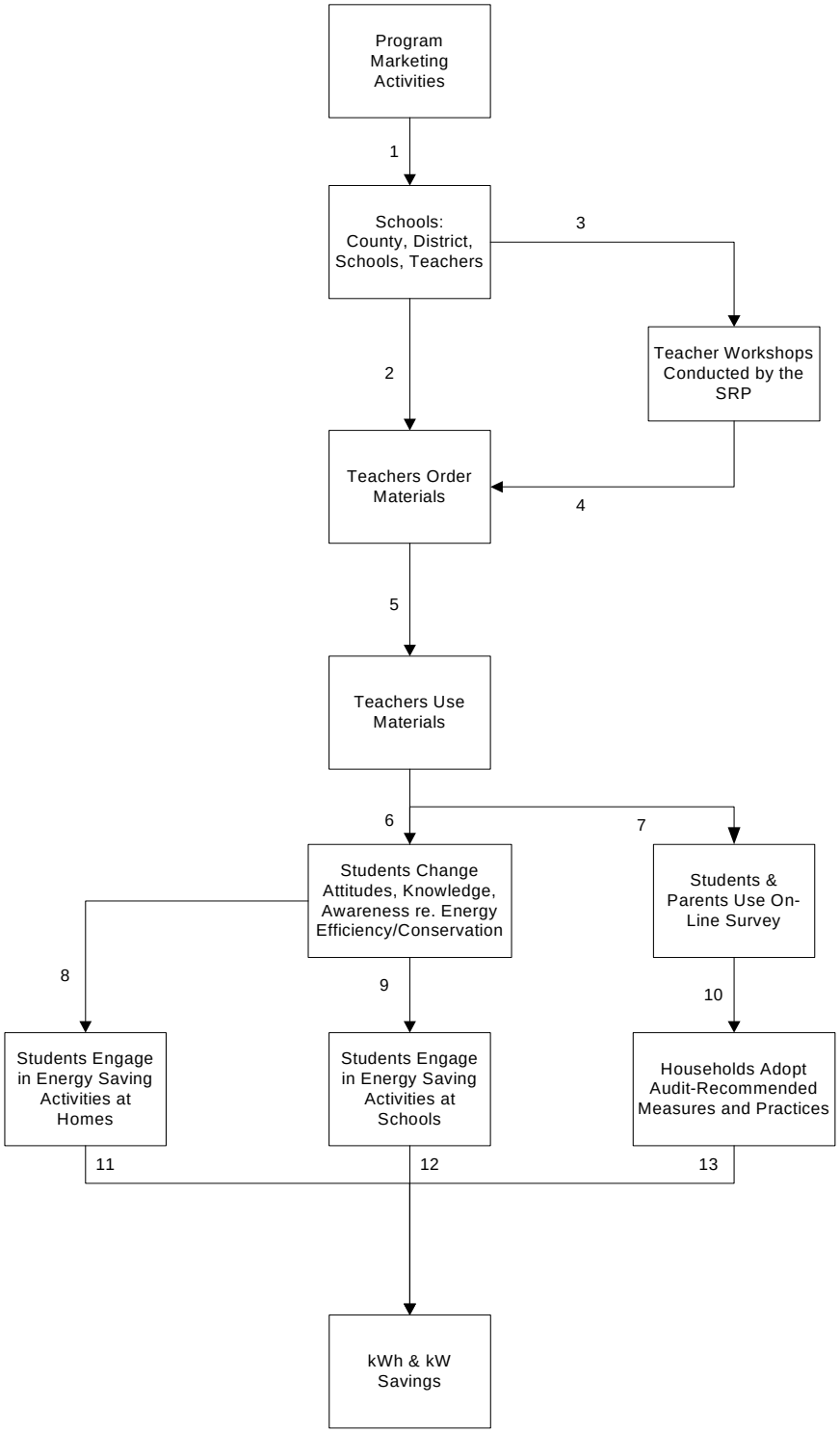
3.2 Program Logic Model

In Figure 3-1, we present the logic model of the EP that was developed in collaboration with the EP program staff and the PG&E EM&V representative. The purpose of the model is to understand the sequence of program activities and their interrelationships and how these activities combine in order to produce immediate, intermediate, and long-range outcomes. Understanding the logic of the program has guided our identification and selection of indicators for the immediate, intermediate, and long-range outcomes and allowed us to test the key linkages

[6] See http://www.pge.com/003_save_energy/energytools/restools.shtml.

in the program logic. In the Data Collection Section, we indicate which linkages were tested using the data collected.

Figure 3-1. Program Logic Model for the EP



3.3 EM&V Methods for the Energenius® Program

This section covers, for the EP, the data collection plan, sample design, and analysis approach.

3.3.1 Sample Plan and Data Collection

Existing data, contained in the EP database, were used to describe patterns of participation, dates of participation, the number of participating schools within each district, the number of participating classes within each school, and the number of students within each class. Additional data was collected from both students and teachers who used EP curriculum materials. Each data collection effort is described below.

3.3.1.1 Program Database

The data from the EP database were provided by PG&E. It contained the names of the schools that have ordered EP materials, the number of units of each EP module ordered, and the dates of the orders. In addition to describing the types of materials ordered, this information was used to test linkages #2, #3, and #4 in Figure 3-1, which provided one measure of program marketing effectiveness.

3.3.1.2 Student Pre-Tests and Post-Tests

Given that the evaluation did not begin until 1/17/2003, we requested that teachers administer pre-tests and post-tests to *all* students who experienced the EP curriculum in the spring 2003 semesters. Since the curriculum did not change between the fall of 2002 and spring of 2003 and the curriculum may very likely have been requested during PY2002, this was considered a reasonable approach to evaluating the effectiveness of the Energenius® curriculum. These pre-tests and post-tests covered the basic material linked to the learning objectives for each EP component. An adequate number of pre-test and post-tests were included in Energenius® materials sent to each teacher who used the Energenius® curriculum. Instructions were included for their completion and returned to PG&E. Teachers were asked to administer the pre-test prior to teaching the EP component and administer the post-test immediately after teaching the EP component. Teachers were provided with a return, self-addressed envelope to return both completed pre-test and post-tests to PG&E for data entry. The student pre-test and post-test data were used to test linkage #6 in the logic model in Figure 3-1.

3.3.1.3 Teacher Surveys

All teachers who use the Energenius® materials were also surveyed by PG&E's Customer Research and Measurement Department using the instrument developed by R&A (see Appendix B). They were asked to report the following information:

- Program elements and materials used
- Rating the Program on 1) holding students' attention, 2) ease of incorporating in curriculum, 3) helpfulness of Teacher's Kit, and 4) overall quality of Program materials
- Overall rating of the Program
- Assessment of student learning
- Number of class hours allocated to the Program
- Number of students in class

- Grades taught
- Likelihood of participating again
- Likelihood of recommending the Program to a fellow teacher

Teachers were provided with a return, self-addressed, stamped envelope to return the completed teacher surveys to PG&E's Customer Research and Measurement Department for analysis and report preparation**.** The student teacher survey data were used to test linkages #5, #6, and #7 of the logic model in Figure 3-1.

3.3.1.4 Surveys of Teachers Who Pilot-Tested the On-Line Energy Audit

Surveys, conducted by another firm under contract to PG&E rather than by R&A, were attempted with *all* four teachers who pilot-tested the on-line energy audit. The following topics were covered in these surveys:

1. Overall impressions of the program.
2. Whether the instructions were clear and easy to follow.
3. Whether the audit was appropriate for the targeted grade levels.
4. How well the program encouraged student/parent interaction.
5. How well the program related to the Energenius Measures Program (if they had experience with Energenius Measures.)
6. Suggestions for improving the on-line energy audit.

The four teachers were contacted via email along and provided a list of questions. The teachers were asked if they would agree to a telephone interview. Two of the teachers responded to the request for feedback; one responded by telephone and the other by email. Their comments are attached in Appendix H.

The survey results were used to test linkage #7 of the logic model in Figure 3-1. While we include the full text of this report in Appendix B, we provide a brief summary of this report in Section 5.

3.3.1.5 Data Collection Summary

Table 3-1 presents the summary of the basic evaluation questions and the planned sources of data.

Table 3-1. Evaluation Question, by Source of Data for the EP

Evaluation Question	Program Database	Teacher Surveys	Students Pre-Tests and Post-Tests	Surveys of Teachers Who Pilot-Tested the On Line Energy Audit	Market Character-ization
How many teachers and students is the EP reaching?	**X**				
Which students is the EP reaching?	X				
What other energy efficiency programs are available to California schools?					X
How well are students performing on expected outcomes?		X	X		
What can be done to improve the EP?		X			
Are teacher workshops effective?		X			
Is the on-line energy effective?				X	
Is the on-line energy audit easy to use?				X	
What kind of improvements should be made to the on-line audit?				X	
What can be done to improve the on-line energy audit?				X	

All of these data were combined to assess the overall performance and success of the program. As data were collected and analyzed, we provided on-going feedback to EP staff so that any necessary corrections could be made in the implementation of the PY2003 Program. This information was also analyzed and interpreted within the context of the market characterization in order to determine whether there is a continuing need for the EP. For example, if the EP materials are well received by teachers and students and if schools, in light of the current California Budget crisis, cannot afford to invest their own money in similar classroom materials, workshops and teacher training, then there would be a clear continuing need for EP.

3.3.1.6 Achieved Responses

Table 3-2 presents the sample frame, the achieved responses, and response rate for all EP data collection efforts. Note that pre- and post-tests were included with *all* student kits shipped. Teacher surveys were also included in *all* teacher kits shipped. That is, we in effect attempted to conduct a *census* of all students and teachers who received EP materials. There are at least two interpretations of why we achieved only a 9.4 percent response rate from students and a 15.9 percent response rate from teachers. First, it is possible that not all teachers had a chance to use the materials and thus there was no reason to complete the teacher surveys or administer the pre- and post-tests. Second, teachers who did use the materials simply failed to complete the teacher survey or administer the pre- and post-tests.

Table 3-2. EP Population, Planned Sample, Achieved Sample, and Response Rate

Survey	Survey/ Interview Attempts	Achieved Responses	Response Rate
Students*	6,278	590	9.4%
Teachers**	2,024	321	15.9%
In-Depth Interviews	4	4	100%

* Student kits shipped from 11/1/02 through 12/31/02 represent our estimate of students who may have been exposed to the opportunity to complete the pre- and post-tests.
** Teacher kits shipped from 1/1/02 through 12/31/02.

3.3.2 Analysis Approach

The evaluation of the EP involved both a process and impact evaluation. Each is described below.

3.3.2.1 Process Evaluation

All data contained in the EP database were reviewed as well as completed surveys of teachers and in-depth interviews of EP staff. This information was used to identify any program design and implementation problems. As issues were identified, necessary changes in the design and implementation of the EP were proposed.

3.3.2.2 Impact Evaluation

The evaluation of the impact of the program on the participants was conducted through an analysis of teacher surveys and pre- and post-tests provided by students. Analysis of completed teacher surveys revealed their perceptions of the effectiveness of the EP. Lastly, paired t-tests were conducted to determine whether the differences in the pre-means and post-means were statistically significant.

4 The School Resources Program

We begin by describing the School Resources Program (SRP) and providing a logic model that guided this evaluation.

4.1 The School Resources Program Description

The SRP provides an opportunity to create a new generation of energy efficient schools given the need for major facility upgrades, rising energy costs, and the resources available at this time to help school districts become more energy efficient. And yet, despite this immense opportunity, schools still experience barriers that can prevent them from taking advantage of the resources being made available, and realizing this timely opportunity.

Schools rarely have the in-house energy efficiency expertise or the staff resources to evaluate the opportunities and take the necessary steps to utilize, coordinate, and manage the myriad of resources through the entire process of upgrading facilities to make them more energy efficient. Even when a school district is fortunate enough to have a project champion, they often do not have the staff resources to manage the process, because they are overwhelmed with other high priority tasks.

The SRP helps K-12 school districts develop and implement district-specific energy savings plans. The SRP does so by assisting districts in identifying energy-efficiency upgrade opportunities, providing access to resources to implement energy-saving projects, and educating school district personnel, students, and parents about energy-related issues. The SRP works in partnership with organizations, such as the U.S. Environmental Protection Agency's (EPA) ENERGY STAR® program, the U.S. Department of Energy's (DOE) Rebuild America program, the California Energy Commission's Bright Schools Program, and energy-efficient equipment manufacturers. The SRP offers participating school districts a broad array of programs and services, including facility energy surveys, technical assistance, financing resources, educational activities, and professional training services.

Thus, the SRP represents a collaborative partnership of federal, state, and regional organizations and industry trade allies that provides each participating district with local resources and support to upgrade the energy efficiency of its facilities and to educate its students, teachers, facilities staff, and decision makers about energy use, energy conservation behavior, and energy efficiency technologies and operation practices. The SRP is tailored specifically for each participating district, recognizing that each district faces different obstacles to upgrading the energy efficiency of its facilities. The level of each district's participation is based upon the district's available funding, size, commitment to the range of program components, vintage of facilities, and scope and date(s) of prior energy-efficiency retrofits.

The program requires a two-way commitment of both the district and the program team, consisting of PG&E program management, field representative, and the contributing SRP business partners.

4.1.1 Supporting SRP Business Partners

- **DOE's Rebuild America Program.** In addition to co-funding the SRP program, DOE's Rebuild America Program provides local support to participating school districts as well as solid relationships with many equipment manufacturers.
- **EPA's ENERGY STAR® for Schools.** Examples of in-kind support provided by the ENERGY STAR® program include retrofit financing Internet presentations and workshops, and tools for improving K-12 school indoor air quality.
- **CEC Bright Schools Program.** Resources provided by the California Energy Commission's (CEC) Bright School Program include investment-grade audits in up to four schools per district and manuals on energy efficiency retrofit financing, planning, and implementation.
- **Industry Partners.** Industry partners, primarily equipment manufacturers, provide limited co-funding, but invaluable in-kind support. In particular, industry partners donate equipment for demonstration projects and participate in targeted workshops.

4.1.2 Program Objectives

Through this collaborative effort, the SRP helps K-12 schools save energy and money through energy efficiency retrofits and educational activities. The principal goals and objectives of the SRP Program are enumerated below:

1. Educate school facility managers, superintendents, financial officers, and custodians about energy efficiency.
2. Educate primary and secondary school students about energy efficiency by linking participating schools' energy-efficiency retrofits with energy-efficiency curriculum:
    - Ensure school facilities themselves become one of the key learning tools.
    - Implement service learning and other techniques to get students and energy efficiency into the community (e.g., student energy audits of their homes, etc.)
    - Continue working with a variety of partnerships and delivery mechanisms to maintain a long-term, sustainable program.
    - Make a special effort to reach out to the hard-to-reach schools and students.
3. Facilitate school energy retrofits by creating a network of decision makers, industry partners, implementers, and financial organizations committed to saving energy.
4. Identify cost-effective energy savings potential.

While not required to achieve energy savings or market effects objectives because these two programs are information-only, the programs have two additional long-range objectives that address these issues.

5. Realize documented, verifiable energy savings.
6. Create permanent behavioral changes (market changes).

4.1.3 Program Components

The program encompasses the following workshop elements:

- Finance Workshops—educates superintendents and facility managers about funding resources;
- Facility Workshops—educates facility managers about the latest energy-efficient technologies such as lighting; lighting controls; and heating, ventilation and air conditioning (HVAC) as well as best practices;
- Custodial Workshops—educates custodians about energy-efficient best practices; and
- Teacher Workshops—educates teachers about energy efficiency educational materials.

These workshops were a central element in the SRP. Four workshops were conducted in the summer and fall of 2002. Table 4-1 presents the workshops, the month in which they were conducted, and the number of attendees.

Table 4-1. SRP Workshops, Date, and Attendees

Workshop	Date	Number of Attendees*
Finance	July 2002	20
Finance	October 2002	25
Custodian	August 2002	17
Facility (2 workshops)	October 2002	60

* All attendees reported in Tables 4-1 and 4-2 *do not* include any PG&E staff who might have attended.

Table 4-2 presents the teacher workshops, the location, the date, and number of participants.

Table 4-2. Teacher Workshops, Location, Date, and Number of Attendees

Name of Workshop/Location	Date/Time	Number of Participants
Christian Center School, Lakeport, CA	8/28/2003 10 a.m. - 1 p.m.	14
Coyote Valley and Cobb Mountain Elementary Schools, Middletown, CA	8/27/2003 10:00 a.m.-1:00 p.m.	40
Child Development Program, Napa Unified School District, Napa, CA	8/26/2003 9:00-11:00 a.m.	13
Lucerne Elementary School, Lucerne, CA	8/22/2003 1:00-3:00 p.m.	12
Yokayo Elementary School, Ukiah, CA	10/8/2003 2:30-4:30 p.m.	16
Tehama County Dept. of Education, Red Bluff, CA	11/6/2003 3:30-5:30 p.m.	7
Arena Elementary School, Pt. Arena, CA	11/13/2003 2:00-4:00 p.m.	17
TOTALS		119

The topics covered in each of these workshops are presented next.

Finance Workshop Topics

- California energy issues and prices
- School bonds and low interest loan program
- A school district success story
- Alternative financing structure
- Quantifying the costs of delay
- Potential sources of funding
- Retrofit project rebates available & school success stories/examples
- What is Energy Star and how it can help your organization
- More efficient buildings with better working and learning environments
- Resources and technical tools provided by Energy Star
- Portfolio manager and benchmarking your building's energy performance

Custodian Workshops Topics

- Background information on energy use in schools
- Systems and equipment in schools
- Cleaning operations
- What it costs and what it can mean to you
- Walk-through of a facility in search of energy efficiency opportunities

Facility Workshop Topics

- Importance of energy conservation and potential savings

- Incorporating efficiency in daily operation and maintenance
- New construction or major renovation
- Success stories from school districts
- Benchmarking and utility tracking
- Lighting and daylighting strategies
- Financial assistance and rebates for your projects
- Mechanical systems
- Building envelope
- Roofs

Teacher Workshops

- What is energy?
- Energenius program hands-on activities for elementary and middle school students
- Energy patrols
- Planning energy – energy efficiency and conservation activities for the classroom

In addition to the above workshops, the program also provided a variety of financial and administrative assistance to help the schools implement their energy efficient retrofit projects. This assistance included:

- Benchmarking—assesses the comparative energy performance of all school facilities within the district against one another;
- Energy audits/surveys—assesses energy use within school district facilities. Provides recommendations on how to improve facility performance;
- Energy efficiency plan review—provides a review of retrofit plans and drawings of participating school districts;
- Project implementation plan—creates a summary plan describing steps the participating school district would need to implement to retrofit energy inefficient school district facilities;
- Resources Conservation Manager—assists partnering school districts with low interest loan applications and other tasks associated with energy-efficient retrofit project implementation; and
- Collaborative for High Performance Schools (CHPS) —informs and educates school districts about CHPS materials and workshops. CHPS ensures new schools are built with energy-efficient designs.

The program also provided two additional educational resources to teachers and students to assist in further reducing energy use at the school and home: 1) Energy Patrol, 2) Educational materials and resources.

The Energy Patrol teaches elementary and middle school students to identify energy waste within their school; it involves organized teams of students that patrol assigned areas of the school building. Students are trained to check for energy waste such as lights left on in unoccupied areas, broken or cracked windows, and leaky faucets in bathrooms. The Energy

Patrol component was pilot-tested during the fall semester of 2002 by three teachers at three schools:

- **Fifth Grade**
  Redwood Valley Elementary School
  700 School Way
  Redwood Valley, CA 95470
  (Ukiah Unified School District, Mendocino County)

- **Sixth Grade**
  Upper Lake Middle School
  725 Old Lucerne Rd.
  Upper Lake, CA 95485
  (Upper Lake Union Elementary School District, Lake County)

- **Second and Third Grades**
  Coyote Valley Elementary School
  22305 Yankee Valley Rd. (P.O. Box 338)
  Middletown, CA 95461

The educational materials and resources component provides schools with educational materials including Energenius® materials, a PG&E program that is separately funded, as well as a resources brochure of other available educational materials.

4.2 Program Logic Model

In Figure 4-1, we present the logic model of the SRP that was developed in collaboration with the SRP program staff and the PG&E EM&V representative. The purpose of the logic model is to understand the sequence of program activities and their interrelationships and how these activities combine in order to produce immediate, intermediate, and long-range outcomes. Understanding the logic of the program guided our identification and selection of indicators for the immediate, intermediate, and long-range outcomes and allowed us to test the key linkages in the program logic. In the Data Collection Section, we indicate which linkages were tested using the data collected. Note that the time dimension, labeled on the right, is included to underscore the point that immediate, intermediate, and long-term impacts emerge over time. SRP staff estimate that approximately three years are required to allow for the emergence of the long-range impacts such as kWh savings.

If this evaluation were to focus only on the PY 2002 SRP, then only the achievement of the immediate and intermediate objectives would be examined. Thus, we chose to re-visit one of the school districts that participated in the PY 2001 Program in order to determine whether any of the longer-range objectives have been achieved.

4.3 EM&V Methods for the School Resources Program

This section covers, for the SRP, the data collection plan, sample design, and analysis approach.

4.3.1 Sample Design and Data Collection

Existing data, contained in the SRP Database, were used to describe patterns of participation, dates of participation, and the number of participating schools within each district.

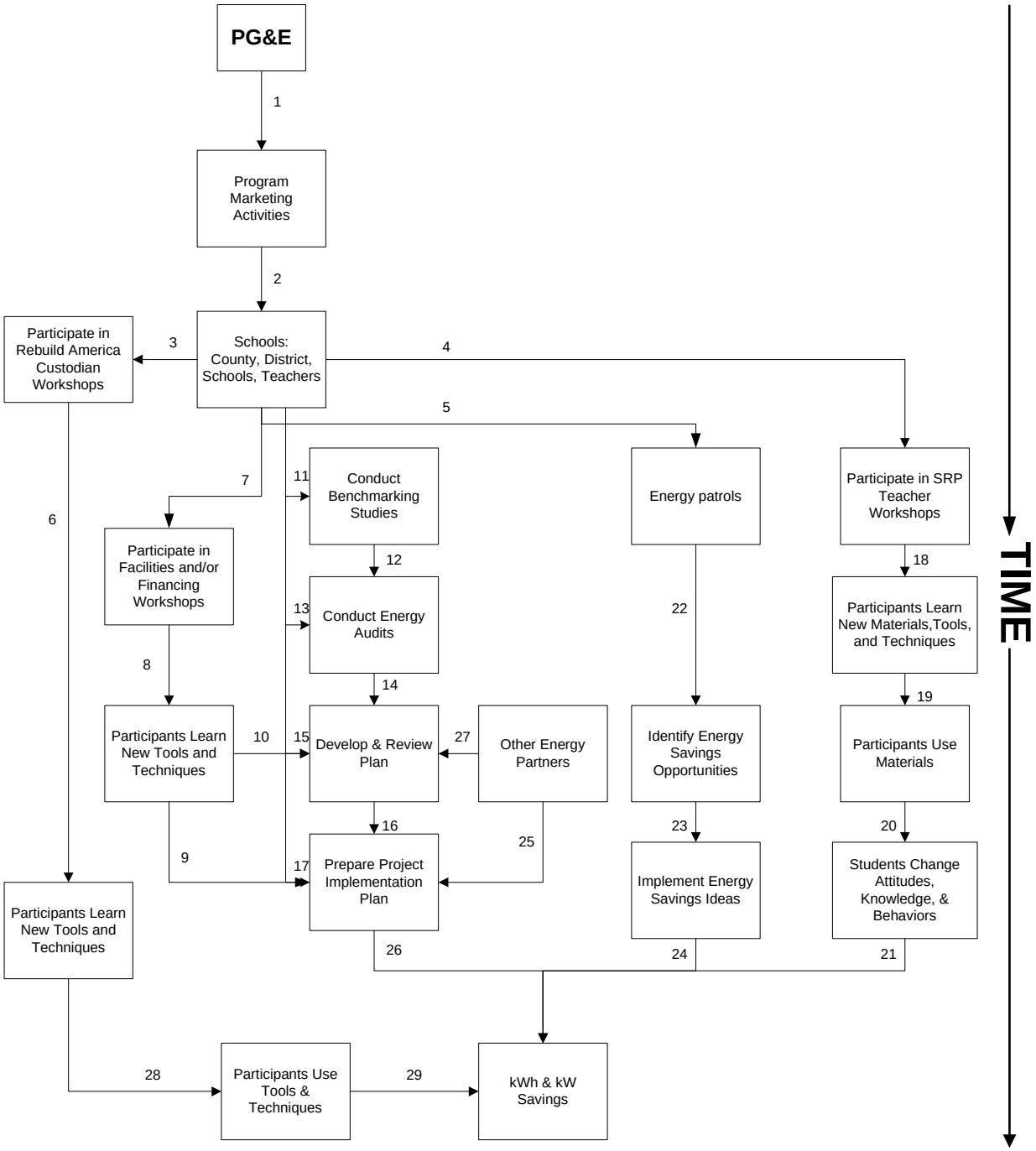
Additional data were collected from those who attended any of the workshops. This included data collected from a variety of school personnel such as principals, teachers, finance officers, facility managers, and custodians. In addition, results of the detailed energy audits were collected. Finally, information was collected from the PG&E Program staff. Each is described below.

4.3.1.1 Workshop Evaluations

The instruments used to evaluate these workshops were developed by those who are responsible for designing and implementing the training workshops. The R&A Team reviewed these instruments and recommended modifications before they were administered. The evaluation forms for the Teacher, Financial, Facility, and Custodian workshops are presented in Appendix A.

All (i.e., a census) workshop participants were asked to complete an evaluation form at the end of each of the workshops designed for teachers, facility managers, custodians, and finance officers. They were also asked for ideas about how to improve these workshops. PG&E Program staff were responsible for distributing the workshop questionnaires at each of the workshops and for returning completed interviews to R&A for data entry and analysis. The workshop evaluation data was used to test linkages #6, #8, and #18 in the logic model in Figure 4-1.

Figure 4-1. Program Logic Model for the SRP



4.3.1.2 Follow-Up Workshop Surveys

Approximately twelve weeks after the workshops, follow-up surveys were administered to *all* (i.e., a census) those who attended the various workshops. The focus of these surveys was on whether and how they were able to use any of the information gained through the workshops. This experience of trying to use the information should have put them in an even better position to evaluate the workshops. In the follow-up survey, they were again asked for their ideas about how to improve these workshops.

The R&A Team prepared the follow-up surveys and mailed or e-mailed them to the workshop participants. For the Financial Workshop, we developed an Internet version for the survey (the survey was posted at http://www.surveyhosting.net/PGE/facilities2.htm). PG&E Program staff provided the names and addresses or e-mails addresses of many of the attendees. The follow-up surveys and a hard copy of the Internet survey are presented in Appendix A.

Data from the completed surveys were entered into Excel spreadsheets by R&A and converted to SAS for analysis. The follow-up workshop survey data were used to test linkages #9, #10, #28, and #19 in the logic model in Figure 4-1.

4.3.1.3 In-Depth Interviews with Program Staff/Key Decision makers

In-depth interviews were conducted by the R&A Team with all key PG&E Program staff and one energy partner (Rebuild America).[7]. They were asked to comment on the SRP, its successes and failures. Program staff were asked a number of questions concerning the logic or theory of the program (the various activities and outcomes and their interrelationships), the development of data collection instruments, and the collection of data. The data from these interviews were used to test linkages #2, #3, #4, #5 and #7 of the logic model in Figure 4-1.

4.3.1.4 Benchmarking and Energy Audits

Both the benchmarking studies and the energy audits were provided by PG&E. After reviewing them with respect to the accuracy of their findings, the R&A Team prepared a summary of the reports that describe all the activities at each school, including the results of the initial audit and recommendations.

There are a number of assumptions underlying the benchmarking and energy audits. The main assumption is that providing a school with benchmarking information regarding its energy use may lead the school to take the next step of conducting an energy audit. Once an energy audit is conducted, a school may proceed to develop and review an energy efficiency/conservation plan. Once a plan is developed, the school may be motivated to prepare a project implementation plan and then proceed to install the efficient measures. Of course, a school may not need to start with the benchmarking but with some other activity such as the energy audit, development/review of a plan, or the preparation of a project implementation plan and initiate the hypothesized at that point causal process. With these assumptions in mind, the benchmarking and energy audit data were used to test linkage #12 of the logic model in Figure 4-1.

4.3.1.5 Pilot Energy Patrols

The effectiveness of the Energy Patrols was evaluated by an independent consultant under contract to PG&E. While the results of this assessment are provided in full in Appendix G, we provide a summary for inclusion in Section 5 of this report. The data from the Energy Patrol evaluation was used to test linkages #22, and #23 of the logic model in Figure 4-1. We recognize at the outset that the evidence in support of this linkage will be weak at best since the Patrol was only a very small pilot test.

[7] Originally R&A planned to conduct two in-depth interviews with teachers who participated in the Energy Patrol pilot test. However, data were collected and analyzed and a report prepared by a separate firm under contract to PG&E as described below.

4.3.1.6 Case Study of the West Contra Costa School District

Although not originally part of the evaluation effort planned for SRP, the West Contra Costa School District (WCCUSD) has had a longer-term relationship with the SRP and, therefore, served as a good example of the type of sustained effort over time that is required to change the attitudes and behavior of school and district decisionmakers.

In order to assess whether longer-term objectives have been achieved, we reviewed the data for the WCCUSD. They began their participation in the PY2001 Program, which was then known as the Energy Treasure Hunt. In depth interviews were to be conducted with key staff at several of the schools in the WCCUSD. The purpose of these interviews was to assess the impacts of the demonstration classrooms, the extent to which the information presented in the various workshops were being used, and whether any of the recommended efficiency measures have been installed or are planned to be installed. However, the WCCUSD staff were interviewed extensively by both PG&E and Rebuild America. Both companies developed brief case studies of the WCCUSD efforts. Because of this and the fact that these administrators and teachers were already overburdened, R&A decided not to conduct any additional interviews at the WCCUSD. However Section 5 of this report summarizes the data on WCCUSD available to R&A for this evaluation.

4.3.1.7 Data Collection Summary

Table 4-3 presents the summary of the basic evaluation questions and the sources of data. All of these data were combined to assess the overall performance and success of the program. Of course, as data were collected and analyzed, we provided on-going feedback to SRP staff so that any necessary corrections could be made in the implementation of the Program. This information was also analyzed and interpreted within the context of the market characterization in order to determine whether there is a continuing need for the SRP.

Table 4-3. Evaluation Question, by Source of Data for the SRP

Evaluation Question	Workshop Surveys	Follow-Up Workshop Surveys	In-Depth Interviews	Energy Audit Review	Energy Patrol Evaluation	Market Character-ization	WCCUSD Case Study
What is the program theory?			X				
What is the feasibility of collecting various data?			X				
What other energy efficiency programs are available to California schools?						X	
How are decisions in the schools segment made regarding efficient equipment?			X			X	
How effective are the workshops?	X	X					
What are the expected kWh and therm savings and kW demand reductions at the school site resulting from the SRP?				X			
How effective are the Energy Patrols?					X		
What can be done to improve the Energy Patrols?					X		
How can the SRP be improved?	X	X	X				
Are longer-term objectives being achieved? (Optional Pending Future Funding)			X				X

4.3.1.8 Achieved Samples

The achieved samples for the SRP data collection effort are presented in Table 4-4.

Table 4-4. Workshop Survey/Interview Attempts, Achieved Responses, and Response Rate

Survey Type	Survey	Survey/Interview Attempts	Achieved Responses	Response Rate
Finance	Original Workshop	45	30	67.0%
	Follow-up	45	8	21.6%
Teacher	Original Workshop	119	109	91.6%
	Follow-up	119	44	37.0%
Facility	Original Workshop	50	27	54.0%
	Follow-up	50	0	00.0%
Custodian	Original Workshop	17	14	82.0%
	Follow-Up	17	0	00.0%
In-Depth Interviews		4	4	100%

For both the facilities and custodial follow-up surveys, the response rates were zero. For the custodial workshops, the strategy was to rely on a supervisor to distribute the questionnaires to custodians, collect the completed questionnaires, and return them to R&A using the self-addressed, stamped enveloped that we provided. Despite repeated attempts, we never received

the completed questionnaires from this supervisor. With respect to the Facility Workshop follow-up survey, of the 22 participants for whom we had good e-mail addresses, none completed the on-line survey. This might have been due to a number of problems including limited access to a computer, unreliable Internet connection, outdated hardware, or outdated software.

4.3.2 Analysis Approach

This evaluation addressed both process and impact. The analysis approach for each is presented below.

4.3.2.1 Process Evaluation

All data contained in the SRP database were reviewed. In addition, we analyzed the completed workshop surveys and in-depth interviews with SRP staff, financial officers, facility managers, and custodians to identify any program design and implementation problems. As any problems were identified, necessary changes in the design and implementation of the SRP were proposed.

4.3.2.2 Impact Evaluation

Because the SRP is an information only program, the evaluation of the impact attributable to the PY2002 SRP focused on the achievement of immediate and intermediate objectives. The analyses focused on the in-depth interviews with SRP staff, follow-up surveys with workshop participants, the results of benchmarking studies and energy audits conducted at participating schools that provided estimates of *potential* energy savings and demand reductions, a review of the Energy Patrol Evaluation, and a review of PG&E's and Rebuild America's work with the WCCUSD.

5 Results

Appendix F provides the full market characterization report that was done as a part of the evaluation of PG&E's PY2000-2001 Energenius and Energy Treasure Hunt Programs. Except for the current funding crisis, this brief review remains reasonably current. Thus, in this section, we provide an update on school funding in California based on the 2003-2004 budget signed on August 2, 2003. We then present the results for the Energenius and School Resources Program.

5.1 Market Characterization Update

We begin by repeating the still salient conclusions of the original market characterization study:

- There is a drastic need for additional classrooms owing to increased enrollments and reduced class sizes. Failure to take advantage of energy efficient options represents a significant missed opportunity.
- Because of reduced school funding over the last 20 years, there is also a dire need for major repairs and renovation of existing buildings. This is the case despite the passage of Proposition 1A. As with new construction, failure to take advantage of energy efficient options represents a significant missed opportunity.
- Energy consumption in PG&E's schools market is increasing much faster than the nonresidential population in general.[8]
- A wide variety of energy conservation programs can have a significant financial impact on school facilities. However, the number of elementary and secondary schools participating in many of PG&E-sponsored energy conservation programs has been limited. It may be that the complexity of school funding and a decision-making process that involves numerous stakeholders operating in a politically-charged environment is simply too labor-intensive to gain the attention of energy efficiency service providers.
- The market barriers facing schools include information-search costs, performance uncertainty, organizational practices, and high first costs. Organizational practices and high first cost may be the greatest barriers.

The revenue for California schools is constrained because of the voter-approved initiative, Proposition 13, that limited the collection of property taxes and because of a 20-year-old law that specifies how much money each district may receive for general purposes (its revenue limit). Almost all school districts' income is controlled by the Governor and Legislature. However, another voter-approved initiative, Proposition 98, somewhat offsets these limits by guaranteeing a minimum amount of revenue for K-12 education. Moreover, in November 1998, voters approved Proposition 1A, which authorizes $9.2 billion in bonds, with $6.7 billion earmarked for K-12 schools and the remainder for higher education. The money will be used for new construction ($2.9 billion), class size reduction ($0.7 billion), and other needs ($1 billion) over the next four years. However, the California Department of Education estimated that approximately **$20 billion** was needed between 1997 and 2002 to address the facilities crisis in

[8] From 1993 through 1999, consumption in elementary and secondary schools in PG&E's service territory has grown from 1.9 percent to 2.3 percent of total nonresidential energy consumption.

California. Of this $20 billion, approximately$15 billion was needed for facility improvements with the remainder going to new construction. [9]

The magnitude of the current California budget crisis has only exacerbated this situation. The current budget funds K-12 education at a level $288 million below that provided in the 2002-2003 Budget Act enacted in September 2002. This reduction translates into a $180 per pupil drop in funding from $7,067 to $6,887. The budget delays $1.2 billion in K-12 payments for programs operated in 2003-04 until July 2004. In addition, the plan reduces funding for deferred maintenance of school facilities by $18.5 million and educational technology by $14.8 million).

Therefore, while the needs outlined in the original market characterization remain, the ability to meet those needs has decreased.

5.2 Energenius Program

5.2.1 Program Database

The data from the EP database were provided by PG&E. It contained the names of the schools that have ordered EP materials, the number of units of each EP module ordered, and the dates of the orders. In addition to describing the types of materials ordered, this information was used to test linkages #2 #3, and #4 in Figure 3-1, which provided one measure of program marketing effectiveness. Table 5-1 presents the number of student kits, teacher kits, test kits, and miscellaneous materials shipped from 6/1/02 through 12/31/02.

Table 5-1. Energenius Materials Shipped from 6/1/2002 through 12/31/2002

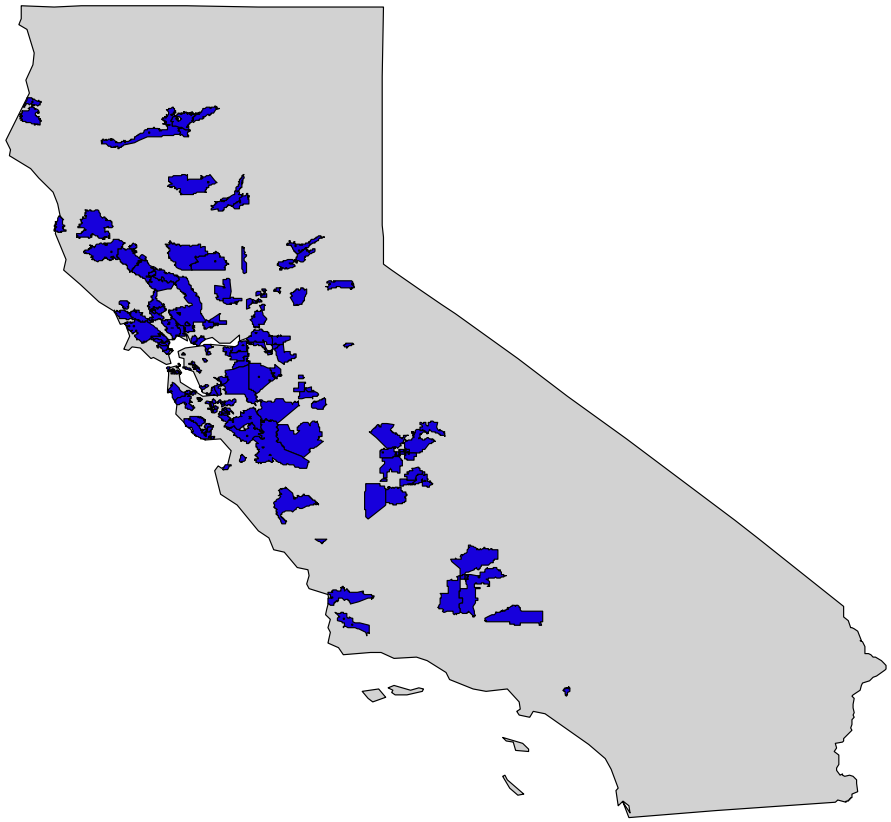
Program Materials	Student Kits	Teacher Kits	Test Kits	Miscellaneous	Total
Bill Buster Materials	5,135	394	127	87	5,743
Intermediate: Measures	3,582	220	114		3,916
Intermediate: Safety	3,664	175	119	35	3,993
Primary: Habits	4,565	345	175	100	5,185
Primary: Safety	3,501	202	146	62	3,911
Miscellaneous				4681	4,681
Total	20,447	1336	681	4965	27,429

Note that items in the Miscellaneous category included such items as posters for Primary Safety program, coloring calendar for the Primary and Habits programs, and test kits for all programs.

There was a total of 260 schools that participated from 6/1/02 though 12/31/02. The geographical distribution of these schools is displayed in Figure 5-1. The darker shapes represent zip codes in which at least one school participated in the EP. As one can see, the schools are evenly distributed throughout the PG&E service territory. Put another way, the needs of a diverse population of schools, including the hard-to-reach, are being addressed by the EP.

[9] Krop, Cathy S., Stephen J. Carroll, and Randy Ross. Tracking K-12 Education Spending in California. The RAND Institute on Education and Training, 1995; Krop, Cathy S. The Finances of Education Governance Reforms in California. The RAND Graduate School, 1996.

Figure 5-1. Geographic Distribution of Schools Participating in the EP



5.2.2 Pre-Tests and Post-Tests

Those students to whom pre- and post-tests were administered from June 2002 through February 2003 were examined to determine whether, for each component, the difference between the mean post-test and the pre-test was statistically significant. A statistically significant difference would indicate that some learning took place. We should note however that this is a simple pre/post design and, as a result, does not rule out various other explanations (e.g., maturation, self-selection, etc.) for any of the observed increases. Table 5-2 present these results.

Table 5-2. Results of T Tests Comparing Energenius Pre and Post Tests, by Program Component

Component	Pre Mean	Post Mean	N	T	p
Bill Buster	9.6	12.8	199	11.7	< 0.0001
Intermediate: Measures	5.8	7.8	32	5.4	< 0.0001
Intermediate: Safety	6.2	7.5	32	3.9	< 0.0005
Primary: Habits	6.6	8.6	136	11.6	< 0.0001
Primary: Safety	6.8	8.5	191	11.7	< 0.0001

A *t* value greater than 2.00 and a *p* value < 0.05 indicates statistical significance at the 95 percent level of confidence. As one can see, the differences for all of the EP components are all statistically significant.

5.2.3 Teacher Surveys

Two surveys were conducted of teachers who used the Energenius materials in the classroom. The returned surveys were collected and analyzed by PG&E's Customer Marketing Department. We took these results and calculated the standard errors so that the confidence interval could be easily determined.[10] Tables Table 5-3 through Table 5-4 presents the results of these surveys.

Teachers were asked to rate the Energenius materials on a five-point scale (1=Poor, 2=Fair, 3=Good, 4=Very Good, and 5=Excellent) with respect to four attributes. Table 5-3 presents the means, the number of respondents, and the standard error for a series of questions.

Table 5-3. Mean Ratings by Teachers of Attributes With Respect to the Energenius Materials

	11/2001 through 6/2002			6/2002 through 6/2003		
Attributes of Energenius Program	Mean	N	Standard Error	Mean	N	Standard Error
Holding Students' Attention	4.1	97	0.09	4.1	215	0.05
Ease Of Incorporating Into Curriculum	4.0	97	0.11	3.9	214	0.06
Helpfulness Of Teacher's Kit	4.3	97	0.09	4.2	216	0.05
Overall Quality Of Program Materials	4.2	96	0.10	4.2	214	0.05

As one can see the teachers on average rated the Energenius materials as "Very Good" or better on these four attributes.

Teachers were next asked the extent to which they agreed (1=Strongly Disagree, 2=Disagree, 3=Agree, and 4=Strongly Agree) with a series of statements concerning the Energenius Program. Table 5-4 presents the mean agreement scores for the four statements.

[10] The 95 percent, 90 percent, and 80 percent confidence intervals can be calculated by multiplying the standard error by 1.96, 1.645, and 1.28, respectively.

Table 5-4. Mean Agreement Scores for the Energenius Program

	11/2001 through 6/2002			6/2002 through 6/2003		
Learning Outcomes	**Mean**	**N**	**Standard Error**	**Mean**	**N**	**Standard Error**
Exhibit More Positive Attitudes About Savings Energy	3.3	96	0.06	3.4	215	0.03
Know More About How To Use Energy More Wisely	3.4	97	0.07	3.5	216	0.03
Can Identify Ways To Reduce Energy Consumption In Their Homes	3.4	96	0.06	3.5	216	0.04
Have Learned How To Be Safer Around Electricity & Natural Gas	3.3	95	0.07	3.4	215	0.04

The mean scores indicate that, on average, teachers agreed with the four statements.

Next teachers were asked three questions and asked to provide a response on a five-point scale (with the 1 score being a poor rating and a 5 score being a high rating): 1) an overall rating for the EP, 2) how likely they were to teach another PG&E-sponsored energy efficiency educational program, and 3) how likely they were to recommend the EP to another teacher? Table 5-5 presents these results.

Table 5-5. Mean Overall EP Rating, Likelihood of Teaching in Another PG&E-sponsored Program, and Likelihood of Recommending the EP to Another Teacher.

	11/2001 through 6/2002			6/2002 through 6/2003		
Attributes of Energenius Program	**Mean**	**N**	**Standard Error**	**Mean**	**N**	**Standard Error**
Overall Rating Of Program	4.3	99	0.08	4.1	218	0.05
How Likely To Teach In Another PG&E Sponsored Efficiency Program	4.5	101	0.08	4.6	218	0.04
How Likely To Recommend Program To Another Teacher	4.7	100	0.07	4.6	218	0.05

From Table 5-5, we note that all the means are well above 4.0 meaning that teachers overall liked the EP, would teach in another PG&E-sponsored program, and are likely to recommend the EP to other teachers.

Teachers were then asked how many class hours they allocated to the EP. Table 5-6 presents these results.

Table 5-6. Number of Class Hours Devoted to the EP

	11/2001 through 6/2002		6/2002 through 6/2003	
Number of Classroom Hours Devoted To Program	**Frequency**	**Percent**	**Frequency**	**Percent**
1 to 3 hours	30	29%	54	25%
4 to 7 hours	42	41%	115	53%
8 to 12 hours	19	19%	34	16%
Over 12 hours	7	7%	13	6%
No Answer	4	4%	3	1%
Total	102	100%	219	100%

In the first period, 71 percent devoted four hours or more and 29 percent devoted eight hours or more. In the second period, 75 percent devoted four hours or more and 23 percent devoted eight hours or more.

Teachers were also asked how many students were in their classrooms. Table 5-7 presents these results.

Table 5-7. Number of Students in Classroom

	11/2001 through 6/2002		6/2002 through 6/2003	
Number of Students in Classroom	**Frequency**	**Percent**	**Frequency**	**Percent**
Less Than 20	20	118%	96	291%
21 - 30	49	288%	62	188%
31 - 50	17	100%	33	100%
Over 50	8	47%	19	58%
No Answer	8	47%	9	27%
Total	102	600%	219	664%

As one can see, in first period, 69 percent of the classrooms had less then 30 students while another 17 percent had 31 to 50 students. In the second period, 72 percent of the classrooms had less then 30 students while another 15 percent had 31 to 50 students. Very few classrooms had more than 50 students.

Finally, teachers were asked how they found out about the EP. Table 5-8 presents the results.

Table 5-8. How Teachers Found Out About the EP

	11/2001 through 6/2002		6/2002 through 6/2003	
How Learned About EP	**Frequency**	**Percent**	**Frequency**	**Percent**
Parents	5	5%	49	26%
Educational Colleagues	12	11%	41	22%
Catalog	8	7%	34	18%
PG&E's Website	45	42%	33	17%
Professional Meetings	10	9%	27	14%
Other	28	26%	5	3%
Total	108	100%	189	100%

In the first period, most, 42 percent, found out about the program through the PG&E website and another 11 percent found out from colleagues. In the second period, parents were the most frequently mentioned sources of EP information, followed by educational colleagues (22 percent), PG&E's Energenius Catalog (18 percent), and PG&E's Website (17 percent).

5.2.4 HEES (Home Energy Efficiency Survey) Results

Overall, the teachers felt the pilot test of the HEES[11] component was very successful. The teachers believe that the materials can accomplish PG&E's goal of involving parents in a simple audit of home energy use. They also felt that the materials could stand on their own if not used as an extension to the Energenius Measures program. Finally, they felt that that other teachers would be able to create other activities based on the output (reports) generated by the program's online survey.

They also offered a number of recommendations for enhancing the HEES component:

1. **Offer an alternative to Web access**. The second version of the materials prints out the first 14 questions of the survey and instructs students to answer the questions with their parents and bring the answers to school where the teacher will help them input their information online.
2. **Address the needs of less educated parents who may not be able to understand the lessons**. The concern for parents who are unable to help their students with homework extends beyond the Energenius programs. This issue was addressed by our recommendation in #1 above. By involving the teacher in reviewing answers from home, teachers have an opportunity to discuss responses with the students, and through the students, with their parents.
3. **Various wording changes**. All the changes were made in the second version of the materials.
4. **Further testing with a small set of teachers and students**.

[11] The HEES is an on-line energy audit offered by PG&E. Students can complete the on-line audit at home (or at school) and receive recommendations for reducing their household's energy use.

5.2.5 Program Theory Results

In this section, we present the results of analysis with respect to the linkages in the program theory illustrated in Figure 3-1. While the budget for this evaluation did not allow for a thoroughly rigorous and comprehensive testing of these linkages that comprise the EP theory, we were able to collect some evidence that allowed the R&A Team to arrive at some tentative conclusions for at least some of these linkages. Table 5-9 presents our conclusions.

Table 5-9. Results of Tests for Linkages in the Energenius Program Theory

Linkage	Description	No Support	Weak Support	Moderate Support	Strong Support
2	Schools persuaded to purchase EP materials				X
3	Teacher effectively trained			X	
4	Teachers persuaded to order EP materials				X
5	Teachers use materials				X
6	Students changes in attitudes, knowledge, & awareness			X	

Moderate to strong support was found for linkages #2 through #6. That the support for linkage #3 was only moderate is due to the fact that the evaluation budget did not permit a more rigorous evaluation of this linkage. Future evaluations should consider testing linkages #7 through #10. If PG&E decides to treat the Energenius Program as a resource acquisition program in the future, linkages #11 through #13 should also be tested.

5.2.6 Recommendations

- If PG&E wants to understand this Program's potential for resource acquisition, efforts should be made to measure the energy savings in the homes of the students as a result of the EP.
- The home energy survey component should be expanded and evaluated more rigorously.
- Energenius pre-test and post-test data should be collected and entered into a database on an on-going basis.
- For consistency, it is vitally important that, whenever appropriate, all surveys conducted use similar rating scales and response categories to record responses. To ensure that this is done in future evaluations, we strongly recommend that the primary evaluation contractor be responsible for constructing all data collection instruments.

5.3 School Resources Program

In this section of the report, we present the results of the workshops surveys, the workshop follow-up surveys, energy audits, the Energy Patrol and recommendations.

5.3.1 Workshop Surveys

This section presents the results of the workshop evaluations of the teacher, facility, custodial, and financial workshops.

5.3.1.1 Teacher Workshops

Participants in the Teacher Workshops were asked the extent to which the presentations of the following topics were effective (1=Not Effective, 5=Highly Effective). The results of this rating exercise are presented in Table 5-10.

Table 5-10. Evaluation of Teacher Workshop Components[12]

Workshop Component	Mean	Standard Error
Energy Bingo	3.9	0.10
Natural Resources: Renewable and Non-Renewable Energy Sources.	3.7	0.10
Video: Active Viewing Exercise	3.1	0.24
Energy Patrol	4.2	0.13
Energenius Ed Program -- Hands On Activities -- Elementary/Middle School Grades	4.1	0.08
Planning Energy -- Efficiency & Conservation Activities for Classroom	3.9	0.07
Overview & Display of classroom materials and resources for teaching about energy conservation and efficiency.	4.2	0.08

Clearly, the participants felt that the presentations were all effective, with scores ranging from 3.1 to 4.2.

Next, participants were asked the extent to which they agreed (1=Strongly Agree, 2=Disagree, 3=Agree, 4=Strongly Agree) with a series of four statements about the overall quality of the workshop and whether it increased their understanding of energy use and whether they expect to change their behavior as a result. Table 5-11 resents these results.

[12] Energy Bingo is a game similar to traditional bingo. Participants are presented with sixteen energy-related questions. A square is covered by placing the name of a person in the workshop who can answer one of the sixteen energy-related questions. The first person to cover an entire row or diagonal wins.

Table 5-11. Evaluation of Teacher Workshop Effectiveness

Statement About Workshop	Mean	Standard Error
I was introduced to a range of energy education materials, resources, and hands-on activities.	3.4	0.06
Wkshp has helped me understand more about energy efficiency practices at school and at home.	3.3	0.06
I understand how teaching about energy -- efficiency and conservation -- correlates to Content Standards and the Science Framework for California Schools.	3.3	0.06
I plan to include activities and lessons on energy education -- efficiency and conservation -- during this school year.	3.5	0.06

Again, participants revealed very high levels of agreement with these four statements. Clearly, the teachers who attended the workshop found the information to have been well presented leading to an increased understanding of energy use and likely to result in changes in their behavior.

5.3.1.2 Facility Workshop

Participants in the Facility Workshop were asked the extent to which they agreed (1=Strongly Disagree, 2=Disagree, 3=Agree, and 4=Strongly Agree) that the presentations of 10 key workshop topics were clear, informative, and useful. The results are presented in Table 5-12.

Table 5-12. Evaluation of Facility Workshop Components

Workshop Component	Mean	Standard Error
Overview: Importance of energy conservation & potential savings	3.5	0.10
Incorporating efficiency in daily operations and maintenance	3.6	0.10
New construction or major renovation: working with the design team	3.6	0.11
Success stories: West Contra Costa Unified School District	3.3	0.12
Benchmarking and Utility Tracking	3.5	0.11
California Energy Commission Programs	3	0.12
PG&E Programs	3.3	0.10
Lighting and daylighting strategies	3.5	0.10
Mechanical systems	3.4	0.12
Building envelope	3.4	0.11
Roofs	3.4	0.12

Participants agreed that the presentations of the 10 workshop components were clear, informative and useful.

Next, participants were asked the extent to which they agreed (1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Strongly Agree) with a series of five statements about the workshop. The results are presented in Table 5-13.

Table 5-13. Evaluation of Facility Workshop Effectiveness

Statement About Workshop	Mean	Standard Error
The Seminar provided a good opportunity to learn how to improve the energy efficiency of facilities in my school district.	3.5	0.10
I will recommend new, energy efficient design, renovation or retrofit projects to my district.	3.5	0.10
I will recommend changing maintenance materials and practices to include energy efficiency considerations.	3.5	0.10
The group working session logistics (e.g., facility, registration, meals, and materials) were well arranged and organized.	3.7	0.10
Overall, the meeting was well planned and informative.	3.7	0.09

From Table 5-13, we see very high levels of agreement regarding the learning opportunities, changes in behavior, logistics, and overall success of the group working sessions.

5.3.1.3 Custodial Workshop

Participants were asked to rate seven components of the workshop on a five-point scale where 1=Low Quality and 5=High Quality. The results of this rating exercise are presented in Table 5-14.

Table 5-14. Evaluation of Custodial Workshop Components

Workshop Component	Mean	Standard Error
Background information on energy use in schools	4.4	0.21
What do you think? (e.g. of current conservation in your school and what you can do to facilitate efficiency in your school)	4.0	0.77
Systems and equipment in schools	4.0	0.28
Cleaning operations	3.8	0.32
What enenergy misuse costs and what energy savings can mean to you	4.5	0.21
What can you do to reduce your energy costs?	4.4	0.21
Area-by-area search for energy use in schools	4.1	0.34

As one can see, the participants on average provided very high ratings, with only one component receiving an average score less than 4.0.

Next, participants were asked the extent to which they agreed (1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree) with a series of five statements about the overall

quality of the workshop and whether it increased their understanding of energy use and whether they expect to change their behavior as a result. The results are presented in Table 5-15.

Table 5-15. Evaluation of Custodial Workshop Effectiveness

Statement about Workshop	Mean	Standard Error
The information provided during the workshop will assist me in reducing energy use in my school.	4.8	0.10
The information provided gives me a better understanding of how energy can be misused in a school.	4.4	0.29
As a result of this workshop, I plan to be an example to the students, staff and administration to reduce energy consumption in my school.	4.2	0.28
I recommend that other districts in the Bay Area have similar training for their custodial staff.	4.4	0.29
Overall, the workshop was well planned and informative.	4.4	0.29

Again, participants revealed very high levels of agreement with these five statements. Clearly, the custodians who attended the workshop found the information to have been well presented leading to an increased understanding of energy use and likely to result in changes in their behavior.

5.3.1.4 Finance Workshops

Participants in the ***July*** Financial Workshop were asked the extent to which they agreed (1=Strongly Disagree, 2=Disagree, 3=Agree, and 4=Strongly Agree) that the presentations of 12 key workshop topics were clear, informative, and useful. The results are presented in Table 5-16. Again, we see very high levels of agreement, with many of the score well above 3.0.

Next, participants were asked the extent to which they agreed (1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Strongly Agree) with a series of four statements about the workshop. The results are presented in Table 5-17. From Table 5-17, we see very high levels of agreement regarding the learning opportunities, logistics, and overall success of the group working sessions.

Table 5-16. Evaluation of Financial Workshop Components

Workshop Component	July		October	
	Mean	Standard Error	Mean	Standard Error
California Energy Issues & Prices	3.2	0.13	3.3	0.11
School Bonds & Low Interest Loan Program	3.5	0.16	3.5	0.12
West Contra Costa Unified School District Success Story	3.5	0.16	3.4	0.16
Financial Presentation				
Energy Efficiency Financing Vehicles	3.5	0.16	3.4	0.13
Quantifying the costs of delaying energy efficiency projects	3.6	0.20	3.3	0.12
Potential sources of funding	3.6	0.20	3.5	0.12
Decision process and team building	3.6	0.22	NA	NA
Retrofit Project Rebates Available & School Success Stories/Examples	3.0	0.13	3.5	0.13
ENERGY STAR products and services				
What is Energy Star and how it can help your organization?	3.3	0.14	3.5	0.13
More efficient buildings with better working and learning environments	3.2	0.13	3.6	0.14
Resources and Technical tools provided by Energy Star	3.3	0.15	3.5	0.14
Portfolio Manager and benchmarking Your Building's Energy Performance	3.1	0.13	3.5	0.15

Participants in the ***October*** Financial Workshop were also asked the extent to which they agreed (1=Strongly Disagree, 2=Disagree, 3=Agree, and 4=Strongly Agree) that the presentations of 12 key workshop topics were clear, informative, and useful. The results are presented in Table 5-16. Again, participants agreed with 12 statements. Clearly, those who attended the Finance Workshop found that the workshop topics were clearly presented, informative, and useful.

Next, participants were asked the extent to which they agreed (1=Strongly Agree, 2=Disagree, 3=Neutral, 4=Strongly Agree) with a series of three statements about the workshop. The results are presented in Table 5-17. Again, we see very high levels of agreement regarding the learning opportunities, logistics, and overall success of the group working sessions.

Table 5-17. Evaluation of Financial Workshop Effectiveness

Statement about Workshop	July		October	
	Mean	Standard Error	Mean	Standard Error
The group working sessions provided a good opportunity to learn how to apply information from the presentation to real-life situations.	3.2	0.13	3.6	0.17
The online presentation was beneficial in preparing for the workshop.	3.2	0.17	NA	NA
The group working session logistics (e.g., facility, registration, meals, and materials) were well arranged and organized.	3.1	0.16	3.6	0.17
Overall, the group working session was a success.	3.3	0.15	3.7	0.14

5.3.2 Follow-Up Workshop Surveys

This section presents the results of the follow-up surveys of those who participated in the teacher and finance workshops. Recall that no follow-up surveys were returned by those participating in the Custodian and Facility Workshops.

5.3.2.1 Teacher Workshops

Participants in the Teacher Workshops were asked whether they had taken any action with respect to the information and tools presented at the workshop. If they had not, they were asked whether or not they planned to do so in the next 12 months. The results are presented in Table 5-18.

Table 5-18. Follow-Up Survey Results for Those Attending the Teacher Workshop

	Since attending the PG&E-sponsored Teacher Workshop in Summer or Fall of 2002, have you . . .	**Yes (%)**	**No, But Plan To In The Next 12 Months (%)**	**No and *Do Not* Plan To In The Next 12 Months (%)**	**Don't Know (%)**	**Missing Response (%)**
1	Ordered and received the *Energenius® Educational Program materials*?	84.1	0	11.4	2.3	2.3
2	Used the *Energenius®* materials in your classroom?	75	13.6	11.4	0	0
3	Used any of the suggested web sites in the PG&E *Online Energy Resources for Educators* booklet distributed at the workshop?	6.8	29.5	52.3	9.1	2.3
4	Used the *Energy Patrol* materials distributed or suggested at the workshop?	54.5	11.4	22.7	6.8	4.5
5	Established a *Classroom* or *School Energy Patrol*?	38.6	18.2	38.6	4.5	0
6	Followed up with other energy activities listed on the personal *Planning Form* submitted at the workshop?	65.9	13.6	15.9	2.3	2.3
7	Conducted *Energenius®* or other energy efficiency activities that involve parents or guardians?	34.1	22.7	34.1	9.1	0
8	Encouraged your students to adopt energy efficient behaviors at school and at home?	93.2	2.3	2.3	0	2.3

These data suggest that the participants have been very active in using workshops information and materials with over 93 percent encouraging their students to adopt energy efficient behaviors at school and home, over 84 percent ordering and receiving Energenius Program materials, and nearly 66 percent following up with other energy activities listed on the Personal Planning Form submitted at the workshop.

5.3.2.2 Finance Workshops

Participants in the Finance Workshops were asked whether they had taken any action with respect to the information and tools presented at the workshop. If they had not, they were asked whether or not they planned to do so in the next 12 months. The results are presented in Table 5-19.

Table 5-19. Follow-Up Survey Results for Those Attending the Finance Workshops

	Since attending the PG&E-Sponsored Financing Workshop in 2002, has your school or school district, . . .	Yes (%)	No, But Plan To in the Next 12 Months (%)	No and *Do Not* Plan To in the Next 12 Months (%)	Don't Know (%)	Missing Response (%)
1	Signed up for ENERGY STAR® products and services?	62.5	25	12.5	0	0
2	Sought the services offered by energy services providers (ESCOs)?	37.5	25	25	0	12.5
3	Entered into a tax-exempt lease/purchase agreement for energy efficient equipment?	0	37.5	37.5	25	0
4	Participated in the Express Efficiency Program?	37.5	25	0	25	12.5
5	Participated in the Standard Performance Contracting Program?	25	37.5	0	12.5	25
6	Accessed the ENERGY STAR® website (www.energystar.com) to explore performance rating systems?	87.5	0	0	0	12.5
7	Accessed the product listings at the ENERGY STAR® website (www.energystar.gov)?	62.5	12.5	0	25	0
8	Begun an effort to institute a performance rating system that measures and rates energy consumption?	50	37.5	0	0	12.5
9	Instituted a performance rating systems that measures and rates energy consumption?	37.5	12.5	0	37.5	12.5
10	Used the Portfolio Manager (performance rating system) on the Environmental Protection Agency Website (www.energystar.gov)?	0	50	12.5	25	12.5
11	Sought to achieve the ENERGY STAR® label for school buildings?	37.5	25	0	25	12.5
12	Used the ENERGY STAR® Purchasing Tool Kit?	37.5	25	12.5	12.5	12.5
13	Encouraged the purchase of energy efficient products?	87.5	12.5	0	0	0
14	Modified equipment specifications and purchasing guidelines to insure the purchase of energy efficient equipment?	62.5	25	0	0	12.5
15	Used the energy-efficient project evaluation methods (first cost, simple payback, project payback, net present value, internal rate of return, return-on-investment, lifecycle cost analysis, simple cash flow)?	62.5	37.5	0	0	0
16	Helped finance an energy efficiency project by participating in a PG&E-sponsored rebate program?	50	50	0	0	0
17	Financed energy efficiency project using Qualified Zone Academy Bonds (QZABs)?	0	12.5	50	25	12.5
18	Financed an energy efficiency project using Urgent School Renovation Grants?	0	0	50	37.5	12.5
19	Financed an energy efficiency project(s) using California Energy Efficiency Financing Programs such as Bright Schools or Flex Fund?	12.5	37.5	25	25	0
20	Had an investment-grade energy audit conducted in your district or school?	50	37.5	12.5	0	0

As one can see, the participants have been very active in using workshops information and materials with over 87 percent accessing the Energy Star website and encouraging the purchase of energy efficient products and nearly 63 percent signing up for Energy Star products and services.

5.3.3 Review of Energy Audit Surveys

As part of the evaluation of the SRP, Ridge & Associates reviewed the energy audits performed by two contractors under this program year. It was found out late in the evaluation that there was a third contractor that audited four schools, but we were unable to obtain those reports in time to include in this review. This section summarizes the review of the two contractors' audits.

5.3.3.1 Overview

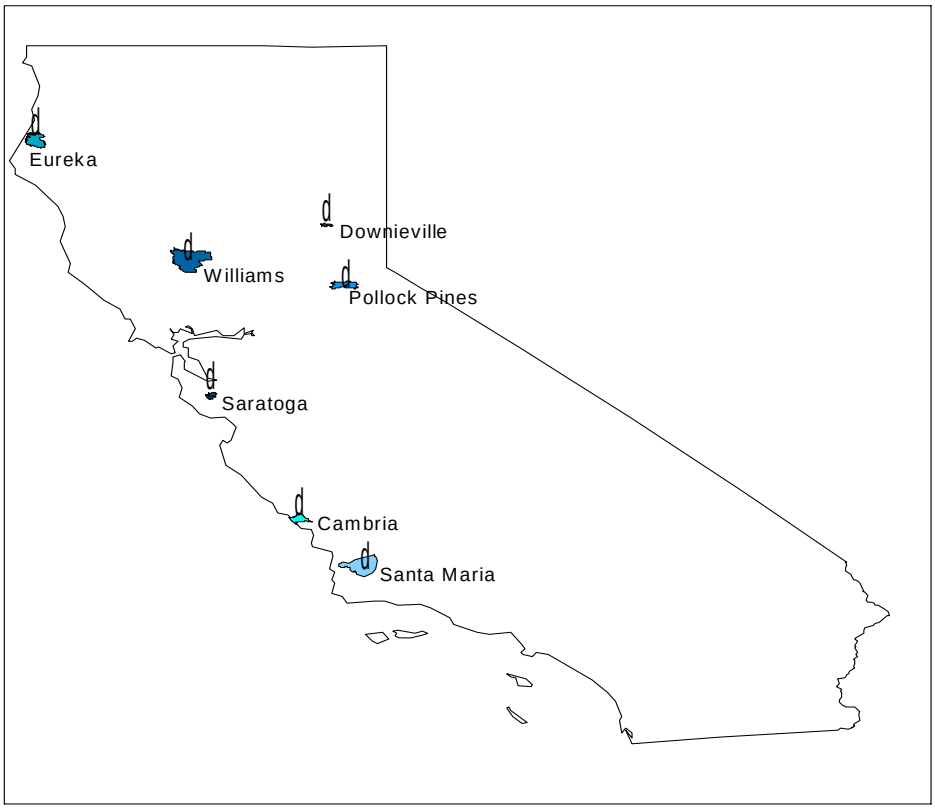
Seven school districts had energy audits through the SRP using funds from program year 2002. These audits, covering 18 schools (shown in Table 5-20), were carried out by two contractors from November of 2002 to February of 2003 with reports following the audit.

Table 5-20. Sites with Energy Audits

District	Site	City
Pollock Pines Schools	Pinewood Elementary	Pollock Pines
Pollock Pines Schools	Sierra Ridge Middle School	Pollock Pines
Pollock Pines Schools	Emmigrant Trail Elementary	Pollock Pines
Williams USD	Elementary, Middle, and High Schools	Williams
Eureka Schools	Eureka High and Marshall	Eureka
Eureka Schools	Zane Middle	Eureka
Eureka Schools	Winship Junior High	Eureka
Eureka Schools	Lincoln Elementary	Eureka
Eureka Schools	Eureka Adult Education / Zoe Barnum	Eureka
Coast Unified SD	Coast Union High School	Cambria
Coast Unified SD	Leffingwell Continuation High School	Cambria
Coast Unified SD	Santa Lucia Middle School	Cambria
Coast Unified SD	Cambria Grammar School	Cambria
Santa Maria Joint USD	Santa Maria High School	Santa Maria
Santa Maria Joint USD	Ernest Righetti High School	Santa Maria
Saratoga High School	Saratoga High School	Saratoga
Sierra-Plumas Joint USD	Pliocene Ridge School	Downieville
Sierra-Plumas Joint USD	Downieville School	Downieville

As shown by the red dots in Figure 5-2, one school district was in the San Francisco Bay area, two districts were in the Sierra foothills or mountains, one district was in the central valley, and the remaining three were either on the coast or very close to it (ranging from the southern to the northern reaches of the PG&E service territory).

Figure 5-2. SRP Energy Audit School Site Map



5.3.3.2 Review Process

An engineering review of the reports from the audits was done to determine what type of savings were possible at the school sites as well as to have another set of eyes critically review the estimated savings.

The R&A Team obtained the audit reports as Adobe Acrobat PDF files. Review of the reports consisted of reading through the write-ups, creating a spreadsheet with recommended measures and estimated savings, going through each measure to assess the validity of the audit estimates, and analyzing the savings data. Not all measures could be critically reviewed because assumptions and engineering specifics were not always detailed within the report. Additionally, certain values within the report, which may have been questioned by the evaluation team, could not be substantiated without actually obtaining information from the site. However, as the audits were meant to provide preliminary estimates of savings, the R&A Team felt that the ability to substantiate questionable values was unnecessary at this point in time. The R&A Team used their expertise in the area and engineering judgment to assess reasonableness of the estimated savings. Past evaluation reports were accessed as needed to help verify assumed savings as needed. These reports are shown in the references (Appendix E).

5.3.3.3 Review Results

Overall, the evaluation team found the audits provided reasonable estimates of potential savings. Out of the 63 measures recommended across all audits, 3 measures gave estimated savings that were definitely too high, 4 more measures had values within the engineering estimate that may have been too high, and for 13 measures no opinion was formed due to insufficient data.

Once the information had been put into a spreadsheet, it was analyzed in various ways. For this analysis, the two of the three measures that the evaluation team felt were definitely too high were removed and one was set to half the original value. In Table 5-21, the total estimated savings from the recommended measures have been broken out by low cost or capital cost. A low cost measure was considered to be a measure that took less than $2,500 to implement. As this table shows, about one-quarter of the measures recommended were considered low cost.

Table 5-21. Potential Estimated Savings By Cost Type

Measure Cost Type*	kWh Savings	kW Savings	Therm Savings	% of kWh Savings	% of kW Savings	% of Therm Savings
Low Cost	225,744	57	5,686	27%	24%	24%
Capitol Cost	602,071	182	18,275	73%	76%	76%
Total	827,815	239	23,961			

*Low Cost is anything under $2,500 to implement

The R&A Team went through each measure and assigned it to a specific end use based on where the energy was saved. Not unexpectedly, lighting has the majority of electric energy and demand savings. Service hot water provides almost all of the natural gas savings. Of interest is the 14% of kWh savings from the Plug Load end use. These savings are, with only two exceptions, from the installation of a Vending-Miser technology. The one measure in the "Other" end use that had a relatively high demand reduction was moving a well pump off peak. Table 5-22 provides this information for all end uses.

Table 5-22. Percent of Potential Savings by End Use

End Use	% of kWh Savings	% of kW Savings	% of Therm Savings
Lighting	53%	68%	0%
HVAC	31%	17%	11%
Motors	1%	1%	0%
Plug Load	14%	0%	0%
Service Hot Water	0%	0%	89%
Other	1%	13%	0%

The R&A Team had annual usage data for all but two schools. The estimated savings were compared to the annual usage to determine what percent the savings were of the usage. On average, the schools were estimated to save 7.9% of their annual electric energy usage, with a median of 7.3% and a range from 0.4% to 17.3%. Only five of the schools had recommendations of measures that would save natural gas. Of those, one of the measures was set to zero because it was too high and could not be reduced by the evaluation team based on the information in the report. However, of the four schools with savings from natural gas, the average therm reduction was 6%, with a median of 3.8% and range from 2.1% to 14.5%.

5.3.4 Energy Patrol

Before introducing the Energy Patrol (Patrol) to their students, teachers received training in how to implement the Patrol. At the conclusion of the workshop, teachers were asked to evaluate the quality of the instruction. They were asked the extent to which they agreed with the following statements:

- I understand the goals of implementing a school Energy Patrol.
- The training has helped me understand more about energy waste and energy efficiency practices at school.
- The draft Handbook was fully explained and reviewed, making the implementation steps clear to me.
- The walk-through of the school helped me better understand the monitoring tasks patrol students will perform.
- As a result of the training, I am able to identify areas of the school where energy use should be monitored.
- The connections made at the training between energy use and conservation of limited natural resources were clear.
- I understand how teaching about energy efficiency and conservation — correlates to Content Standards and the Science Framework for California Public Schools.
- I understand all my responsibilities to the field test process, including providing recommendations for the final Energy Patrol Handbook.

The three teachers agreed strongly with all these statements, clearly indicating that they considered the training to be highly effective.

After completing the Patrol, PG&E interviewed three of the four teachers who field-tested the Patrol. Below we first present their general reactions to the handbook, the actual filed testing of the Patrol, and recommendations.

5.3.4.1 Energy Patrol Handbook

While teachers had many useful recommendations regarding the Energy Patrol Handbook, most felt that, overall, the Patrol handbook was well written, well organized, and contained useful materials. One teacher felt that there were more materials in the handbook than necessary and some things were over-explained. The teacher stated that it is important not to overwhelm the students with material. Another teacher felt that the idea of adding a "Quick and Easy" section actually "devaluates it."

5.3.4.2 Field Test

While a sample of three constitutes only anecdotal evidence, the data from the interviews indicate that the field tests went well, with most students actively engaged in a variety of hands-on activities. The teachers would do the Patrol again but suggested that it be a year-long program so that students could see how energy savings opportunities vary across seasons and integrated into the science and math curriculum.

However, the Patrol appeared not to be equally effective for all students. Two teachers noticed that high achieving students were more enthusiastic about the Patrol than lower achieving students. Again, while this constitutes only anecdotal information, it is something to watch for since the SRP presumably targets all students and not just the high achieving students. It may become necessary to develop modules that lower achieving students find more interesting.

Having the flexibility to modify the Patrol given their situations is critical if the Patrol is going to be widely used by teachers. For example, one teacher set up his patrol differently from what was described in the manual. He felt that other teachers in the school would not like the "policing" approach to "force" them to save energy. The fact that students from another class would be leaving "reminder" notes could be perceived in a negative way. Instead, after students analyzed the school site for energy-saving areas, two or three students went to other classes to present information about the importance of saving energy. Each group of two or three students was assigned different classes to visit at school. Disseminating information in this manner seemed to encounter less resistance, according to this teacher.

5.3.4.3 Energy Patrol Recommendations

The recommendations below were made by more than one teacher and suggest some agreement of important changes in program design and delivery.

- I recommend that a video about Energy Patrol be shown right away as a motivation for students.
- The principal should not assign this to a teacher. It should be strictly on a volunteer basis.
- A connection to standards is a must! Not just the Energenius, but also the Patrol itself. Focus on science and math. "The selling point being that this is part of education."
- Keep the Patrol Manual as is, but simplify the glossary.
- Make the program a year-long effort.
- Develop a video to show teachers and students how an energy patrol can be done in various ways/various school settings. This could be an effective way to motivate teachers.
- The video should be short and shown at a teachers' school-wide meeting since it is critical that there is school-wide buy into the Patrol component of the SRP.

5.3.5 The West Contra Costa Unified School District Case Study

The PG&E School Resources Program has worked with the West Contra Costa Unified School District for three years. This short write-up provides an overview of the school district and a chronology of some of the work performed with the school by PG&E and their partners.

5.3.5.1 Overview of School District

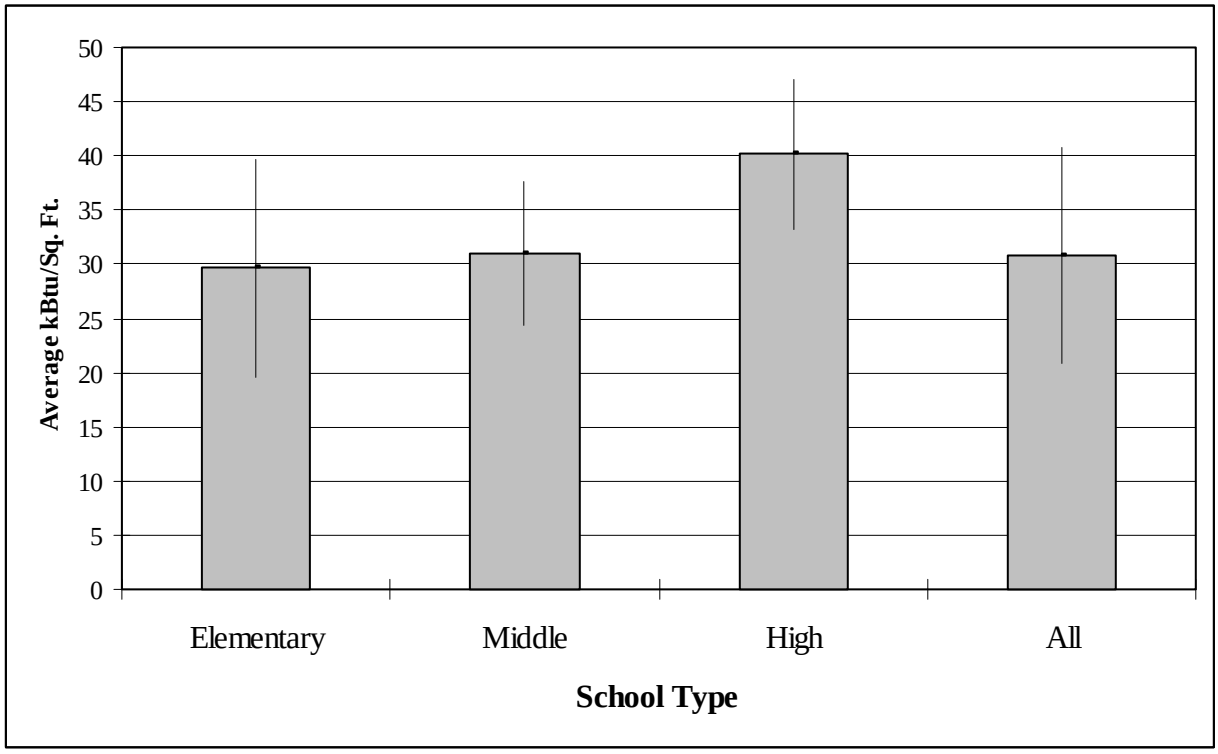
West Contra Costa Unified School District (WCCUSD) encompasses schools in Richmond, San Pablo, Pinole, Hercules, and other cities in the western portion of Contra Costa County. The district has 63 schools, broken into school types as shown in Table 5-23. Also shown in this table are the number of schools in the energy use benchmarking study (MIT, 2002). This value is included because the remainder of the school statistics are taken from this study and, therefore, represent 49 of the schools within the district.

Table 5-23. WCCUSD School Types

School Type	Number of Schools	Schools in Benchmarking Study
Elementary	39	39
Middle	6	5
High	6	5
Alternative	10	0
Special Education	2	0
Total	*63*	*49*

The schools within the benchmarking study cover 3.2 million square feet of construction and enroll close to 33,000 students. The benchmarking study obtained energy use data (electric and natural gas) from PG&E for 1999-2000. That data was used to calculate energy use for each school. Figure 5-3 shows the average energy use in kBtu/square foot by school type as well as the standard deviation of the average.

Figure 5-3. Average Energy Use and Standard Deviation by School Type

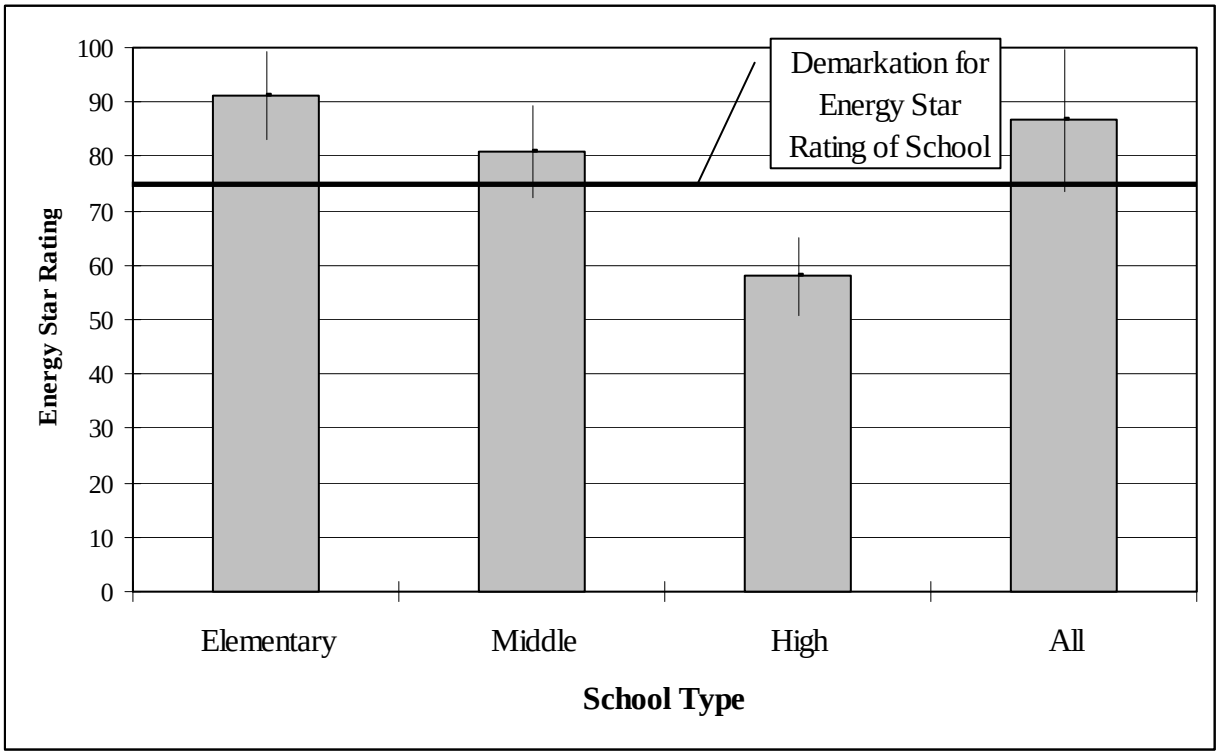


Each of the schools in the benchmarking study had an Energy Star rating computed using actual annual electric and gas records (assumed from 1999-2000, although not overtly stated in the report), building area, student population, and cooking facility data. Hours of operation and percentage of mechanical cooling were assumed for most of the elementary schools, while actual values were used for the middle and high schools.

A school is considered an Energy Star school if this rating is 75 or greater. (See http://www.energystar.gov/index.cfm?c=k12_schools.bus_schoolsk12 for further details on Energy Star K-12 schools). Figure 5-4 shows the average school Energy Star rating along with the standard deviation of the mean.[13]

[13] Ridge & Associates made no effort to verify the Energy Star rating values in the benchmarking study.

Figure 5-4. Energy Star Rating by School Type



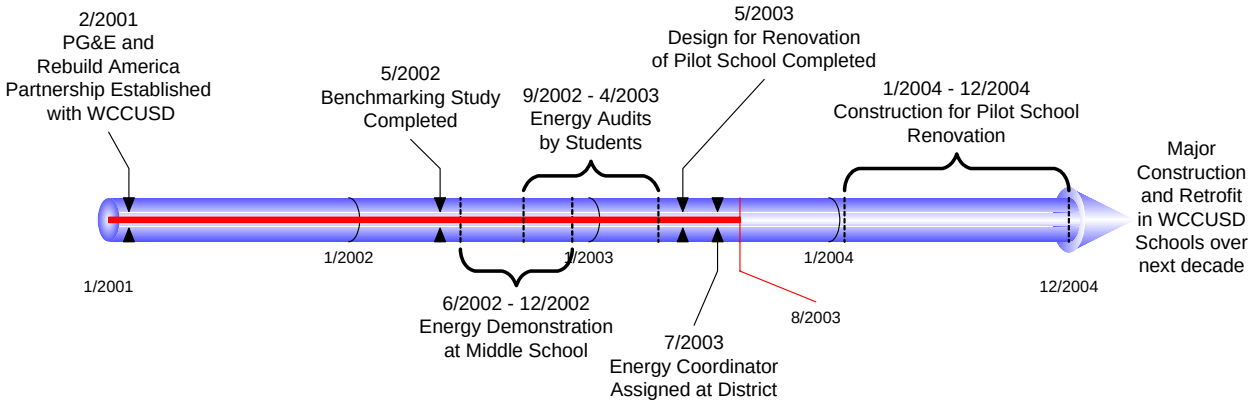
As Figure 5-4 shows, the elementary schools all rated very highly. On a school-by-school basis, all but two elementary schools were above the rating of 75 to indicate they were Energy Star schools. One middle school was under the Energy Star rating value of 75, one middle school was right at the break point and three were above 75. All of the high schools were below an Energy Star rating.

5.3.5.2 Chronology

WCCUSD has been working with multiple entities (i.e., PG&E, Rebuild America, California Energy Commission, and others) over the past three years to improve the energy efficiency of schools within the district. These entities have formed a loose confederation of companies that "partner" to provide energy efficiency services to schools within California. Through this partnership, the PG&E School Resource Program (SRP) has been helping the district work through the steps that will hopefully lead to more efficient use of energy at the WCCUSD schools that need help.

The chronology of the work at WCCUSD is instructive as it highlights the sustained intervention needed to create change within a school setting. This is shown in Figure 5-5.

Figure 5-5. Chronology of Work with WCCUSD



Although the involvement of PG&E and Rebuild America with the WCCUSD began in early 2001, WCCUSD was very likely already aware of the benefits energy efficiency. Prior to 2001, WCCUSD had completed two 10-year efficiency phases that no doubt had a significant impact on the awareness, knowledge, and attitudes of WCCUSD decisionmakers. During that earlier period, WCCUSD installed time and temperature controls on mechanical systems, replaced boilers with individual classroom furnaces, purchased new hot water heaters, and installed newer lighting. Based on this earlier work, the school district was very likely eager to identify additional energy efficiency options when the opportunity arose to partner with PG&E and Rebuild America. This underscores the importance of identifying customers who are eager to participate but lack the necessary resources. Such customers, with assistance, can achieve significant energy savings.

5.3.6 Program Theory Results

In this section, we present the results of analysis with respect to the linkages in the program theory illustrated in Figure 4-1. While the budget for this evaluation did not allow for a thoroughly rigorous and comprehensive testing of these linkages that comprise the SRP theory, we were able to collect some evidence that allowed the R&A Team to arrive at some tentative conclusions for at least some of these linkages. Table 5-24 presents our conclusions.

Moderate to strong support was found for linkages 2 through 12. Note that strong support of linkages #3, #4, #5, #7, #11, and #12 means that we were able to verify that these activities occurred; they are considered outputs of the SRP. No data were obtained from facilities and custodians who participated in the workshops to determine support on linkages #8b and #28. If PG&E decides to treat the Energenius Program as a resource acquisition program in the future, linkages #21, #24, #26, and #29 should also be tested.

Table 5-24. Results of Tests for Linkages in the SRP Theory

Linkage	Description	No data available to test linkage	No Support	Weak Support	Moderate Support	Strong Support
2	Targeted districts and schools reached by marketing efforts				X	
3	Custodians participate in workshops					X
4	Teachers participate in workshops					X
5	Energy Patrols created					X
6	Custodians learn new tools and techniques in workshops				X	
7	School personnel participate in financing and facilities workshops					X
8a	Participants in financing workshops learn new tools and techniques				X	
8b	Participants in facilities workshops learn new tools and techniques	X			X	
9	Participants in financing and facilities workshops apply new tools and techniques in preparing project implementation plans				X	
10	Participants in financing and facilities workshops apply new tools and techniques in the development and review of energy efficiency plans				X	
11	Schools conduct benchmarking studies					X
12	After conducting benchmarking studies, schools conduct energy audits					X
18	Participants in the teacher workshops learn new materials, tools, and techniques				X	
19	Participants in the teacher workshops use new materials, tools, and techniques				X	
22	Eenrgy Patrols identify energy savings opportunities			X		
23	Identified energy savings opportunities are implemented by schools			X		
28	Custodians use tools and techniques that are learned in workshops	X				

5.3.7 Recommendations

- Efforts should be made to expand and more carefully evaluate the impact of the energy patrols.
- Because the SRP is an information-only program, there is currently no requirement to estimates kWh, kW, or therm impacts. However, greater efforts should be made to verify the accuracy of the estimates contained in the benchmarking studies and energy audits since customers are making decisions about efficiency investments based upon this information.
- Participant names, mail addresses, and e-mail addresses should be regularly input into a program-tracking database. These data should include:
  - Workshop participant
  - Workshop teachers
  - Participating schools and key personnel
- An improved program-tracking database will be required to support future evaluations. For example, information regarding all services received by each school, the date(s) these

services were delivered, and any estimated savings would be useful. A more comprehensive case study analysis should be done at the WCCUSD. Part of this analysis should address the extent to which the WCCUSD model can be replicated in other school districts.

- For consistency, it is vitally important that, whenever appropriate, all surveys conducted use similar rating scales and response categories to record responses. To ensure that this is done in future evaluations, we strongly recommend that the primary evaluation contractor be responsible for constructing all data collection instruments.

Appendix A. SRP Questionnaires

This appendix has multiple surveys used within the SRP. In the order provided they are:

- In-depth Interview Guide for the SRP in general
- Evaluation form for the Financial Workshop
- Evaluation form for the Facility Manager Workshop
- Evaluation form for the Custodian Workshop
- Follow-up Survey for the Financial Workshop participants

In-Depth Interview Guide: Strategic Innovations

Introduction:

Ridge & Associates is conducting a market assessment and evaluation (MA&E) study of PG&E's School Resources and Energenius Programs. The focus of this interview is on the School Resources Program. The goal of this interview is to discuss the program process, recent innovations in marketing, program delivery and program design, and factors affecting participation in 2002.

---

1. Approximately when was your first contact with the PG&E SRP Program?

2. In general, what is your role in the PY 2002 School Resources Program?

3. Who was responsible in 2002 for coordinating the efforts of Strategic Innovations, Rebuild America, CEC, PG&E, and Phillip Lighting?

4. How successful was coordination of efforts in 2002 of Strategic Innovations, Rebuild America, CEC, PG&E, and Phillip Lighting? [PROBE AS NECESSARY]

READ: Now I'd like to focus on the activities at the West Contra Costa County Unified School District.

5. How many schools are in the WCCCUSD?

6. How many students are enrolled?

   Elementary:
   Middle:
   High:

7. When did your involvement with the WCCCUSD begin?

8. Was your involvement in support of the SRP?

9. What kind of support did the Strategic Innovations provide to the SRP effort in the WCCUSD? Please describe your efforts chronologically.

10. What, in you opinion would the WCCUSD have done without the support of all the partners?

11. Where can I obtain more specific data on which particular buildings have been treated by the SRP over the since the beginning of SRP's involvement with the WCCCUSD?

12. Approximately, how many square feet are there?

13. Approximately how many square feet have been treated?

14. Where can I obtain more specific data on which particular activities have been conducted by the SRP over the since the beginning of SRP's involvement with the WCCCUSD?

15. Where can I obtain more specific data on what particular measures have been installed in these buildings?

16. Where can I obtain more specific data on the savings associated with these measures?

17. Are there plans to continue making energy efficient retrofits at WCCCUSD?

18. Have there been any permanent changes at WCCCUSD in *procurement* policies and procedures with respect to energy efficiency?

    If yes, what changes have been made?

19. Have there been any permanent changes at WCCCUSD in building *operation and maintenance* policies and procedures with respect to energy efficiency?

    If yes, what changes have been made?

20. Do you feel that a culture of energy efficiency has been created at WCCCUSD among the:

    Faculty:
    Students:
    School Administrators:
    District Administrators:

    READ: thank you for taking the time to talk with me about the School Resources Program.

Evaluation Form for Teacher Workshop

	Please indicate the extent to which the presentations of the following topics were effective:	Highly Effective		Effective	Not Effective	
		5	4	3	2	1
1	Energy Bingo					
2	Natural Resources: Renewable and Non-Renewable Energy Sources					
3	* Video: Active Viewing Exercise					
3	* Energy Patrol					
4	Energenius Education Program Hands-On Activities for Elementary and Middle-Grade Students					
5	Planning Energy Efficiency and Conservation Activities in the Classroom					
6	Overview and Display of Classroom Materials and Resources for Teaching about Energy Conservation and Efficiency					
	Please indicate the extent to which you agree or disagree with the following statements:	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**	
7	I have been introduced to a range of energy education materials, resources, and hands-on activities.					
8	The workshop has helped me understand more about energy efficiency practices at school and at home.					
9	I understand how teaching about energy efficiency and conservation correlates to Content Standards and the Science Framework for California Public Schools.					
10	I plan to include activities and lessons on energy education (conservation and efficiency) during the school year.					
11	Were you familiar with (or have you taught) any of the materials presented at the workshop? Yes/No					

*Two versions of item 3 are evaluated, because the video viewing excercise intended for presentation in the first four workshops was replaced by an Energy Patrol in the last three. (The video was shown in only one workshop, at the Christian Center School in Lakeport.)

Evaluation Form for Custodian Workshop

On the five-point scale of "Low" to "High", please rate the quality of the information provided on the following topics covered during the workshop:	**Low 1**	**2**	**3**	**4**	**High 5**
Background information on energy use in schools					
What do you think?					
Systems and equipment in schools					
Cleaning operations					
What energy misuse costs and what energy savings can mean to you					
What you can do to reduce your energy costs					
Area-by-area search for energy use in schools					
Please indicate the extent to which you agree or disagree with the following statements:	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
The information provided during the workshop will assist me in reducing energy use in my school.					
The information provided gives me a better understanding of how energy can be misused in a school.					
As a result of this workshop, I plan to be an example to the students, staff and administration to reduce energy consumption in my school.					
I recommend that other districts in the Bay area have similar training for their custodial staff.					
Overall, the workshop was well planned and informative.					

What were the best parts of the workshop?

What areas (if any) need to be improved?

Is there anything else you would have liked this workshop to include?

Evaluation Form for Financial Workshop

Please indicate the extent to which you agree or disagree that the presentations of the following workshop topics were *clear, informative, and useful*:	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**
California Energy Issues and Prices				
West Contra Costa School District Success Story				
Financial Presentation:				
Alternative Energy Efficiency Financing Structure				
Quantifying the costs of delaying energy efficiency projects				
Potential sources of funding				
Retrofit Project Rebates Available and School Success Stories/Examples				
Energy Star Product and Services:				
What is Energy Star and how it can help your organization				
More efficient buildings with better working and learning environments				
Resources and technical tool provided by Energy Star				
Please indicate the extent to which you agree or disagree with the following statements:				
The group working sessions provided a good opportunity to learn how to apply information from the presentation to real-life situations.				
The online presentation was beneficial in preparing for the workshop.				
The group working session logistics (e.g., facility, registration, meals, and materials) were well arranged and organized.				
Overall, the group working session was a success.				

Please provide any suggestions for future topics/sessions:

Please provide any suggestions to improve future group working sessions:

Evaluation Form for Facility Manager Workshop

Please indicate the extent to which you agree or that the presentations of the following topics were clear, informative, and useful:	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**
Overview: Importance of energy conservation & potential savings				
Incorporating efficiency in daily operations and maintenance				
Success stories: West Contra Costa Unified School District				
Benchmarking and Utility Tracking				
California Energy Commission Programs				
PG&E Programs				
Lighting and daylighting strategies				
Mechanical systems				
Building envelope				
Roofs				
Please indicate the extent to which you agree or disagree with the following statements:				
The Seminar provided a good opportunity to learn how to improve the energy efficiency of facilities in my school district.				
I will recommend new, energy efficient design, renovation or retrofit projects to my district.				
I will recommend changing maintenance materials and practices to include energy efficiency considerations.				
The group working session logistics (e.g., facility, registration, meals, and materials) were well arranged and organized.				
Overall, the meeting was well planned and informative.				

Which aspects of the workshop were the most beneficial to you?

Which aspects of the workshops could be improved?

What suggestions do you have for future meetings/workshops?

Draft Follow-Up Survey for Financial Workshop

Below, please indicate which of the following resources or tools your school or school district have used or plan to use within the next 12 months.

Since attending the PG&E-sponsored financing workshop on February 20, 2001, has your school or school district,	**Yes**	**No, But Plan To In The Next 12 Months**	**No and *Do Not* Plan To In The Next 12 Months**	**Don't Know**
Signed up for ENERGY STAR® products and services?				
Sought the services offered by energy services providers (ESCOs)?				
Entered into a lease/purchase agreement for energy efficient equipment?				
Participated in the Standard Performance Contracting Program?				
Accessed the ENERGY STAR® website (www.energystar.com) to explore performance rating systems?				
Begun an effort to institute a performance rating system that measures and rates energy consumption?				
Instituted a performance rating systems that measures and rates energy consumption?				
Used the Portfolio Manager (performance rating system) on the Environmental Protection Agency Website (www.epa.gov/buildings/label)?				
Sought to achieve the ENERGY STAR® label for school buildings?				
Used the ENERGY STAR® Institutional Purchasing Tool Kit?				
Encouraged the purchase of energy efficient products?				
Modified equipment specifications and purchasing guidelines to insure the purchase of energy efficient equipment?				
Used the project evaluation methods (first cost, simple payback, project payback, net present value, internal rate of return, return-on-investment, lifecycle cost analysis, simple cash flow)				
Financed energy efficiency project using Qualified One Academy Bonds (QABs)?				
Financed energy efficiency project using Qualified Zone Academy Bonds (QZABs)?				
Financed energy efficiency project using Urgent School Renovation Grants?				
Financed an energy efficiency project(s) using California Energy Efficiency Financing Programs?				
Accessed the product listings at the ENERGY STAR® website (www.energystar.gov)				

Thank you for your cooperation.

Appendix B. Energenius Questionnaires

This appendix has multiple surveys used within the Energenius Program. In the order provided they are:

- Energenius Educational Survey
- Student pre- and post-test survey provided with the Energenius packet. The first set is for the Habits components (Grades 1-3), the second set is for Measures (Grades 4-5), and the third set is for Bill Buster (Grades 6-8).

ENERGENIUS EDUCATIONAL SURVEY

1. Which Energenius Program did you teach?
(*If you used more than one Energenius Program, use the second enclosed Energenius Educational Survey form)*

- [5] ☐ Habits (Primary)
- [4] ☐ Measures (Intermediate)
- [3] ☐ Primary Safety
- [2] ☐ Intermediate Safety
- [1] ☐ Bill Buster

2. Please rate the Energenius Program on:

	Excellent	Very Good	Good	Fair	Poor
a. Holding students' attention	[5] ☐	[4] ☐	[3] ☐	[2] ☐	[1] ☐
b. Ease of incorporating into curriculum	[5] ☐	[4] ☐	[3] ☐	[2] ☐	[1] ☐
c. Helpfulness of Teacher's Kit	[5] ☐	[4] ☐	[3] ☐	[2] ☐	[1] ☐
d. Overall quality of the Program materials	[5] ☐	[4] ☐	[3] ☐	[2] ☐	[1] ☐

3. As a result of the Energenius Program:

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. My students exhibit more positive attitudes about saving energy	[4] ☐	[3] ☐	[2] ☐	[1] ☐
b. My students know more about how to use energy more wisely.	[4] ☐	[3] ☐	[2] ☐	[1] ☐
c. My students can identify ways to reduce energy consumption in their homes.	[4] ☐	[3] ☐	[2] ☐	[1] ☐
d. My students have learned how to be safer around electricity and natural gas.	[4] ☐	[3] ☐	[2] ☐	[1] ☐

4. Which materials did you use from the Energenius Program? *Check all that apply*

- [12] ☐ Posters
- [11] ☐ Stickers
- [10] ☐ Calendar
- [9] ☐ Puzzle
- [8] ☐ Video
- [7] ☐ Check List
- [6] ☐ Script Books
- [5] ☐ Star Times
- [4] ☐ Software
- [3] ☐ See & Check Survey
- [2] ☐ Energy Survey
- [1] ☐ Other

_____
_____

5. Overall, how would you rate this Program?

Excellent	Very Good	Good	Fair	Poor
[5] ☐	[4] ☐	[3] ☐	[2] ☐	[1] ☐

6. How many class hours did you allocate to this Program?

- [4] ☐ 1 to 3
- [3] ☐ 4 to 7
- [2] ☐ 8 to 12
- [1] ☐ Over 12

7. How likely are you to teach in another PG&E-sponsored energy efficiency educational program?

- [5] ☐ Very likely
- [4] ☐ Somewhat likely
- [3] ☐ Not sure
- [2] ☐ Somewhat unlikely
- [1] ☐ Very unlikely

8. How likely are you to recommend this Program to another teacher?

- [5] ☐ Very likely
- [4] ☐ Somewhat likely
- [3] ☐ Not sure
- [2] ☐ Somewhat unlikely
- [1] ☐ Very unlikely

9. What grade(s) do you teach?
(*Check all that apply)*

- [8] ☐ 8th grade
- [7] ☐ 7th grade
- [6] ☐ 6th grade
- [5] ☐ 5th grade
- [4] ☐ 4th grade
- [3] ☐ 3rd grade
- [2] ☐ 2nd grade
- [1] ☐ 1st grade

10. How many students are there in your class(es)?___

11. How did you learn about the Energenius Program? *Check all that apply*

- [6] ☐ Parents
- [5] ☐ Educational colleagues
- [4] ☐ PG&E's Energenius Catalog
- [3] ☐ Internet
- [2] ☐ Professional meetings
- [1] ☐ Other

12. Please provide the following information so that PG&E can keep you informed regarding future energy efficiency programs.

Name:_____

School: _____

School Phone: _____

E-Mail Address:_____

Thank you again for participating in our Energenius Education Program and for completing this survey.
If you would like additional information on energy efficiency, visit www.pge.com or call PG&E's Smarter Energy Line at 1*800-933-9555

Pacific Gas and Electric Company
WE DELIVER ENERGY.

ENERGENIUS HABITS PROGRAM

PRE-TEST

DIRECTIONS: Read each item below and circle the correct answer.

1. On cold days, how can you help save energy in your home?

a) Turn up the heater a lot.

b) Put on a warm sweater and close the windows.

c) Sit close to the window.

2. Which one of these is an appliance?

a) Bicycle

b) Clothes line

c) Television

3. How do you think adults can save energy when they do the laundry?

a) By washing only a few clothes at a time.

b) By washing only full loads.

c) By washing clothes every day.

4. What should you do every time you leave a room to save energy?

a) Leave the door open.

b) Turn on the lights.

c) Turn off all the lights.

5. What is one important way you can use less electricity in your home?

a) Open the windows.

b) Help with the dishes.

c) Always turn off the television when no one is watching it.

6. What do you think an Energenius is?

a) Someone who uses energy wisely.

b) Someone who wastes energy.

c) Someone who uses lots of energy.

7. What is wasted when hot water is left running in a sink?

a) Just water is wasted.

b) Water and the energy to heat the water are both wasted.

c) Just energy is wasted

8. When should you open the refrigerator door?

a) Whenever I want to have a look.

b) Whenever I want to feel the cold.

c) Whenever I know what to take out.

9. What is the best energy-saving way to keep yourself clean?

a) Take a bath in a full tub.

b) Take a short five-minute shower.

c) Take a long, hot shower.

10. When adults cook, why do you think they should cover pots and pans with lids?

a) The food cooks faster and energy is saved.

b) The smell of the food stays in the kitchen.

c) The food tastes better.

Energenius Habits Program

Post-test

DIRECTIONS: Read each item below and circle the correct answer.

1. When adults cook, why do you think they should cover pots and pans with lids?

a) The food cooks faster and energy is saved.

b) The smell of the food stays in the kitchen.

c) The food tastes better.

2. What is the best energy-saving way to keep yourself clean?

a) Take a bath in a full tub.

b) b) Take a short five-minute shower.

c) c) Take a long, hot shower.

3. When should you open the refrigerator door?

a) Whenever I want to have a look.

b) b) Whenever I want to feel the cold.

c) c) Whenever I know what to take out.

4. What is wasted when hot water is left running in a sink?

a) Just water is wasted.

b) Water and the energy to heat the water are both wasted.

c) Just energy is wasted.

5. What do you think an Energenius is?

a) Someone who uses energy wisely.

b) Someone who wastes energy.

d) Someone who uses lots of energy

6. What is one important way you can use less electricity in your home?

a) Open the windows.

b) Help with the dishes.

c) Always turn off the television when no one is watching it.

7. What should you do to save energy every time you leave a room?

a) Leave the door open.

b) Turn on the lights.

b) Turn off all the lights.

8. How do you think adults can save energy when they do the laundry?

a) By washing only a few clothes at a time.

b) By washing only full loads.

c) By washing clothes every day.

9. Which one of these is an appliance?

a) Bicycle

c) Clothes line

c) Television

10. On cold days, how can you help save energy in your home?

a) Turn up the heater a lot.

b) Put on a warm sweater and close the windows.

c) Sit close to the window.

ENERGENIUS PRIMARY SAFETY PROGRAM

PRE TEST

Energenius wants to know:
What do you already know about safety around electricity and natural gas?

Instructions: Circle the letter next to the correct answer.

1. What is the very first thing to do if you are home alone and smell natural gas?
   a) Turn off the television and all lights.
   b) Go outside quickly and tell an adult you know.
   c) Check the stove to see if burners are turned off.

2. When is it safe to reach over the burners on a stove?
   a) After all the cooking is finished.
   b) If a pot holder is used.
   c) It is never safe.

3. When can a metallic balloon be very dangerous?
   a) When it catches on a power line.
   b) When it gets caught in the bushes.
   c) When it loses its air very quickly.

4. Which one is the right safety rule about electric substations?
   a) Never go near an electric substation without a friend.
   b) Keep out! Never go near or in an electric substation.
   c) Danger ahead! You must be 18 to enter an electric substation.

5. Why is it important to keep appliances away from water?
   a) Most appliances cannot float.
   b) Appliances in water will rust.
   c) People can be hurt badly if water carries electricity to their bodies.

6. How can you stay safe around a furnace or heater?
   a) Keep yourself and all toys far away from the furnace.
   b) Sit close enough to only warm your hands and feet.
   c) Only put your metal toys close to the furnace.

7. What objects can be safely put into a toaster?
   a) Small forks.
   b) Flat plastic knives.
   c) Only food items like bread.

8. When are electric power lines dangerous to touch?
   a) Only when they are up on the poles.
   b) When they are up on the poles or on the ground.
   c) Only when they have fallen to the ground

9. When is it safe to play in or with appliances?
   a) When they are no longer being used.
   b) When an older friend is with you.
   c) Never.

10. What objects can be safely put into electric outlets?
   a) Metal tools.
   b) Electric plugs and plug guards.
   c) Plastic objects.

Key: 1 b, 2 c, 3 a, 4 b, 5 c, 6 a, 7 c, 8 b, 9 c, 10 b

ENERGENIUS PRIMARY SAFETY PROGRAM

POST TEST

Energenius wants to know:
What have you learned about safety around electricity and natural gas?

Instructions: Circle the letter next to the correct answer.

1. What should you do when your family is cooking with an electric barbecue or on the top of the stove top?
   a. Touch it to make sure its hot.
   b. Never get too close or reach over the top.
   c. Play immediately next to electric barbecue or stove.

   (correlates to pre-test question #2)

2. What should you do If you find toys or other things too close to a heater or furnace?
   a. Move them far away.
   b. Leave them where they are.
   c. Watch them closely.

   (correlates to pre-test question # 6)

3. What should you do if you see your brother, sister, or a friend trying to stick a small toy into an electric outlet?
   a. Help them.
   b. Stop them immediately and explain that it is unsafe.
   c. Tell an adult after dinner.

   (correlates to pre-test question #10)

4. What should you do if you smell natural gas and your are home alone?
   a. Call a repairperson.
   b. Wait for your family to come home.
   c. Leave your home immediately and find an adult you know to tell.

   (correlates to pre-test question #1)

5. What should you do if you get a metallic balloon for your birthday?
   a. Keep it away from power lines.
   b. Always hold on to it very tightly.
   c. Both of the above.

   (correlates with pre-test question #3)

6. What should you do if you see an electric power line down after a storm?
    a. Move it out of the way.
    b. Don't touch it and keep away.
    c. Cover it with leaves.

    (correlates with pre-test question #8)

7. Where is it safe to hide if you are playing hide and seek at home?
    a. In unused appliances.
    b. Behind the washer or dryer.
    c. Behind the sofa.

    (correlates with pre-test question #9)

8. What should you do if a friend asks you to go with him or her to an electric substation?
    a. Keep out! Never go near or in an electric substation.
    b. Stay close together.
    c. Get someone older to go with you.

    (correlates with pre-test question #4)

9. What should you do it a piece of bread gets stuck in a toaster?
    a. Dig it out with a metal fork.
    b. Use a plastic knife to dig it out.
    c. Get an adult to help you.

    (correlates with pre-test question #7)

10. Why should electric appliances be kept away from the sink or bathtub?
    a. They might get scratched.
    b. People can be hurt badly when water carries electricity to their bodies.
    c. They will not work.

    (correlates with pre-test question # 5)

KEY: 1 b, 2 a, 3 b, 4 c, 5 b, 6 b, 7 c, 8 a, 9 c, 10 b

Energenius Measures

Pre-test

DIRECTIONS: Read each item below and circle the correct answer.

1. What are the two most common forms of energy used in the home?

a) Televisions and VCRs

b) Stoves and refrigerators

c) Natural gas and electricity

d) Clothes washing machines and dryers

2. Which one of the following household appliances is sometimes run by natural gas and sometimes by electricity?

a) Study lamp

b) Toaster

c) Television

d) Stove

3. What is the most energy-efficient way to keep yourself clean?

a) Take a long, hot shower.

b) Take a hot bath in a full tub of water.

c) Take a short hot shower of less than five minutes.

d) Take a hot shower of 10 minutes.

4. How do you think an energy-saver showerhead can save energy?

a) By making shower time shorter.

b) By keeping the water from getting too hot.

c) By reducing the amount of water used and the energy needed to heat the water.

d) None of the above

5. On cold days, what is the recommended energy -efficient temperature?

a) 75°F

b) 85°F

c) 68°F

d) Any temperature under 78°F

6. How can planting shade trees outside home windows save heating energy?

a) By shading the house all the year.

b) By letting sun in during the hot months.

c) By keeping sun out during hot months.

d) None of the above.

7. Which one of the following habits can reduce the use of energy?

a) Putting on a sweater instead of turning the heat on or up.

b) Deciding what you want from the refrigerator before opening the door.

c) Opening the curtains on a sunny winter day.

e) All of the above.

8. What is the most energy-efficient way to dry clothes on sunny days?

a) Dry only the few clothes you might need for the next day.

b) Dry clothes outside on a clothesline.

c) Dry only small-size loads.

d) None of the above.

9. Which one of the following is an energy-saving device that won't allow heat to transfer?

a) Water heater blanket

b) Attic insulation

c) Duct insulation

d) All of the above

10. How can an energy-efficient person be described?

a) Someone who doesn't waste energy.

b) Someone who knows that energy is a limited resource.

c) Someone who recycles.

d) All of the above.

Energenius Measures

Post-test

DIRECTIONS: Read each item below and circle the correct answer.

1. On cold days, what is the recommended energy-efficient temperature?

a) 68°F

b) 85°F

c) 75°F

d) Any temperature under 78°F

2. How do you think an energy-saver showerhead can save energy?

a) It reduces the amount of water used and the energy needed to heat the water.

b) It keeps the water from getting too hot.

c) It decreases shower time.

d) None of the above.

3. What is the most energy-efficient way to keep yourself clean?

a) Take a short hot shower of less than five minutes.

b) Take a hot bath in a full tub of water.

c) Take a long hot shower.

d) Take a hot shower 10 minutes long.

4. Which one of the following household appliances is sometimes run by natural gas and sometimes by electricity?

a) Television
b) Toaster
c) Study lamp
d) Stove

5. What are the two most common forms of energy used in the home?

a) Natural gas and electricity
b) Stoves and refrigerators
c) Televisions and VCRs
d) Clothes washing machines and dryers

6. How can an energy-efficient person be described?

a) Someone who recycles.
b) Someone who knows that energy is a limited resource.
c) Someone who doesn't waste energy.
d) All of the above.

7. Which one of the following is an energy-saving device that won't allow heat to transfer?

a) Duct insulation
b) Attic insulation
c) Water heater blanket
d) All of the above

8. What is the most energy-efficient way to dry clothes on sunny days?

a) Dry only small-size loads.
b) Dry clothes outside on a clothesline.
c) Dry only the few clothes you might need for the next day.
d) None of the above.

9. Which one of the following habits can reduce the use of energy?

a) Opening the curtains on a sunny winter day.
b) Deciding what is wanted from a refrigerator before opening the door.
c) Putting on a sweater instead of turning the heat on or up.
d) All of the above.

10. How can planting shade trees outside home windows save heating energy?

    a) By keeping sun out during hot months.

    b) By letting sun in during hot months.

    c) By shading the house all the year.

    d) None of the above.

ENERGENIUS INTERMEDIATE SAFETY® PROGRAM PRE-TEST

Instructions: For each question, there is only one correct answer.
Circle the letter next to the correct answer for each question.

1. Which statement about electricity is true?
   a. People should never touch electricity nor let electricity touch them.
   b. It is safe to play in or on electric appliances when they are not in use.
   c. Water does not conduct electricity.
   d. It is always safe to plug as many appliances as possible into an electric outlet.

2. Which of the following rules about electric substations is correct?
   a. Never go near an electric substation without a friend.
   b. Always keep away! Never go near or in an electric substation.
   c. Enter an electric substation only if you are over 18 or with an adult.
   d. Always tell an adult before you plan to enter an electric substation.

3. Which of the following is NOT involved in getting power to your home?
   a. Power plants.
   b. Transmission towers, powerlines, and electric substations.
   c. Electrical appliances in the kitchen.
   d. Utility poles in the neighborhood.

4. What should children do if an appliance sputters, flashes, or makes a spark?
   a. Tug on the cord to make sure the plug is in correctly.
   b. Check the fuse box to make sure everything is working.
   c. Turn on at least five appliances to see if they still work.
   d. Tell an adult immediately and let him or her take care of the problem.

5. When are electric powerlines dangerous to touch?
   a. Only when they are up on the poles.
   b. Only when they fall to the ground.
   c. When a person is wearing anything with metal.
   d. When they are up on the poles or on the ground.

6. What should children do when they are home alone and smell natural gas?
   a. Go outside right away and ask an adult they know for help.
   b. Wait inside until an adult arrives and tell him or her.
   c. Light matches or a candle to see if the gas leak can be found.
   d. Turn off appliances and electric switches to see if the smell disappears.

7. Which of the following is NOT involved in getting natural gas from underground sources to homes?
   a. Gas wells.
   b. Compressor stations.
   c. Gas stoves and water heaters.
   d. Gas meters and regulators.

8. Which of the following statements is true?
   a. People should never reach over the burners on a stove, whether the burners are hot or not.
   b. Pot and pan handles should always hang over the side of the stove.
   c. Food can be warmed in the microwave when it is wrapped in metal or foil.
   d. A metal fork is the correct way to get stuck bread out of a toaster.

9. Which of the following statements about fire safety is true?
   a. The best way to put out a grease fire is with water.
   b. Every family should have its own emergency plan in the event of a fire or other disasters such as earthquakes.
   c. The correct way to put out an electrical fire is with water.
   d. None of the above.

10. What is needed to create a fire?
   a. Fuel — something that will burn.
   b. Oxygen — a gas always in the air we breathe.
   c. Heat — energy that raises the temperature of fuel high enough to burn.
   d. All of the above.

ENERGENIUS INTERMEDIATE SAFETY® PROGRAM POST-TEST

Instructions: For each question, there is only one correct answer.
Circle the letter next to the correct answer for each question.

1. Which is the correct definition of a conductor of electricity?
   a. A material that permits the easy flow of electricity.
   b. A worker in a power plant.
   c. A material that does not allow electricity to flow through it easily.
   d. None of the above.

2. Which of the following statements about appliances is true?
   a. Always keep electrical appliances away from water.
   b. Handle electrical appliances with wet hands only if you are extra careful.
   c. There is no danger reaching across the stove top if burners look like they are turned off.
   d. Use only a metal knife or fork to remove bread stuck in the toaster.

3. Which is the correct definition of an insulator of electricity?
   a. A material that permits the easy flow of electricity.
   b. A person who installs window insulators.
   c. A material that does not allow electricity to flow through it easily.
   d. A wool material wrapped around hot water heaters.

4. Which one of the following statements is true?
   a. Flying balloons and kites near powerlines is safe during daylight hours.
   b. Powerlines are always dangerous to touch.
   c. It is safe to climb trees that have powerlines running through them.
   d. People should not enter electrical substations unless they are over 18.

5. Which rule can help keep people safe around electricity?
   a. Never use an electric mixer close to the kitchen sink.
   b. Never mix water and electricity! This can cause electric shocks.
   c. Never stand close to electric heaters or any furnace.
   d. All of the above.

6. Which of the following statements about appliances is true?
   a. When an appliance cord is frayed or damaged, the cord should be grabbed and the plug pulled from the outlet.
   b. Plug as many appliances as possible into each outlet.
   c. If an appliance or cord sputters or sparks, an adult should take care of the problem.
   d. Children should check the fuse box when an appliance stops working.
7. What is the best way for an adult to put out a grease fire if it starts in a pan in the kitchen?
   a. Spray it with water.
   b. Cover the pan completely with the pan top or spray it with a fire extinguisher rated ABC-Handy.
   c. Cover the pan with a wet dish towel.
   d. Fan the fire rapidly.
8. Which is the correct safety rule for children to follow?
   a. Never light a natural gas pilot light that goes out. This is a job for an adult.
   b. Never turn electric switches on or off when you smell natural gas.
   c. When you smell smoke or see a fire start, get away and call for help.
   d. All of the above.
9. What is involved in getting natural gas from underground sources to homes?
   a. Gas wells.
   b. Compressor stations.
   c. Gas meters and regulators.
   d. All of the above.
10. What should children do if they smell smoke or see a fire starting at home?
   a. Try to put the fire out.
   b. Open windows wide so the fire will blow out.
   c. Get away from the fire or smoke and tell an adult to call for help.
   d. Smother the flames with a blanket or towel.

Pre-Test Answer Key:
1 a, 2b, 3 c, 4 d, 5 d, 6 a, 7 c, 8 a, 9 b, 10 d

Post-Test Answer Key:
1 a, 2 a, 3 c, 4 b, 5 d, 6 c, 7 b, 8 d, 9 d, 10 c

Correlation between Pre-Test and Post-Test:

	PRE-TEST	POST-TEST
1		5
2		3
3		1
4		6
5		4
6		8
7		9
8		2
9		7
10		10

BILL BUSTER -- ENERGENIUS

PRE TEST

INSTURCTIONS: PLACE AN X BEFORE THE CORRECT ANSWER.

1. Energy efficiency is NOT affected by:
   ____ a. personal habits
   ____ b. recycling
   ____ c. how energy is measured
   ____ d. how energy is used

2. Which of the following is an example of recycling?
   ____ a. re-using grocery bags
   ____ b. buying a used CD
   ____ c. turning newspapers into drawing paper
   ____ d. all of the above

3. Which of the following is NOT a source of energy?
   ____ a. solar power
   ____ b. an air conditioner
   ____ c. every individual
   ____ d. natural gas

4. Renewable energy is energy that:
   ____ a. is easily restored or made again by nature
   ____ b. is gained through conservation
   ____ c. is made by individuals
   ____ d. is efficiently used energy

5. Alternative energy is energy that:
   ____ a. alternates yearly
   ____ b. comes from sources other than fossil fuels such as wind
   ____ c. is made from petroleum
   ____ d. is made from natural gas

6. What is geothermal power?
   ____ a. energy produced by water power
   ____ b. energy from the sun
   ____ c. energy from heat inside the earth
   ____ d. energy from the wind

7. A definition of kwh is:
   ____ a. a measure of electric power used over time
   ____ b. the physical movement of machines
   ____ c. a form of energy
   ____ d. all of the above

8. Which of the following will reduce energy use when washing clothes?
   ____ a. sorting the clothes by light and dark colors
   ____ b. adjusting the water level to match the size of the load
   ____ c. using more detergent
   ____ d. washing twice a day

9. People can reduce the amount of energy used when cooking on the stove by:
   ____ a. always covering the pot
   ____ b. increasing the level of the heat
   ____ c. using aluminum pots
   ____ d. all of the above

10. A definition of a therm is:
   ____ a. the temperature
   ____ b. a proposal
   ____ c. unit of measurement for natural gas
   ____ d. car gas

11. Which of the following is NOT an energy-saving measure?
   ____ a. installing storm windows
   ____ b. rinsing dishes in hot water before putting in dish washer
   ____ c. weather-stripping doors and windows
   ____ d. using fluorescent bulbs

12. Which of the following is true? Saving energy . . .
   ____ a. means more energy for future use
   ____ b. will mean less air pollution
____ c. will result in conservation of the world's limited resources
____ d. all of the above

13. Which of the following uses the most energy in the average home?
   ____ a. refrigerator
   ____ b. television
   ____ c. stove
   ____ d. computer

14. What is the most energy efficient way to keep warm on a cold day?
    - ____ a. turn up the heat
    - ____ b. put on a sweater or other additional clothing
    - ____ c. buy additional heaters
    - ____ d. use the oven to provide additional heat

15. What is the most energy efficient way to keep your home cooler on hot days?
    - ____ a. turn on a fan
    - ____ b. turn on an air conditioner
    - ____ c. open doors and windows
    - ____ d. close windows, doors, shades, and curtains

16. Which one of the following statements is true?
    - ____ a. people are sources of energy
    - ____ b. using energy wisely, leaves more for the future
    - ____ c. using less energy reduces pollution
    - ____ d. all of the above

17. Which one of the following statements is true?
    - ____ a. recycling saves energy
    - ____ b. reusing things doesn't help the environment
    - ____ c. collecting trash isn't a problem
    - ____ d. energy isn't used to keep the environment clean

18. What temperature is recommended for a house on cold days?
    - ____ a. 65 degrees
    - ____ b. 85 degrees
    - ____ c. 72 degrees
    - ____ d. any temperature under 80 degrees

19. Which one of the following statements describe an energy-efficient person?
    - ____ a. someone who recycles
    - ____ b. someone who turns off appliances when not in use
    - ____ c. someone who takes public transit and not the family car
    - ____ d. all of the above

20. Which of the following is NOT true?
    - ____ a. energy is limited
    - ____ b. every individual is a source of energy
    - ____ c. energy use does not affect natural resources
    - ____ d. energy use affects the environment

Answer Key: 1 c, 2 d, 3 b, 4 a, 5 b, 6 c, 7 a, 8 b, 9 a, 10 c
11 b, 12 d, 13 a, 14 b, 15 d, 16 d, 17 a, 18 c, 19 d, 20 c

BILL BUSTER -- ENERGENIUS
POST TEST

INSTRUCTIONS: PLACE AN X BEFORE THE CORRECT ANSWER

1. Which of the following is a non-renewable source of energy?
   ____ a. fossil fuels
   ____ b. wood
   ____ c. solar power
   ____ d. wind power

   (correlates with pre-test question 4)

2. An energy-efficient person can be described as?
   ____ a. someone who doesn't waste energy
   ____ b. someone who knows that energy is a limited resource
   ____ c. someone who recycles
   ____ d. all of the above

(correlates with pre-question 19)

3.. Which of the following is NOT an example of being energy efficient?
   ____ a. turning the computer off when its not in use
   ____ b. taking a short shower instead of a bath in a full tub
   ____ c. using the car to go to the corner store instead of walking
   ____ d. wearing a sweater instead of turning up the heat
   (correlates with pre-test question 1)

4. Which of the following is NOT an alternative source of energy?
   ____ a. solar energy
   ____ b. wind power
   ____ c. gasoline
   ____ d. hydroelectric power
   (correlates with pre-test question 5)

5. Which one of the following statements is true?
   ____ a. people are sources of energy
   ____ b. using energy wisely, leaves more for the future
   ____ c. using less energy reduces pollution
   ____ d. all of the above.
   (correlates with pre-test question 16)

1. Recycling is:
   ____ a. reusing materials from trash
   ____ b. energy that can be made again
   ____ c. not a means of energy efficiency
   ____ d. caused by nuclear fission
   (correlates with pre-test question 2)

2. Energy can be defined as:
   ____ a. the amount of soap it takes to operate a washing machine
   ____ b. the capacity for work or action
   ____ c. a part of nature that is useful for people
   ____ d. a measure of power
   (correlates with pre-test question 3)

3. The energy that comes from heat inside the earth is:
   ____ a. solar power
   ____ b. hydroelectric power
   ____ c. geothermal power
   ____ d. electricity
   (correlates with pre-question 6)

9. Which one of the following statements is true?
   ____ a. energy is limited
   ____ b. every individual is a source of energy
   ____ c. energy use affects the environment
   ____ d. all of the above
   (correlates with pre-test question 20)

10. A definition for kwh is:
   ____ a. the amount of kilowatt hours of electricity used over one hour
   ____ b. a measure of natural gas usage
   ____ c. a measure of speed
   ____ d. a measure of temperature
   (correlates with pre-question 7)

11. What is the most energy-efficient way to keep clean?
   ____ a. taking a long hot shower
   ____ b. taking a hot bath in a full tub of water
   ____ c. taking a short hot shower of less than five minutes
   ____ d. taking a hot shower of ten minutes
   (correlates with pre-question 11)

12. What is the most energy-efficient way to wash clothes?
    ____ a. using a hot water wash and cold water rinse
    ____ b. using a cold water wash and cold water rinse
    ____ c. using a hot water wash and hot water rinse
    ____ d. using a cold water wash and hot water rinse
    (correlates with pre-question 8)

13. When cooking food on top of the stove, energy is saved when:
    ____ a. cooking slowly
    ____ b. covering the pot
    ____ c. using aluminum pots
    ____ d. all of the above
    (correlates with pre-question 9)

14. If it is a hot day at home, what should people do first to keep cool?
    ____ a. turn on the air conditioner
    ____ b. turn on a fan
    ____ c. close windows, doors, shades, and curtains
    ____ d. open doors and windows
    (correlates with pre-question 15)

15. Being energy-efficient means:
    ____ a. not wasting energy
    ____ b. recycling glass, paper, and metals
    ____ c. reusing own bags when shopping
    ____ d. all of the above
    (correlates with pre-question 12)

16. The following appliance uses the most energy in the average home.
    ____ a. television
    ____ b. refrigerator
    ____ c. dish washer
    ____ d. video games
    (correlates with pre-question 13)

17. What should people do at home first to keep warm if it is a cold day?
    ____ a. put on a sweater or additional clothing
    ____ b. turn on a portable heater
    ____ c. turn on the house's main heater
    ____ d. open windows and doors
    (correlates with pre-question 14)

18. Which one of the following statements is true?
    ____ a. recycling saves energy
    ____ b. reusing things helps the environment
    ____ c. collecting and disposing of trash uses energy
    ____ d. all of the above
    (correlates with pre-question 17)

19. On cold days, what is the recommended energy-efficient temperature?
    ____ a. 72 degrees
    ____ b. 85 degrees
    ____ c. 65 degrees
    ____ d. any temperature under 78 degrees
    (correlates with pre-question 18)

20. Which of the following statements is true?
    ____ a. therms measure the quantity of natural gas used
    ____ b. one therm equals 100,000 Btu
    ____ c. natural gas is found in the earth
    ____ d. all of the above

    (correlates with pre-question 10)

Answer Key: 1 a, 2 d, 3 c, 4 c, 5 d, 6 a, 7 b, 8 c, 9 d, 10 a,
11 c, 12 b, 13 b, 14 c, 15 d, 16 b, 17 a, 18 d, 19 a, 20 d

Appendix C.
Energenius Educational Survey: Results Through June 2002

2002 Energenius Educational Survey

Results through: June 2002

prepared for:
Pam Murray
Customer Energy Management

prepared by:
Maritza Rivera
Customer Research & Measurement

December 2002

2002 Results: Energenius Educational Survey
Results through: June 2002

Total Responses *(November 2001 thru June 2002)*	**102**

Summary

- Through June 2002, a total of 102 Energenius responses have been reviewed and databased.

- The Energenius program, with a mean score of 4.28, is shown to be well received. The majority (85%) of respondents rate this program as "Excellent" or "Very Good".

- Respondents indicated that the Energenius program has been successful in providing (in order of satisfaction by mean score): a helpful teacher's guide (4.26), quality Program materials (4.23), holding students' attention (4.05) and easy implementation into curriculum (3.96).

- Respondents indicated that as a result of Energenius (in order of agreement): students can identify ways to reduce energy consumption in their homes (97% agree) students exhibit more positive attitudes abut saving energy (97% agree), students know more about how to use energy more wisely (95% agree) and students have learned how to be safer around electricity and natural gas (94% agree).

- The largest proportion (46%) of respondents learned about the Energenius Program through PG&E's website. Another 12% learned about the Energenius Program through educational colleagues.

- More than one-third (43%) of respondents assigned 8 classroom hours to the program.

- The Habits (47%) and the Primary Safety (39%) Energenius programs were the most widely selected programs. The Bill Buster program was only selected by 15% of the respondents.

- The Posters (80%) the Stickers (67%) and the Videos (74%) are the most often used materials from the Energenius Program. "Software" was used by only 4% of respondents.

- Almost three-quarters (69%) of respondents indicated they are "Very Likely" to teach another PG&E-sponsored energy efficiency program.

- Three-quarters (75%) of respondents indicated they are "Very Likely" to recommend the Energenius Program to other teachers.

2002 Results: Energenius Educational Survey
Results through: June 2002

1. Which Energenius Program did you teach?

	# of Responses	% of Responses
Habits (Primary)	48	47.1%
Measures (Intermediate)	18	17.6%
Primary Safety	40	39.2%
Intermediate Safety	21	20.6%
Bill Buster	15	14.7%

2. Please rate the Energenius Program on:

Q2a. Holding students' attention

	# of Responses	% of Responses
Excellent (5)	35	36.1%
Very Good (4)	38	39.2%
Good (3)	20	20.6%
Fair (2)	2	2.1%
Poor (1)	2	2.1%
Total	**97**	**100.0%**
No Answer	**5**	
*** Mean Score**	**4.05**	

Q2b. Ease of incorporating into curriculum

	# of Responses	% of Responses
Excellent (5)	37	38.1%
Very Good (4)	30	30.9%
Good (3)	21	21.6%
Fair (2)	7	7.2%
Poor (1)	2	2.1%
Total	**97**	**100.0%**
No Answer	**5**	
*** Mean Score**	**3.96**	

2002 Results: Energenius Educational Survey
Results through: June 2002

Q2c. Helpfulness of Teacher's Kit

	# of Responses	% of Responses
Excellent (5)	46	47.4%
Very Good (4)	35	36.1%
Good (3)	13	13.4%
Fair (2)	1	1.0%
Poor (1)	2	2.1%
Total	**97**	**100.0%**
No Answer	**5**	
*** Mean Score**	**4.26**	

Q2d. OVERALL quality of the Program materials

	# of Responses	% of Responses
Excellent (5)	47	49.0%
Very Good (4)	32	33.3%
Good (3)	12	12.5%
Fair (2)	2	2.1%
Poor (1)	3	3.1%
Total	**96**	**100.0%**
No Answer	**6**	
*** Mean Score**	**4.23**	

3. As a result of the Energenius Program :

Q3a. My students exhibit more positive attitudes about saving energy

	# of Responses	% of Responses
Strongly Agree (4)	34	35.4%
Agree (3)	59	61.5%
Disagree (2)	1	1.0%
Strongly Disagree (1)	2	2.1%
Total	**96**	**100.0%**
No Answer	**6**	
*** Mean Score**	**3.30**	

2002 Results: Energenius Educational Survey

Results through: June 2002

Q3b. My students know more about how to use energy more wisely

	# of Responses	% of Responses
Strongly Agree (4)	45	46.4%
Agree (3)	47	48.5%
Disagree (2)	2	2.1%
Strongly Disagree (1)	3	3.1%
Total	**97**	**100.0%**
No Answer	**5**	
***Mean Score**	**3.38**	

Q3c. My students can identify ways to reduce energy consumption in their homes

	# of Responses	% of Responses
Strongly Agree (4)	43	44.8%
Agree (3)	50	52.1%
Disagree (2)	1	1.0%
Strongly Disagree (1)	2	2.1%
Total	**96**	**100.0%**
No Answer	**6**	
***Mean Score**	**3.40**	

Q3d. My students have learned how to be safer around electricity and natural gas

	#of Responses	% of Responses
Strongly Agree (4)	38	40.0%
Agree (3)	51	53.7%
Disagree (2)	3	3.2%
Strongly Disagree (1)	3	3.2%
Total	**95**	**100.0%**
No Answer	**7**	
***Mean Score**	**3**	

2002 Results: Energenius Educational Survey

Results through: June 2002

4. Which materials did you use from the Energenius Program?

	# of Responses	% of Responses
Posters	80	83%
Stickers	75	77%
Video	72	74%
Calendar	52	54%
Energy Survey	47	49%
See & Check Survey	35	36%
Check List	28	29%
Script Books	24	25%
Puzzle	18	19%
Other	8	8%
Star Times	7	7%
Software	4	4%

Q5. Overall, how would you rate this Program?

	# of Responses	% of Responses
Excellent (5)	47	47.5%
Very Good (4)	37	37.4%
Good (3)	12	12.1%
Fair (2)	2	2.0%
Poor (1)	1	1.0%
Total	**99**	**100.0%**
No Answer	**3**	
*** Mean Score**	**4.28**	

Q6. How many class hours did you allocate to this Program?

	# of Responses	% of Responses
1 to 3 hours	30	30.6%
4 to 7 hours	42	42.9%
8 to 12 hours	19	19.4%
Over 12 hours	7	7.1%
Total	**98**	**100.0%**
No Answer	**4**	
Total	**102**	

2002 Results: Energenius Educational Survey
Results through: June 2002

Q7. How likely are you to teach in another PG&E - sponsored energy efficiency educationsl program?

	# of Responses	% of Responses
Very Likely (5)	70	69.3%
Somewhat Likely (4)	19	18.8%
Not Sure (3)	10	9.9%
Very Unlikely (1)	2	2.0%
Total	**101**	**100.0%**
No Answer	**1**	
*** Mean Score**	**4.53**	

Q8. How likely are you to recommend this Program to another teacher?

	# of Responses	% of Responses
Very Likely (5)	75	75.0%
Somewhat Likely (4)	21	21.0%
Not Sure (3)	2	2.0%
Very Unlikely (1)	2	2.0%
Total	**100**	**100.0%**
No Answer	**2**	
*** Mean Score**	**4.67**	

9. What grade(s) do you teach?

	# of Responses	% of Responses
1st Grade	22	24.4%
2nd Grade	22	24.4%
3rd Grade	30	33.3%
4th Grade	33	36.7%
5th Grade	22	24.4%
6th Grade	13	14.4%
7th Grade	5	5.6%
8th Grade	6	6.7%

2002 Results: Energenius Educational Survey

Results through: June 2002

10. Total number of students in your classes?

Q10. Total number of students in your class(es)?

	# of Responses	% of Responses
Less than 20	20	21.3%
20 - 30	49	52.1%
31 - 50	17	18.1%
Over 50	8	8.5%
Total	**94**	**100.0%**
No Answer	**8**	
Total	**102**	

11. How did you learn about the Energenius Program?

	# of Responses	% of Responses
Parents	5	5.2%
Educational Colleagues	12	12.4%
PG&E's Energenius Catalog	8	8.2%
PG&E's Website	45	46.4%
Professional Meetings	10	10.3%
Other	28	28.9%

2002 Results: Energenius Educational Survey

Results through: June 2002

Verbatim/Comments

What recommendations do you have to make the Energenius Program a more effective educational program?	**Q11. Other- How did you learn about the Energenius Program?**
Update the video	PG&E Bill
To continue sending the Habits to my class next year	
The video was dry and aimed at children with a little or no vocab skills	
The teachers I recommended it to were more likely to use the materials if they came collated or organized due to time factor	
The primary program is excellent. It would be great if you can add any hands on activities for this grade level, it will be more meaningful expirience	PG&E Bill
The posters were very dificult to get out	
Thanks for the materials	
Thanks	PG&E Bill
Thank you	
Stands on==Materials are effective	Newsletter
Software	
Send a scratch + sniff for each child of the gas smell	
Scripts are helpful, for students to act out	
Received this too late (my fault) to fully use in my class--plan to use earlier next year	
Provide enough startimes so that every child can keep both	Speaked
Program is great put up pictures colored them, older students would step up, its great for the kids	
Please Note that I did not Personally teach, I ordered the Materials for my teachers. They Loved Using the materials. ITS ADULT ESL	
Overall an excellent program, Thanks	
Nothing	
None--works great	
None-Great Program	
none--great	
None at this time	
Need it at the beginning of thw year for planing	
N/A	
More teachers involved-this is great	
More hands on activities to do in a class	
Maybe a magnet for a students to put on their refrig. To remind them to conserve energy + to be safe	
Make it available in other languages, I teach a Spanish bilingual class	
Keep Wattalot + Thermolot, kids love them	
Its very dificult to find primary level naturaly of electricity so I really appriciate this program,	
Its Perfect	
Interactive software (5 copies) for each program	
Increase the nubers of videos as they really bring the bright massage. Add a section of the runing videos of the appliances $ and new vs. old	
I want to be honest and let you know that I did not use the program this	

year I plan to use it next school year	
I thought this was an excellent program. It had enough fun activities so that my students did not realize this was work and they were excited when it was time to work on it	
I think it already is efficient	
I requested materials for next year. I did use them this year but I did study them, I need at least 70 sets	
I really liked the whole piece	
I really had a fun and kids did too	
I ordered the materials to distribute to teachers in my district. As I looked at them I thought they were very well done. Thank you	
I liked the program, keep going	
I have had trouble re-ordering materials I need enough for 75 students for next year	
I enjoyed it, it was easy to do because of its completions	
I did not have a chance to use it this year, but will next year. It looks like a great program	
I can not think for a change of the program I used, we all liked it	
Great program as is	
Could not implement into 8th grade CA students	
Comments-I had ordered this in hope to use it for housing unit in my High School Class, unfortunately by the time I received it and we were done with state testing, I did not have time to use it. I will use it for the next year. I appreciate PG&E making resources available to teachers	
Better(More) reading materials on energy savings and their impact on our envoronment (even though this is PG&E)	

Appendix D.
Energenius Educational Survey: Results Through June 2003

2003 Energenius Educational Survey

Results through: June 2003

prepared for:
Pam Murray
Customer Energy Management

prepared by:
Maritza Rivera
Customer Research & Measurement

June 2003

2003 Results: Energenius Educational Survey
Results through: June 2003

Total Responses *(October 2002 thru June 2003)*	**219**

Summary

- Through June 2003, a total of 219 Energenius responses have been reviewed and databased.
- The Energenius program, with a mean score of 4.13, is shown to be well received. The majority (82%) of respondents rated this program as "Excellent" or "Very Good".
- Respondents indicated that the Energenius program has been successful in providing (in order of satisfaction by mean score on a scale of 5=excellent and 1=poor): overall quality Program materials (4.21), a helpful teacher's guide (4.21), holding students' attention (4.05) and easy implementation into curriculum (3.86).
- Respondents indicated that as a result of Energenius (in order of agreement): students know more about how to use energy more wisely (100% agree), students exhibit more positive attitudes abut saving energy (99% agree), students can identify ways to reduce energy consumption in their homes (99% agree) and students have learned how to be safer around electricity and natural gas (98% agree).
- The largest proportion (28%) of respondents learned about the Energenius Program through PG&E's website. Another 24% learned about the Energenius Program through PG&E's Energenius Catalog and 19% learned about the Energenius Program through Educational Colleagues.
- More than half (53%) of respondents assigned 7 classroom hours to the program.
- The Habits (51%), and the Primary Safety (31%) Energenius programs were the most widely selected programs. The Bill Buster program was only selected by 16% of the respondents.
- The Posters (83%) the Videos (70%) and the Stickers (67%) are the most often used materials from the Energenius Program. "Star Times" was used by only 5% of respondents.
- Almost two-thirds (65%) of respondents indicated they are "Very Likely" to teach another PG&E-sponsored energy efficiency program.
- More than two-thirds (67%) of respondents indicated they are "Very Likely" to recommend the Energenius Program to other teachers.

2003 Results: Energenius Educational Survey
Results through: June 2003

1. Which Energenius Program did you teach?

	# of Responses	% of Responses
Habits (Primary)	108	50.5%
Measures (Intermediate)	36	16.8%
Primary Safety	66	30.8%
Intermediate Safety	41	19.2%
Bill Buster	34	15.9%

2. Please rate the Energenius Program on:

Q2a. Holding students' attention

	# of Responses	% of Responses
Excellent (5)	61	28.4%
Very Good (4)	106	49.3%
Good (3)	45	20.9%
Fair (2)	3	1.4%
Total	**215**	**100.0%**
No Answer	**4**	
Mean Score	**4.05**	

Q2b. Ease of incorporating into curriculum

	# of Responses	% of Responses
Excellent (5)	51	23.8%
Very Good (4)	93	43.5%
Good (3)	58	27.1%
Fair (2)	12	5.6%
Total	**214**	**100.0%**
No Answer	**5**	
Mean Score	**3.86**	

2003 Results: Energenius Educational Survey
Results through: June 2003

Q2c. Helpfulness of Teacher's Kit

	# of Responses	% of Responses
Excellent (5)	89	41.2%
Very Good (4)	89	41.2%
Good (3)	32	14.8%
Fair (2)	6	2.8%
Total	**216**	**100.0%**
No Answer	**3**	
Mean Score	**4.21**	

Q2d. OVERALL quality of the Program materials

	# of Responses	% of Responses
Excellent (5)	85	39.7%
Very Good (4)	94	43.9%
Good (3)	31	14.5%
Fair (2)	4	1.9%
Total	**214**	**100.0%**
No Answer	**5**	
Mean Score	**4.21**	

3. As a result of the Energenius Program :

Q3a. My students exhibit more positive attitudes about saving energy

	# of Responses	% of Responses
Strongly Agree (4)	80	37.2%
Agree (3)	134	62.3%
Disagree (2)	1	.5%
Total	**215**	**100.0%**
No Answer	**4**	
Mean Score	**3.37**	

2003 Results: Energenius Educational Survey

Results through: June 2003

Q3b. My students know more about how to use energy more wisely

	# of Responses	% of Responses
Strongly Agree (4)	101	46.8%
Agree (3)	115	53.2%
Total	**216**	**100.0%**
No Answer	**3**	
Mean Score	**3.47**	

Q3c. My students can identify ways to reduce energy consumption in their homes

	# of Responses	% of Responses
Strongly Agree (4)	101	46.8%
Agree (3)	113	52.3%
Disagree (2)	2	.9%
Total	**216**	**100.0%**
No Answer	**3**	
Mean Score	**3.46**	

Q3d. My students have learned how to be safer around electricity and natural gas

	# of Responses	% of Responses
Strongly Agree(4)	91	42.3%
Agree (3)	120	55.8%
Disagree (2)	3	1.4%
Strongly Disagree (1)	1	.5%
Total	**215**	**100.0%**
No Answer	**4**	
Mean Score	**3.40**	

2003 Results: Energenius Educational Survey

Results through: June 2003

4. Which materials did you use from the Energenius Program?

	# of Responses	% of Responses
Posters	181	83%
Video	153	70%
Stickers	145	67%
Calendar	105	48%
Energy Survey	97	45%
Script Books	80	37%
Check List	58	27%
See & Check Survey	50	23%
Puzzle	45	21%
Software	25	12%
Other	16	7%
Star Times	11	5%

Q5. Overall, how would you rate this Program?

	# of Responses	% of Responses
Excellent (5)	75	34.4%
Very Good (4)	103	47.2%
Good (3)	35	16.1%
Fair (2)	4	1.8%
Poor (1)	1	.5%
Total	**218**	**100.0%**
No answer	**1**	**218**
Mean Score	**4.13**	**1**

Q6. How many class hours did you allocate to this Program?

	# of Responses	% of Responses
1 to 3 hours	54	25.0%
4 to 7 hours	115	53.2%
8 to 12 hours	34	15.7%
Over 12 hours	13	6.0%
Total	**216**	**100.0%**
No Answer	**3**	
Total	**219**	

2003 Results: Energenius Educational Survey
Results through: June 2003

Q7. How likely are you to teach in another PG&E - sponsored energy efficiency educational program?

	# of Responses	% of Responses
Very Likely (5)	141	64.7%
Somewhat Likely (4)	62	28.4%
Not Sure (3)	15	6.9%
Total	**218**	**100.0%**
No Answer	**1**	
Mean Score	**4.58**	

Q8. How likely are you to recommend this Program to another teacher?

	# of Responses	% of Responses
Very Likely (5)	147	67.4%
Somewhat Likely (4)	57	26.1%
Not Sure (3)	10	4.6%
Somewhat Unlikely (2)	3	1.4%
Very Unlikely (1)	1	.5%
Total	**218**	**100.0%**
No Answer	**1**	
Mean Score	**4.59**	

9. What grade(s) do you teach?

	# of Responses	% of Responses
1st Grade	36	17.5%
2nd Grade	65	31.6%
3rd Grade	64	31.1%
4th Grade	61	29.6%
5th Grade	39	18.9%
6th Grade	36	17.5%
7th Grade	12	5.8%
8th Grade	15	7.3%

2003 Results: Energenius Educational Survey
Results through: June 2003

Q10. Total number of students in your class(es)?

	# of Responses	% of Responses
Less than 20	96	45.7%
21 - 30	62	29.5%
31 - 50	33	15.7%
Over 50	19	9.0%
Total	**210**	**100.0%**
No Answer	**9**	
Total	**219**	

11. How did you learn about the Energenius Program?

	# of Responses	% of Responses
PG&E's Website	49	28.2%
PG&E's Energenius Catalog	41	23.6%
Other	34	19.5%
Educational Colleagues	33	19.0%
Professional Meetings	27	15.5%
Parents	5	2.9%

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Appendix F.
Schools Market Characterization – March 2001

The following appendix contains the complete market characterization of the schools segment report provided to PG&E in March of 2001.

Equipoise Consulting, Inc.

Energy Analysis

Project Management

Training

Final Market Characterization of the Schools Market Segment

Submitted by:

Equipoise Consulting Incorporated

in association with

Ridge & Associates

March 20, 2001

Equipoise Consulting Incorporated is committed to environmentally friendly practices in the workplace. We use recycled paper in all our proposals and reports. We print double sided and use electronic faxes when possible to decrease paper use. All our office paper is recycled. Our distributed office arrangement means that work between colleagues is performed by telecommuting, thereby minimizing environmental transportation impacts.

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Table of Tables

1. INTRODUCTION

Pacific Gas and Electric Company (PG&E) is evaluating the 2000-2001 Energy Treasure Hunt Program (ETHP) and the Energenius Program (EP). -One component of this evaluation is a baseline market characterization of the schools market segment. This market characterization will involve a review of the literature and existing data and will address the following topics:

- Descriptive statistics the elementary and secondary schools in the PG&E service territory
    - Number of elementary and secondary schools
    - Number of students
    - Ethnicity of students
- Funding
    - Sources of school funding elementary and secondary schools
    - The existing efficiency programs for schools and in which schools in PG&E service territory have participated
- School management/decision making
    - How decisions are made regarding capital investments
    - Who is involved in making these decisions
    - The purchasing process in schools and how it varies by school
    - Who has ultimate decision-making authority regarding capital investments
    - The criteria for making capital investments
- The barriers to investing in energy efficient equipment

There are two existing general sources of data that were used to characterize the schools market segment:

1. data provided by the California Department of Education (CDE), and
2. literature regarding the implementation of energy efficiency programs in schools.

The existing literature was reviewed and integrated with the results of data from the California State Department of Education. The goal was to provide a comprehensive and internally consistent picture of the schools market segment that provides the context within which this evaluation will be conducted.

Each is briefly described below.

1.1.1 California Department of Education

The CDE contains information that will be used to describe the context within which the EP and the ETH are implemented. The CDE maintains demographic and financial information on each school district. This information will be used to determine whether the programs are reaching a representative sample of all schools.

1.1.2 Literature

Various sources of literature will be explored including the University of California on-line library, the California High Performance Schools Program, the Rand Corporation library, conference proceedings such as those published by the American Council for an Energy Efficient Economy (ACEEE) and International Energy Program Evaluation Conference, and the Internet.

2. DESCRIPTIVE STATISTICS

2.1 Enrollment in California Public and Private Schools

In 1999-2000, there were 1,054 public school districts in California with 5,951,612 students enrolled. Exhibit 2.1 presents the breakdown of the number of districts and enrollments by type of district.

Exhibit 2.1. California Public School Districts by Type, 1999-2000

Type	Number	Enrollment
Elementary	571	1,209,110
High School	93	547,952
Unified	323	4,123,509
Sub-Total	***987***	***5,880,571***
County Office	58	65,850
California Youth Authority	9	5,191
Total	**1,054**	**5,951,612**

In the period 1999-2000, there were 8,563 elementary and secondary public schools in California. Exhibit 2.2 presents the breakdown of the types of schools and their associated enrollments.

Exhibit 2.2. Types of Schools and Enrollment

Grade Level	Number	Enrollment
Elementary	5,311	3,128,262
Middle	1,134	1,040,827
Junior High	20	1 7,726
High School	908	1,538,497
Continuation	523	68,598
Alternative	227	61,221
Special Education	121	29,964
K-12	27	19,849
Community Day	199	7,069
Opportunity	12	1,262
Juvenile Court	56	30,366
County Community	11	2,780
California Youth Authority	14	5,191
Total	**8,563**	**5,951,612**

Although not the focus of this market characterization, some mention must be made of the private school sector.

Exhibit 2.3. California Private Schools and Enrollment

Type	Number	Enrollment
Church-Affiliated	2,045	441,847
Religious	676	68,127
Other	1,545	130,828
Total	**4,266**	**640,802**

Exhibit 2.4. California Private School Enrollment by Grade Level

Grade Level	**Enrollment**
Kindergarten	71,058
Elementary (1st through 8th)	428,314
High School (9th through 12th)	141,430
Total	**640,802**

Thus, in California, there are 12,829 elementary and secondary public and private schools with a total enrollment of 6,592,414.

2.2 Ethnic Background

The ethnic background of students enrolled in California public elementary and secondary schools is presented in Table 3.

Exhibit 2.5. Ethnic Background of California Elementary and Secondary School Students

Ethnicity	Number	Percent
American Indian	50,750	0.9%
Asian	479,073	8.0%
Pacific Islander	37,995	0.6%
Filipino	141,045	2.4%
Hispanic	2,513,453	42.2%
African American	509,637	8.6%
White	2,195,706	36.9%
Multiple/No Response	23,953	0.4%
Total	**5,951,612**	**100.0%**

2.3 Enrollment in Elementary and Secondary Schools in PG&E Service Territory

Based on a recent extract from PG&E's Customer Information System (CIS), there are an estimated 5,994 elementary and secondary (public and private) schools in PG&E's service territory. This represents 46.7 percent of the 12,829 schools in all of California. Assuming that the number of students in PG&E's service territory is proportional to the number of schools in PG&E's service territory, we estimate that there are 3,080,125 (46.7 % X 6,592,414) students in both public and private elementary and secondary school in the PG&E service territory.

2.4 Forecasted Enrollment in California Elementary and Secondary Schools

The California Department of Finance (CDF) estimates that the state will add over 300,000 new students in the five years from 1997-98 to 2001-02, bringing the total number of public K-12 students to nearly six million. Assuming a similar percent increase in private schools, would add an additional 32,300 private school students. Again assuming that the growth rate in PG&E's service territory will be in proportion to the number of students in its service territory, we expect an increase in public school enrollment of 140,100 (46.7% X 300,000) and an increase in private school enrollment of 15,084 (46.7% X 32,300).

2.5 School Personnel

To attempt to keep up with the demands of increased enrollments and reduced class sizes, the number of certified teachers has grown three percent from 1998-1999 school year to the 1999-2000 school year. Exhibit 2.6 presents the number of administrators, certified teachers and others in these two school years.

Exhibit 2.6. California Full-Time-Equivalent Public School Personnel

	1999-2000		1998-1999	
Full Time Staff	**FTE**	**Pupils Per FTE**	**FTE**	**Pupils Per FTE**
Administrators	21,653	275	20,618	284
Pupil Services[1]	19,887	299	17,357	337
Certified Teachers	284,628	21	276,313	21
Classified[2]	271,721	22	258,688	23

[1] Counselors, librarians etc.

[2] Instructional aides, bus drivers, custodians, secretaries.

The salaries and benefits of these FTEs typically are 80-85 percent of a district's expenditures.

2.6 The Facilities Overload

Californians spent over $20 billion on school facilities from 1986 to 1996. But as large as that investment might sound, it has been inadequate to meet a tremendous statewide need. The need arises from three sources. One is the growth in California's student population, described above. Many California School districts are struggling to catch up with the housing needs caused by this enrollment growth. Most recently, high schools have felt increasing pressure as the students who flooded elementary schools in the late 1980s enter the secondary systems. The two other reasons are the effect of reduced class sizes and the number of school buildings in need of repair, renovation, and modernization.

2.6.1 Class Size Reduction

California's class size reduction program (CSR) has also had a profound effect on school facilities. In the first years of CSR implementation - 1996-97 and 1997-98 – California's elementary schools added about 28,000 new K-3 classroom spaces through a variety of strategies, including a heavy reliance on portable classrooms. They reduced class sizes to not more than 20 students for an estimated 85 percent of the state's kindergarten through third grade students. If schools throughout the state had reached full implementation in 1997-98, it could have required from 2,000 to 4,000 more classroom spaces.

2.6.2 School Maintenance and Modernization

The California Department of Education (CDE) reports that 55 percent of California's public school buildings are over 30 years old. Due simply to their age, many schools are in need of basic repairs and routine maintenance.

In a national survey completed in 1995 by the U.S. General Accounting Office, California ranked among the worst states in most of the building features below. Seven out of 10 school districts reported at least one inadequate building feature and four out of ten reported at least one inadequate building. The state's schools ranked a little better on some environmental factors, most notably ventilation, indoor air quality, and air conditioning.

Exhibit 2.7. Percent of California Schools Reporting "Inadequate" Building Features in 1994-95

Building Features	California Respondents	National Survey
Roofs	0.41	0.27
Framing, floors, foundations	0.28	0.18
Exterior walls, finishes, windows, doors	0.42	0.27
Interior finishes	0.47	0.24
Plumping	0.41	0.3
Heating, ventilation, air conditioning	0.41	0.36
Electrical power	0.32	0.26
Electrical lighting	0.43	0.25
Lifesafety codes (such as fire and earthquake)	0.21	0.19

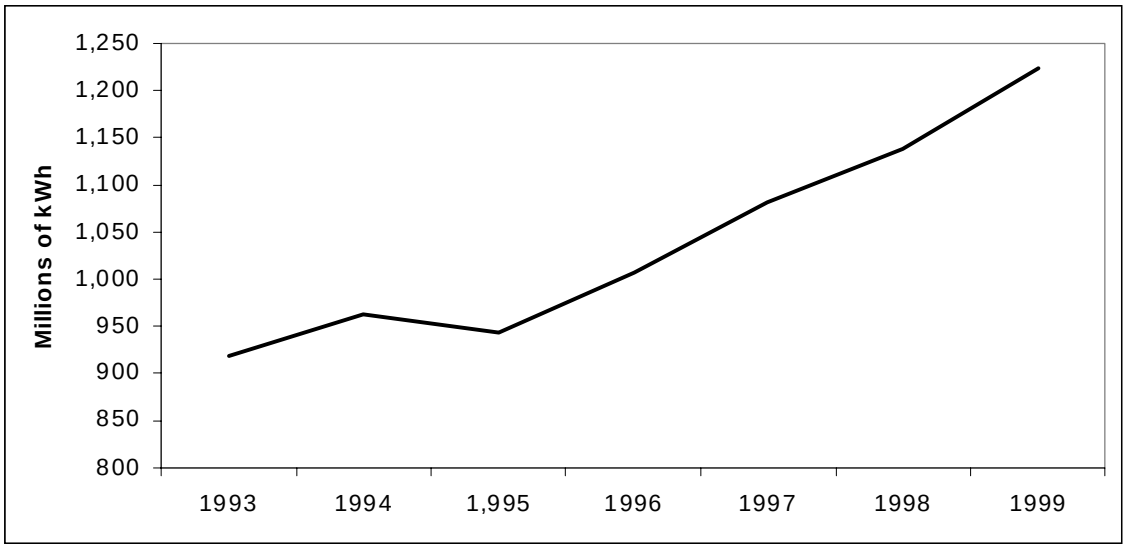
Exhibit 2.8. Percent of California Schools Reporting "Unsatisfactory" Environmental Factors in 1994-95

Environmental Factors	California Respondents	National Survey
Lighting	0.31	0.16
Heating	0.25	0.19
Ventilation	0.29	0.27
Indoor Air Quality	0.22	0.19
Acoustics	0.34	0.28
Space Flexibility	0.70	0.54
Energy Efficiency	0.60	0.41
Physical Security	0.41	0.24
Schools With Air Conditioned Classrooms	0.67	0.51

2.7 Energy Consumption

Of the total state budget for California elementary and secondary schools, approximately 2 to 3 percent is spent on energy (Rand, 1996). From 1993 through 1999, consumption in elementary and secondary schools in PG&E's service territory has grown from 1.9 percent to 2.3 percent of total nonresidential energy consumption. The compound annual growth rate (CAGR) for schools is nearly five percent, nearly five times the CAGR of the entire nonresidential sector. Exhibit 2.9 presents the kWh consumption for elementary and secondary schools in PG&E's service territory from 1993 through 1999. There are currently increasing kWh prices in San Diego Gas & Electric service territory. The other investor owned utilities are expected to face increased electricity prices in the near future. Natural gas prices are also rising throughout the state.

Exhibit 2.9. Energy Consumption by Public and Private Elementary and Secondary Schools in the PG&E Service Territory



3. FUNDING

The revenue for California schools is constrained because of the voter-approved initiative, Proposition 13, that limited the collection of property taxes and because of a 20-year-old law that specifies how much money each district may receive for general purposes (its revenue limit). Almost all of school districts' income is controlled by the Governor and Legislature. Another voter-approved initiative, Proposition 98, somewhat offsets these limits by guaranteeing a minimum amount of revenue for K-12 education. However, in November 1998, voters approved Proposition 1A, which authorizes $9.2 billion in bonds, with $6.7 billion earmarked for K-12 schools and the remainder for higher education. The money will be used for new construction ($2.9 billion), class size reduction ($0.7 billion), and other needs ($1 billion) over the next four years. However, the CDE has estimated that approximately $20 billion is needed between 1997 and 2002 to address the facilities crisis in California. Of this $20 billion, approximately$15 billion is needed for facility improvements with the remainder going to new construction.

In 2000-2001, the total projected revenue for schools in California is $49.2 billion. This reflects a one-year increase in state funding of $4.5 billion that will become part of the base revenues in future years. About 84 percent of the total – or about $41.3 billion including state funds and local property taxes – is controlled by the State's governor and Legislature

The breakdown of revenues for public school districts is provided in Exhibit 3.1.

Exhibit 3.1. Breakdown of Revenue Sources for Public Schools

Source	Percent
State Aid	38.9%
Local Property Taxes and Fees	27.5%
Federal Revenue	5.4%
Other State Revenue	21.3%
Lottery	2.2%
Other Local Revenues	4.7%
	100.0%

In addition to these sources of funds, there is a wide variety of federal, state, and utility sponsored energy conservation programs can also make a significant contribution in the construction and renovation of schools. These programs are discussed in the following section.

4. CURRENT ENERGY EFFICIENCY PROGRAMS AND RESOURCES

In the PG&E service territory there are a number of resources and programs that are available to schools. Each is briefly described below.

4.1 Bright Schools Program

This California Energy Commission Program offers specific services to help schools become more energy wise, such as identifying cost-effective energy-efficient systems to meet their needs and providing design and implementation assistance – at little or no cost to them. This Program has two components: 1) new schools construction, and 2) school modernization, deferred maintenance and energy audits.

4.1.1 New School Construction

Schools built with energy-efficient designs will cost less to operate, offering continuous savings and leaving more money for education. Many new schools incorporate equipment and building measures that barely meet recommended energy-efficiency standards. However, many of these designs could be improved with little or no additional expense. Bright Schools provides technical assistance early in the design phase, before the plans are solidified. The savings accumulate from the first day of operation. For new school construction, Bright Schools can:

1. provide design consultation,
2. identify cost-effective energy-saving measures,
3. compare different technologies,
4. develop specifications for energy-efficient equipment,
5. help select architects and other design professionals with school construction and energy-efficiency expertise,
6. review construction plans, and
7. complete value engineering of specific energy-efficiency measures.

4.1.2 School Modernization, Deferred Maintenance and Energy Audits

Bright Schools can help you get the most from your modernization and maintenance investments. With an evaluation of your five-year deferred maintenance plans or an energy audit of you facilities, you could identify energy-related projects that should be implemented immediately as part of a comprehensive Bright Schools energy package. Schools planning major renovations can benefit from our technical assistance. The program can also help you get loans to obtain the matching funds required by some State programs. For school modernization and deferred maintenance efforts, Bright Schools can:

1. conduct energy audits and feasibility studies,
2. review existing proposals and designs,

3. provide equipment bid specifications,
4. assist with contractor selection, and
5. assist with installations.

4.2 Energy Quest

This is the California Energy Commission's web site for kids. This website includes art contests, science projects, literature, puzzles, history, and game shows with a focus on energy, all presented at several levels of difficulty. For example, users can click on Poor Richard's "Energy" Almanac and learn about Benjamin Franklin's experiments with electricity, how energy was used in 1740 and how energy use evolved to the present day, and some of Ben Franklin's energy saving devices.

4.3 PG&E's Energenius Program

The Energenius Program provides gas and electric energy conservation and safety, water conservation, and recycling education to school children in grades 1 through 8. More specifically, the EP:

- provides basic education to students that help shape their energy use behavior and practices as adults in home and work environments, and
- teaches students how to conserve energy in their homes and increases their parents' awareness about energy.

Participation over the years has continued to increase. Since 1991, PG&E has been providing these free energy efficiency and safety materials to all schools within their service territory. In 2000, PG&E provided education materials to over 27,000 students. School districts and teachers request these materials over the Internet or by telephone. Of all the DSM programs, the Energenius Program reaches the greatest number of schools.

The materials consist of five basic lessons:

1. Bill Buster Program (grades 6-8)
2. Primary Energenius Program (grades 1-3)
3. Energenius Primary Safety Program (grades 1-3)
4. Intermediate Energenius Program (grades 4-5)
5. Energenius Intermediate Safety Program (grades 4-5)

4.4 PG&E's Energy Treasure Hunt Program

PG&E is facilitating the implementation of DOE's Rebuild America through a Program that PG&E has named the Energy Treasure Hunt Program. The ETHP provides a great opportunity to create a "new generation of energy efficient schools" given the need for major facility upgrades, rising energy costs, and the resources available at this time to help schools districts become more energy efficient. Despite this immense opportunity, schools still experience barriers that can prevent them from taking advantage of the resources being made available, and realizing this timely opportunity.

Schools rarely have the in-house energy efficiency expertise, or the staff resources to evaluate the opportunities and take the necessary steps to utilize, coordinate and manage the myriad of resources through the entire process of upgrading facilities to make them more energy efficient. Even when a school district is fortunate enough to have a project champion, they often do not have the staff resources to manage process, because they are overwhelmed with other high priority tasks.

Rebuild America is a DOE program focused on energy efficiency upgrades in commercial buildings. Rebuild America's EnergySmart Schools campaign has three more specific objectives:

1. to raise awareness about energy in K-12 schools,
2. to help schools address their facility needs, and
3. to facilitate student energy education.

A resource that Rebuild America brings to the ETHP is that of private industry - its "Business Partners." Philips Lighting Company is a Rebuild America Business Partner that is providing seed monies, web site design, prizes, and actual materials to the initiative. PG&E, another business partner, will sponsor, promote, coordinate, and tailor most of the activities of the ETHP in its service territory. Other ETHP Business Partners include Trane, Sarnafil Reflective Roofing, My-Lite Daylighting, and Sempra Energy Services.

Currently, there are two school districts participating in the pilot ETHP. Within each district, four schools are participating.

4.5 PG&E's Nonresidential Standard Performance Contracting (NSPC) and Large Nonresidential Standard Performance Contracting (LNSPC) Programs

Under the 1998 NSPC[1] Program and the 1999 LNSPC Program, the program administrators offered fixed price incentives to Energy Efficiency Service Providers (EESPs)[2] for measured kWh energy savings achieved by the installation of energy efficiency measures. The fixed price per kWh, performance measurement protocols, payment terms, and all other operating rules of the programs were specified in a standard contract. The role of the program administrator was to manage the programs in a fair and nondiscriminatory manner, promote

[1] In 1998, the Program's first year, it was called the "Nonresidential Standard Performance Contract Program." In 1999, the Program was separated into two separate programs based on customer size. The 1999 LNSPC was designed to serve end users with peak demand of 500 kW or more, while the 1999 Small Business SPC Program was designed to serve customers of less than 500 kW peak demand. In this report, we focus on the 1999 LNSPC and its predecessor the 1998 NSPC. For an evaluation of the Small Business SPC Program refer to XENERGY, Inc., *1999 State-Level Small/Medium Nonresidential MA&E Study, Final* Report, December 2000.

[2] In the context of the program, an EESP can be any company, organization or individual that contracts with the administrator to receive payment for measured energy savings resulting from an energy efficiency project. In the 1998 NSPC Program, a customer could act as an EESP by contracting directly with their utility and installing and measuring savings from an energy efficiency project at their own facility. Within the context of this paper, however, we refer separately to self-sponsoring customers and EESPs. Our references to EESPs in the remainder of this report refer to third-party firms, not customers.

the programs, educate customers and EESPs on the programs, and enter into contracts with applicants to pay for measured energy savings.

The programs were both "pay-for-performance" programs. With traditional utility rebate programs, the utility pays an incentive directly to its customer based on an estimate of annual savings from a project. However, under these pay-for-performance SPC programs, the utility program administrator pays a variable incentive amount to a third-party EESP, or to a customer acting without a third-party EESP, based on measured energy savings.

It is important to note that a review of the 1998 and 1998 NSPC and LNSPC Program databases revealed that of the 82 PG&E customers *only three* (3.7 percent) were elementary or secondary schools.

4.6 PG&E's Small Standard Performance Contracting Program (SBSPC)

The SBSPC is also a statewide program. Under the 1999 Program, third-party project sponsors (including contractors) were paid for measured, verified savings, based on a fixed schedule for verified savings amounts. End users could not self-sponsor projects. A standard contract between the program administrator (utilities) and third-party sponsors specified incentives, performance measurement and verification (M&V) options and protocols, payment terms, and other operating rules. Measures had to have a useful life of at least 3 years, and save 20,000 to 200,000 kWh/year (or 2,000-20,000 therms/year). Third-party participants submitted applications that might or might not be accepted, depending on adherence to program requirements, including detailed justification for expected savings.

A review of the 1999 SBSPC Program revealed that participation by elementary and secondary schools was very low (one participating school), despite an application process that was far simpler.

4.7 PG&E's Express Efficiency Program

The 1999 Express Efficiency Program was a statewide rebate program targeted to adoption of high-efficiency measures by businesses with electricity demands <500 kW. The Program has been available to PG&E's nonresidential customers in one form or another for almost 10 years (although prior to 1998, there was no customer size requirement). Each of the other utilities has had nonresidential rebate programs in some form or another for most of the past 10 years as well. Annual rebate expenditures peaked in the mid-1990s and are currently dramatically lower than what they were during this peak period.

The statewide 1999 Express Efficiency Program was similar to PG&E's former Retrofit Express Program except that it was designed to encourage market transformation and includes two upstream components (HVAC and motors). Under the 1999 Express Efficiency Program small/medium businesses could receive rebates for a number of high-efficiency HVAC, lighting, refrigeration, and other measures. Rebates were paid to customers generally within one month of completed installation paperwork. Payment was subject to utility verification of appropriate installation, at the utility's discretion.

A review of the 1999 Express Efficiency Program revealed that participation was much higher than in the NSPC, LNSPC, and the SBSPC Programs. This was primarily due to the fact that participation involves the least amount of hassle. While the participation rate was

higher, the absolute number of participants was only 89, which is 1.5 percent of PG&E's 5,994 elementary and secondary schools (both public and private).

4.8 Savings By Design

Savings by Design is a program to encourage high performance non-residential building design and construction. Sponsored by four of California's largest utilities under the auspices of the Public Utilities Commission, Savings By Design offers building owners and their design teams a wide range of services such as:

- Design Assistance provides information and analysis tailored to the needs of their project to help design more efficient buildings.
- Owner Incentives help offset the costs of energy efficient buildings.
- Design Team Incentives to reward designers who meet ambitious energy efficiency targets

Savings By Design seeks to improve the comfort, efficiency, and performance of buildings by creating a team approach to design. Between the owner, design team, and utility representatives, every member of the team has a role to play, and the program offers benefits for each.

4.9 The California High Performance Schools Program (CHPS)

The CHPS seeks to create a new and improved generation of energy-efficient, high performance educational environments. It plans to achieve this goal through the development and promotion of tools, processes and interventions to deliver sustainable energy efficiency in California K-12 schools. More specifically, CHPS will accomplish this objective by:

1. communicating the value of high performance schools through public and professional outreach and educational efforts, and linking that value proposition with specific solutions and resources available through the stakeholders,
2. providing technical assistance, tools, and training to influence the design, specification, construction and operation of energy efficient schools,
3. coordinating the availability of various financial option for design teams and schools,
4. demonstrating the performance benefits of high performance schools through pilot new construction and modernization projects, and
5. collaborating with school facilities planning and approval agencies to institutionalize high performance design methods.

5. SCHOOL MANAGEMENT/DECISION MAKING

Restrictions present in California Education Code, categorical aid funding restrictions, and previous empirical work, suggest that districts will allocate similar shares of their dollars on particular spending categories. The education code, categorical aid programs, and collective bargaining agreements all lead to high minimum expenditures on classroom personnel and materials. The share of dollars devoted to expenditures on classroom personnel and materials is likely to be similar across districts even though the per pupil spending may vary due to discretionary resources. On other categories of expenditure, which have a smaller base minimum level of expenditures required or where there are less restrictions governing the spending, districts may show greater flexibility in their design decisions. For example, districts are likely to show more variation in the share and level of total expenditures they devote to maintaining school facilities, which have lower minimum spending restrictions and are more discretionary in nature.

This greater discretion with respect to facility-related expenditures suggests that it is possible to get schools to at least consider adopting energy efficient equipment and building designs. That is, they do have some discretion to assume the higher first costs, if the payback is reasonably short.

5.1 Decision-Making in the Schools Market

The focus in this section is on decision making in schools in general and decision making regarding capital expenditures in particular. While the local government's role in controlling education funding decisions has diminished, it is still at the local level that the allocation of resources for education ultimately takes place. The local school district remains the basic administrative unit of schooling. And, despite increased federal and state regulations that have developed throughout the years, practical realities of daily government and the belief in local control of education have kept education a fundamentally local enterprise. Placing restrictions on use is always a matter of degree, and what really matters is how the restrictions affect behavior at the local level.

At the local level, who are the key decision-makers typically involved in planning educational facilities? Castaldi (1994) mentions five key stakeholders:

1. the *school board* holds the ultimate decision making power for all school sites in a district,
2. the *chief administrator at the school* (the principal) has ultimate decision-making power at a specific school,
3. the *facility planner/operations manager* at the school typically oversee the entire planning and design process and act as liaisons to the school board and superintendents,
4. the *educational consultant* is responsible for assisting the architect in converting educational concepts into school facilities, and
5. the *architect/engineer* has the primary responsibility for translating educational concepts and functions into educational facilities that are conducive to learning.

The extent to which these stakeholders can overcome the market barriers they face will determine whether opportunities to invest in energy efficiency will be taken. The most significant market barriers facing these stakeholders are discussed in the next section.

6. BARRIERS TO INVESTING IN ENERGY EFFICIENT EQUIPMENT

One key element in any market characterization is the identification of probable market barriers that might impede the adoption of the efficiency products. For reference purposes, the generic barriers defined in the *Scoping Study*[3] are described in Exhibit 6.1. Then the conclusions of the CHPS Advisory Committee regarding the most significant market barriers facing the schools sector are presented. These market barriers are couched in terms of those defined in Exhibit 6.1.

Exhibit 6.1. Market Barrier Descriptions

Barrier	Description
Information or Search Costs	The costs of identifying energy-efficient products or services or of learning about energy-efficient practices, including the value of time spent finding out about or locating a product or service or hiring someone else to do so.
Performance Uncertainties	The difficulties consumers face in evaluating claims about future benefits. Closely related to high search costs, in that acquiring the information needed to evaluate claims regarding future performance is rarely costless.
Asymmetric Information and Opportunism	The tendency of sellers of energy-efficient products or services to have more or better information about their offerings than do consumers, which, combined with potential incentives to mislead, can lead to sub-optimal purchasing behavior.
Hassle or Transaction Costs	The indirect costs of acquiring energy efficiency, including the time, materials and labor involved in obtaining or contracting for an energy-efficient product or service. (Distinct from search costs in that it refers to what happens once a product has been located.)
Hidden Costs	Unexpected costs associated with reliance on or operation of energy-efficient products or services - for example, extra operating and maintenance costs.
Access to Financing	The difficulties associated with the lending industry's historic inability to account for the unique features of loans for energy savings products (i.e., that future reductions in utility bills increase the borrower's ability to repay a loan) in underwriting procedures.
Bounded Rationality	The behavior of an individual during the decision-making process that either seems to be or actually is inconsistent with the individual's goals.
Organization Practices or Customs	Organizational behavior or systems of practice that discourage or inhibit cost-effective energy-efficiency decisions - for example, procurement rules that make it difficult to act on energy-efficiency decisions based on economic merit.
Misplaced or Split Incentives	Cases in which the incentives of an agent charged with purchasing energy efficiency are not aligned with those of the persons who would benefit from the purchase.

[3] Eto, Joseph, Ralph Prahl, and Jeff Schlegel. 1996. *A Scoping Study on Energy-Efficiency Market Transformation by California Utility DSM Programs*, Earnest Orlando Lawrence Berkeley National Laboratory, LBNL-39058 UC-1322, prepared for The California Demand-Side Measurement Advisory Committee, Berkeley, CA.

Table 6-1 (continued)
Market Barrier Descriptions

Barrier	Description
Product or Service Unavailability	The failure of manufacturers, distributors or vendors to make a product or service available in a given area or market. May result from collusion, bounded rationality, or supply constraints.
Externalities	Costs that are associated with transactions, but which are not reflected in the price paid in the transaction.
Non-Externality Pricing	Factors other than externalities that move prices away from marginal cost. An example arises when utility commodity prices are set using ratemaking practices based on average costs (rather than marginal).
Inseparability of Product Features	The difficulties consumers sometimes face in acquiring desirable energy-efficiency features in products without also acquiring (and paying for) additional undesired features that increase the total cost of the product beyond what the consumer is willing to pay.
Irreversibility	The difficulty of reversing a purchase decision in light of new information that may become available, which may deter the initial purchase - for example, if energy prices decline, one cannot resell insulation that has been blown into a wall.

Source: Eto, et al., 1996.

6.1 Information and Search Costs

The information and search cost market barrier is primarily due to a lack of awareness of the value of energy efficiency. This lack of awareness is tied to the low interest in energy efficiency in this sector arising from the fact that energy costs in a given school are such a low percentage (2 percent) of overall operating costs.

In the schools market, schools often do not have the technical expertise to conduct energy audits or conduct the engineering modeling needed to estimate savings. They also do not have information about high performance schools benefits, cost effectiveness, and process information. As a result, districts do not know what to ask for when shopping for new equipment or architectural designs.

In addition, those who design schools (architects and engineers) often lack the information and training to design high performance schools.

6.2 Performance Uncertainty

In the schools, there is little enthusiasm for adopting the more efficient technologies, since they are uncertain about their performance. Put another way, there is a fear of being first to market.

6.3 Organizational Practices

In the schools market, they have little practice in incorporating efficient technologies in educational or building specifications, since they have traditionally opted only for standard equipment and designs. Decision-makers have usually focused on the first costs rather than consider the stream of future benefits in the form of reduced energy bills. In addition, the current budgetary process does not allow sufficient time to examine all the energy efficient

equipment and design options, making the use of standard equipment and building designs, and convenient rules-of-thumb the norm.

6.4 High First Costs

While not technically a market barrier, declines in school funding over the last 20 years have left little or no room in school budgets for incorporating high performance measures. While the effects of Proposition 1A may help, much more money is needed before schools will seriously consider the more energy efficient options.

7. CONCLUSIONS

There are a variety of conclusions that can be made regarding the schools market segment.

- There is a drastic need for additional classroom owing to increased enrollments and reduced class sizes. Failure to take advantage of energy efficient options represents a significant missed opportunity.
- Because of reduced school funding over the last 20 years, there is a drastic need for major repairs and renovation of existing buildings. This is the case despite the passage of Proposition 1A. Failure to take advantage of energy efficient options represents a significant missed opportunity.
- Energy consumption in PG&E's schools market is increasing much faster than the nonresidential population in general.
- A wide variety of energy conservation programs can have a significant financial impact on school facilities. However, the number of elementary and secondary schools participating in many of PG&E-sponsored energy conservation programs has been limited. It may be that the complexity of school funding and a decision-making process that involves numerous stakeholders operating in a politically-charged environment is simply too labor-intensive to gain the attention of energy efficiency service providers.
- The market barriers facing schools include information-search costs, performance uncertainty, organizational practices, and high first costs. Organizational practices and high first cost may be the greatest barriers.

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Appendix G.
Energy Patrol Assessments

Final Interview Report: First Field-Tester

Comments by the First Field-Tester, fifth-grade teacher, interviewed on December 16, 2002.

Overall recommendations for program

- The walk through the school and "training workshop" at school site was very beneficial.
- The *Energenius* video was perfect for my students.
- I recommend that a video about Energy Patrol be shown right away as a motivation for students.
- T-shirts were a hit! Everyone wanted one.

The Field Test

The First Field-Tester's original plan was to use his "more active" students who tend to be "low achievers" to be on the Energy Patrol. However, he found those students were not enthusiastic about the patrol program and their motivation to do the patrol was mostly to "get out of class." Their attitude toward the Energy Patrol tasks was more negative than others in the class.

On the other hand, his "higher achievers" volunteered to do the Energy Patrol, wanted to be leaders, and took it seriously. They wanted to write down the areas where energy could be saved and were more enthusiastic about the program. Some students wanted to be on patrol because they liked the idea of being able to tell others what to do, as this gave them power.

He tried to integrate the Energy Patrol into his science program. He started by conducting a 15-minute class discussion about what is an Energy Patrol and then took the entire class on a walk around the school to locate areas that could be monitored. Students looked inside and outside of classrooms and visited the science lab and gym.

Next he assigned homework. Students were to discuss four questions with their parents:

1. How do you heat your house?
2. How do you cool your house?
3. What energy saving practices to you do?
4. What else might you do to save energy?

He said that several parents told him that this assignment provided good conversation around the dinner table.

He set up his patrol differently from what was described in the manual. He felt that other teachers in the school would not like the "policing" approach to "force" them to save energy. Especially the fact that students from another class would be leaving "reminder" notes, which is a negative approach to encouraging energy conservation. After students analyzed the school site for energy-saving areas, two or three students went to other classes to present information about

the importance of saving energy. Each group of two or three students was assigned different classes to visit at school.
Then some students were asked to interview a teacher. It was particularly effective if an Energy Patrol student was in the teacher's class in the previous years, because the student felt more confident to talk to that teacher. This was done at recess or during lunch. The student asked the teacher: What do you do in the classroom and what do you do at home to conserve energy? Then the student wrote a report on what the teacher said.

Once most staff members had been interviewed, he brought up at a staff meeting what teachers were already doing to save energy. This gave other teachers ideas on what else they could do.

Then his students created posters on ways to save energy and these were posted around the school. The challenge, he thought, is for all teachers and students to do a better job in saving energy so that the entire school is working together instead of individual classrooms.

Comments on the Energy Patrol Handbook (by section)

He felt that there were more materials in the handbook than necessary and some things were over-explained. It teachers haven't done anything like the Energy Patrol before, it is important, he said, not to overwhelm them with material.

Timeline: The meeting with teacher timeline was very beneficial for him. It kept him on schedule knowing that someone will be checking. It was good to have dates for completion.

Section 1 (Two Steps for Teaches)

The most beneficial part of the entire manual is the "Getting Started Check List" (page 8). Gordon liked its short language and that is was easy to understand and to follow.

Section 2 (A Five-Step Educational Process)

He thought the five-step educational process (page 9) looks too intimidating, even though in reality teachers do this when they teach any subject. But it looks like it'll be too much work and might keep the teacher from implementing this program.

Providing a sample for *brainstormed ideas* (page 11, Collecting Information About School Energy Use) was very beneficial.

Pages 12 and 13 are too similar, just combine into one.

This section seems repetitive; consider shortening it.

Section 3 (Implementing Your Energy Patrol Plan of Action)

Okay, but didn't use these materials.

Section 4 (Taking Steps Beyond Patrolling the School)

No comment.

Section 5 (Helpful Resources))

Need to add links to standards for Energenius Program.

Also it is important to link the Energy Patrol to standards.

Section 6 (Glossary)

Glossary: too much, too high a vocabulary; should be simplified. Students won't understand these definitions. This is more for high school.

Section 7 (Appendix)

Have only one Energy Patrol Check List and skip the general things to check (too much for elementary). The second list has too many big words like low wattage, weather-stripped, and monthly energy consumption, which is over the students' heads.

Overall Recommendations for Energy Patrol Program:

- Start with showing a video about the EP program to students to get them excited.
- Consider having two sections in the manual: one quick guide with the "nitty-gritty" information, and the other sections that is more detailed. It the teacher is interested, he or she can look up the information.
- Student pages should be translated into Spanish.
- Training workshop for teachers would be beneficial to teachers. Teachers will have questions.
- It is also important to get the energy bill for the school and do some comparisons before and after the implementation of Energy Patrol program.

Recommendations to get teachers to participate in EP:

- The principal should not assign this to a teacher. It should be strictly on a volunteer basis. "You don't want to force a teacher to do the EP program as this could make the program look bad and the teacher won't do a good job."
- Need to find only one teacher for each site.
- A video to show teachers at a staff meeting when recruiting an EP teacher would be important, to show that this is not a difficult thing to do, and to show that there are more than one way to do this. Video should show two or three schools, each doing EP differently.
- A connection to standards is a must! Not just the Energenius, but also the EP itself. Focus on science and math. "The selling point being that this is part of education."

Final Interview Report:
Second Field-Tester

Comments by Second Field-Tester, a sixth-grade teacher, interviewed on December 17, 2002.

Overall recommendations for program:

- Start with showing a video about the EP program to students to get them excited.
- Keep the EP Manual as is, but simplify the glossary.
- Make the program be year long.
- Make clear connections to content standards.
- Develop a video to show teachers and students on how an energy patrol can be done in various ways.
- For middle schools, the best place to do this program is during science class.

The Field Test

The video on EP sparked interest and got the students motivated. It allowed students to see what students at other schools were doing. Would be good to have a video specifically on PG&E's EP program so it is localized to Northern California.

Students loved the T-shirts. Especially when they could draw and write slogans on them. On T-shirts, students used permanent markers to write slogans, such as:

- Watt's ya gonna do when the lights go out?
- Watt's your problem? Turn out the lights.
- Don't waste power.
- Lights on — nobody home.
- Your watts are up.
- Join the Watt Patrol.
- Save energy while you still have it.
- You use it — we loose it.
-

"Students are more motivated when they do hands-on stuff. They liked working on the T-shirts, then wearing them."

Concerning the reminder notes to be placed in classrooms: students wanted to use colors like a stoplight: Green — first warning; yellow — second warning; red — third warning.
Students also wanted to make "good job" signs. Students liked placing tags on the door; that gave them to feeling of power.
She incorporated the Bill Buster program into the EP program. She felt that it is better to do both as once, instead of Bill Buster and then EP. Bill Buster Surveys were hard to get back form students (the students resisted the homework assignment).

She first discussed what students might look for when they do an energy patrol. Then they walked the campus with the class and looked into rooms. Students wrote down areas that use electricity.

Scheduling the Energy Patrol

Her program was set up differently from the way it is described in the manual, because of the way the classes are scheduled at her school. Two days a week the sixth-grade students stay an extra hour at school and are in special classes: one day a computer and the other days another other class (I think it is a reading class).

During the last ten minutes of the computer class (once a week) is when she had her students do the Energy Patrol. She assigned (or had students volunteer) two students to each classroom at the school. During EP time, each pair patrols only one classroom or building (e.g., gym). The students had the last 10 minutes of the day to get the clipboards and forms and do the patrol on their assigned room. They tended to do this quickly so they wouldn't miss their buses. She also set this up as a requirement, so that all students in her class were to do this.

She noticed the difference between the "high" end groups who were high achievers and the "low end." The higher groups think differently and have more meaningful discussions. They seem to care more about saving energy. They think more like "I get to recycle; I get to save energy." Whereas the other group's thoughts are more, "I get to get out of class."

She would do this program again and recommends that it be a yearlong program. If it only goes for a month or two, the students will think that it is not important enough. We want them to think, "This is important, so that's why we do it all year." The monitoring can be done once a week.

She said: "This should be a year-long program, incorporated into the science class; a supplement to the regular science program. There are many sixth-grade science standards correlations to EP. So it is a perfect fit. The seasons should be incorporated, as EP would be looking at different things in the summer vs. winter. They can then see how energy conservation practices change over the seasons. This could also be taught as an elective and really incorporate electricity and all the related standards."

The teachers at her middle school had no problem with EP students coming into their classes as long as they weren't disruptive to their own students.

She said that she understands how elementary school teachers may not want to have students from other classes come into their room. They are much more protective of their areas and don't like to be evaluated. They might feel like the EP is invading their environment and telling them what to do.

The Energy Patrol Handbook

She felt that the materials in the handbook were just right. "Not so easy that it is insulting and just enough challenging." She said that is was good to have the samples and models in the handbook. She does not like the idea of adding a "Quick and Easy" section as that "devaluates it."

She said not to do a timeline next time, to see what the average time is for a teacher to go through the binder and program. However, a timeline would keep a teacher on track. Without a timeline it is possible for a teacher not the get to the program.

Maybe do a handbook for each grade level or grade level spans like the *Energenius* program. But all must connect to content standards.

Section 1 (Two Steps for Teachers)

Defining the EP Program is important.
"Getting Started Check List" (page 8) is good, but Greta didn't use it that much.

Section 2 (A Five-Step Educational Process)

Great read through all of it, but shortened this section considerably. Students brainstormed what uses energy and what they might look for when they tour the campus.

Providing a sample for brainstormed ideas (page 9) was very beneficial.

First time through their walk on the school campus, students just wrote what they saw. They did not use a form. Then the students developed their own form.

Section 3 (Implementing Your Energy Patrol Plan of Action)

Great information. Keep as is. Does not think that is it too lengthy.
Didn't use the agreement form. No use for it. No consequences if they don't follow it, since she wants all of her students to do it and not try to get out of it.

Sixth-graders don't seem to value a written contract.

Instead, her students discussed the etiquette of going into classrooms when the students are working there. Then the class made a list to post in the classroom. (e.g., do not make lots of noise or say Hi to their friends or do a high-five while they are on EP).

Greta did not want to rotate her students. She wants all of her students to participate. Therefore the entire class does the EP at the same time.

Section 4 (Taking Steps Beyond Patrolling the School)

No comment.

Section 5 (Helpful Resources)

Need standards for *Energenius* Program included.
Also it is important to link the Energy Patrol to standards.

Section 6 (Glossary)

Glossary too high of a vocabulary; should be simplified.

Section 7 (Appendix)

Have only one Energy Patrol Check List and skip the general things to check (too much for elementary).

Recommendations to get teachers to participate in EP:
The principal should not assign EP to a teacher. It should be strictly volunteer. Maybe show a video at a teacher's meeting to recruit a volunteer teacher to do the EP program.

She was asked how she found out about being a field tester and she said that she read about it in the Lake County Office of Education's printed bulletin. She feels that the teacher must volunteer to do this and not be told by a principal to do the EP. Teachers do not want to do more than they have to, so only teachers who really want to should be recruited.

One way to get a teacher interested would be to show a video of how three different schools do the patrols. The video should be short and shown at a teachers' school-wide meeting. The video could then motivate a teacher to want to do this.

There should only be one teacher per school doing this (although that depends on the size of the school).

Final Interview Report:
Third Field-Tester

Comments by the Third Field-Tester, a second- and third-grade teacher, interviewed on December 23, 2002. Note that she revised the handbook and did some energy education activities, but *did not* implement an energy patrol.

Overall recommendations for program:

- Keep the EP Manual as is. The "Five-Step Educational Process for Students" is especially valuable; but place the Classroom Energy Patrol into this section during step 2 (classroom first, then school).
- Don't waste paper: print the EP Manual on both sides of the paper.
- Develop a video to show teachers and students how an energy patrol can be done in various ways/various school settings.
- It is important that there is school-wide buy into the EP Program.

Other Comments

- The *Energenius Habits* and *Measures* go well with the EP program.
- Do the Classroom Energy Patrol first (before the Energenius programs). This is especially important with lower grade students.
- She showed three videos from the Energy for Children series (see info at end of this report): All *About the Conservation of Energy*; *All About the Uses of Energy*; and *What Is Energy?* Students really liked these. Each is about 23 minutes long.
- The EP should definitely be a yearlong program.
- Students might record the temperature for each day when comparing energy bills. This would be a good science lesson (how to read the outside temperature). The Second Field-Tester's idea of incorporating the seasons is great.
- Consider having an "Energy Saver" as one of the class jobs.
- This program would work particularly well as an after-school program.
- I would ask at a staff meeting what teachers want to participate and would allow my students to patrol the class. But ideally all should participate with the support of the administrator.
- Principal said that if EP means that students will be out during class time, he cannot support it. Recess, lunchtime, before and after school is okay for students to perform EP duties.
- An incentive for the entire school to participate would be if the district agrees to share the every saving dollars with the teachers for classroom materials, field trips, etc. Administrators should give additional incentives to teachers to do the EP and to all teachers who make an effort to conserve energy.
- It is important to get whole school to buy in to cutting energy costs (very important in existing district budget cuts).
- Provide recognition to teachers and students involved in EP through local news media.

- It is important to give the binder to the teacher way ahead of time and allow a longer period to implement the program.
- The patrol should be done everyday, if possible.
- Her school has different lunch and recess schedules for different grade levels; so several grade levels could be involved in Energy Patrol. The 2-3 grade students might need to have an adult present, so the teacher could go with a small group at a time, unless a teacher's aide or parent volunteer is available.
- All students in the class should participate in the EP. The less responsible students could be assigned their own class to patrol.
- EP students should go to other classes every month to report what other classes are doing to conserve energy.
- It would be interesting to have data to find out how much electricity computers and other appliances in the classroom use per hour. This could be added as an extra page to the EP Handbook.
- The teachers and classes that seem to be saving the most energy can be recognized during the morning bulletin announced on the intercom.
- Energy conservation should be part of everyone's life.

The Energy Patrol Handbook

She felt that the materials in the handbook were organized well and were easy to follow.
The timeline should be over a longer period of time.

Perhaps the entire binder's contents could be placed on a CD. But particularly important are the forms that should be available electronically (e.g. CD or on-line) so teachers could easily adapt them for their classrooms and schools.

Section 1 (Two Steps for Teachers)

Page 7: Every student should participate in EP.
"Getting Started Check List" (page 8) is a good list. The staff buy-in should be first.

Section 2 (A Five-Step Educational Process for Students)

Debby likes this sections a lot. Easy to follow and well layed out. A good format for teachers. This is the "meat and potatoes" part of it all. Very important.

Might want to include: What's the big idea of EP. (Like K-12 Alliance does.) Why are we doing this?

Analyzing is very important. Step 4 has great suggestions.
Page 13: What is the cost for a computer to run? Good to have examples of wasteful situations.
Pages 15 and 16: Great suggestions.

Section 3 (Implementing Your Energy Patrol Plan of Action)

Page 18 is too specific (too much info). Maybe make a list on the first page (#1-5) and further explain parts on the second page. Then EP Procedures.

Delete the part about keys. No school would allow students to have keys to classrooms. Look into windows instead.

Recommend to laminate the check sheets so they can be reused.
Good guidelines.

Need to explain what to do with the data gathered.

Page 21: Debby had a logistical problem of taking all students at once on a tour. A better way is to take a few at a time during recess or at lunchtime.

Evaluating success (page 25) has good ideas.

Section 4 (Taking Steps Beyond Patrolling the School)

Great idea to publicize the program. Gives recognition to teachers and students. Can showcase what students have done to save energy.

Section 5 (Helpful Resources)
Need to add links to standards for *Energenius* Program.

Take class energy patrol info out of this section. It gets lost here. Place in Section 2 (Five-Step Educational Process for Students).

Section 6 (Glossary)

Glossary: a good thing to have.

Maybe do a glossary for students (one page that could be copied and given to students). But make the teacher's glossary also easy for teachers (non-science majors) to understand.

Section 7 (Appendix)

For the first Energy Patrol Check List, add the info about outside of classroom including trees. Keep the other list, but place on disk or CD so teacher can create one that applies to the school.

Make the note about that this is a sample list in larger bolder font so teachers are aware that they are to select those applicable to their school and the grade level of their EP students.

Nice to have a page of examples of reminders to classes. Could use some that say that the class is doing a good job.

Recommendation of video series:

Energy for Children series (K-4)
Energy in Action series (5-8)

Schlessinger Science Library
1-800-843-3620
libraryvideo.com

Appendix H.
Feedback of Home Energy Efficiency Survey (HEES) From Field Testers

24 February 2003
TO: Pam Murray, PG&E
FM Greg. Tong
RE Teacher Feedback for Energenius Home Energy-Efficiency Survey

The impressions of teachers who reviewed the Energenius Home Energy-Efficiency Survey were highly positive. They said that the materials were written clearly and could both stand alone and act as an extension of the Energenius Measures program. They felt that the materials would encourage parent participation and offered a few suggestions for enhancement.

This report summarizes the findings and the changes made in the second version of the Survey in response to suggestions. It also describes the methodology briefly. An appendix includes the actual input from the teachers.

Summary of Findings

- Overall, the teachers felt the program was very good: "Great program." "This is well-written and a great set of activities for students and their parents."

- The teachers believe the material can accomplish PG&E's goal of involving parents in a simple audit of home energy use.

- The materials can stand on their own if not used as an extension to the Energenius Measures program.

- They felt that other teachers will be able to create other activities based on the output (reports) generated by the program's online survey.

Recommendations

The teachers have a few suggestions for enhancing the program.

1. **Offer an alternative to Web access**. The second version of the materials prints out the first 14 questions of the survey and instructs students to answer the questions with their parents and bring the answers to school where the teacher will help them input their information online.

2. **Address parents of "various intellect levels" who may not be able to understand the lessons**. The concern for parents who are unable to help their students with homework extends beyond the Energenius programs. We address this issue by #1 above. By involving the teacher in reviewing answers from home, we give teachers an opportunity to discuss responses with the students, and through the students, with their parents.

3. **Various wording changes**. All the changes are made in the second version of the materials.

4. **Further testing with a small set of teachers and students**. This testing is not budgeted in time or expense but is an option for PG&E to pursue.

Research Methodology

In December 2002, the first draft of the Energenius Home Energy-Efficiency Survey was distributed to four teachers for review. All four teachers were active in the target grade 3-5 levels.

Distribution was made via email along with a set of questions. The teachers were asked to respond in a follow-up telephone conversation. Two of the teachers responded to the request for feedback. One responded by telephone and the other by email. Their comments are attached in the appendix.

The following request for feedback appeared in the emails to the teachers and formed the basis for subsequent discussions.

When reviewing the materials, please keep the following points in mind:
1. Your overall impressions of the program?

2. Are the instructions easy to follow and clear? Appropriate for the target grade levels?

3. How well does the program encourage student/parent interaction?

4. How well does the program relate to the Energenius Measures Program (if you have had experience with Energenius Measures.)

5. Your suggestions.

APPENDIX

First Field-Tester

Overall
"Great program."
"I can see students working with their parents. I had to get my husband's help."
"The instructions are clear and easy to follow. And I don't use the computer much."

Relation to Energenius Measures
Did not see the relation to Energenius Measures but she couldn't remember which Energenius program she taught: "This program can definitely stand alone."

Reports
Printed out many reports.
Can see teachers creating their own activities around the reports.

Suggestion
Make kids who don't have computers at home feel included.
Include a printed sheet of the Level 1 questions. Ask students to fill out at home and turn them into their teacher for Web input at school.

Other
"I'm very interested in doing school audits. We're a Green School."

Second Field-Tester

Teacher guide
Overall it is well written. It would be helpful to have teachers do this in the classroom and report back to you.

First paragraph: Intermediate students "Intermediate" is a word that is not usually used to refer to students in grades 3-5. I would use actual grade levels.

Second paragraph: First sentence needs to refer to what they learned at school (for example through the Measures program where they learned ways to conserve energy).

Also consider making two sentences instead of one long one for the entire paragraph.

Parent, student, teacher Collaboration. Good info. It wasn't obvious to me which part is the teacher's collaboration.

Level 1 in Teacher Background. You might mention what HEES stands for the first time it is mentioned on this page (in case someone did not read the first page).

Level 2 and Level 3 same comment as above.

Concerning the Student Survey:
First paragraph. Students did not really learn how to install energy-saving appliances. Maybe they learned the importance of installing energy-saving appliances.
Concerning the fourth paragraph. My editor has me use "Make **certain"** instead of "make sure" (which is actually a slang term, but many people use it, so probably no big deal).

Same as above for the section "Before you Start" #2 make certain versus make sure.

For #4, how many people keep their statements for a year? Maybe give them an alternative if they don't have it. Can they still do this if they don't have that data? This is well written and a great set off activities for students and their parents. My concern is for those parents who cannot read well or do not have the educational background to be able to understand charts and graphs. What can be offered to them? Could there be a much simplified focus on a one month-type activity? This could be a stepping-stone to the exiting activities?

Maybe this could be an evening event where parents and their students go to a computer lab with one PG&E bill and the teachers helps them to get through a section. Then when they get the hang of it they can complete the rest at home.

Your overall impressions of the program? *Very comprehensive. Well written.*

Are the instructions easy to follow and clear? *Yes* Appropriate for the target grade levels? *I am not certain. Only students can tell us that (or their teachers). I am worried about those parents*

who are not as well educated or do not speak or read English well.

How well does the program encourage student/parent interaction? *Well, if parents can handle computer stuff, following directions, and spending an hour to do this, then it definitely encourages interaction. What's nice it that it is not just busy work; it applies directly to one's life and pocketbook.*

How well does the program relate to the Energenius Measures Program? (If you have had experience with Energenius Measures.) *I need more time to research this. Perhaps a teacher could answer better.* Your suggestions. *Get five parents of various intellect levels with their 3-5 grade students. Watch them do this and then discuss with them afterwards what needs to be adjusted.*