Equipoise Consulting, Inc.

Evaluation

Project Management

Final Report for

Pacific Gas & Electric Company's 2004/2005 Local School Resources Program and the Energenius® Program Evaluation

1129-04 Local Schools Program
1132-04 Energenius

Submitted by:

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1 EXECUTIVE SUMMARY

This evaluation covers Program Years (PY) 2004 and 2005 of Pacific Gas & Electric (PG&E) Company Energenius® and School Resources Program (SRP) energy efficiency programs. Both programs were local, information-only programs.

The Energenius® program is a curricula and student activities program for grades K-8 that educates students, teachers, energy management staff, custodial staff, and parents on energy efficiency and electric and gas safety to help shape their energy use behavior at home, school and work. The SRP used Resource Conservation Managers (RCM) to provide energy related direct assistance to school districts including benchmarking, energy audits and energy policy development. The program also provided information and education workshops for school district business officers, facility managers, custodial staff, food service staff, and faculty. Another component was a Relocatable Classroom (RC) Retrofit Pilot that demonstrated higher efficiency energy system retrofit opportunities in both portable and tilt-up relocatable classrooms and included system monitoring and occupant preference surveys.

1.1 Evaluation Objectives

The evaluation plan for the PY2004-2005 programs used both the CPUC Energy Efficiency Policy Manual and the California Framework for Evaluation to help determine the best and most cost effective approach to assess these programs. Because only 1.5% of the program's budget had been provided for the evaluation of these two programs and previous evaluations had been conducted on both programs that found positive impacts, the chosen approach was necessarily targeted towards examining new program elements and looking more at outstanding issues from past evaluations.

The agreed research plan covered four objectives:

1) assess the effectiveness of a new marketing approach by the Energenius® Program;

2) assess the effectiveness of the Resource Conservation Manager concept;

3) track and describe the relocatable classroom demonstration; and

4) monitor and describe a pilot project that incorporated energy audit training into a high school vocational education program.

Both primary and secondary data collection occurred to enable meeting the four objectives.

1.2 Findings and Recommendations

Effectiveness of Energenius® Marketing Approach: The Summer Energy Education Institute 2004 brought about self-reported changes in behavior by the participants. Half of the teachers indicated that they would incorporate one or more of the energy curricula presented during the Institute. When asked about the level of influence of the Institute presentation on whether the teacher planned to include the curriculum lessons in their teaching plans, the average response was 8.5 (where 1=no influence and 10=very influential) with a range of 6 to 10. The Summer Energy Education Institute was deemed a successful venue for both the program and the teachers and it is recommended to be continued. Future evaluations should perform multiple surveys over

time with the participants to determine what actions were actually taken during the following school year. Additionally, a nonparticipant comparison group would provide a baseline for the actions taken. (Both actions were outside the scope of this evaluation.)

Effectiveness of the RCM Component: The RCM approach appears to be successful at influencing the installation of energy efficiency hardware and practices at school sites and should be continued.[1] The RCMs felt that they provided a useful service in a timely manner and the participants agreed. The participants felt that the RCMs were knowledgeable; thus supporting the RCMs statements that training may be needed for future groups, but not this current set of RCMs. The high regard for and actions taken towards enabling the school districts to implement energy saving measures held by the RCMs was mirrored by the participants. The actual energy efficiency changes implemented within the school districts reflected the RCMs influence. While some of the "behind-the-scenes" processes (such as meetings and paperwork) need improvement, these did not appear to impair the program's ability to provide a well-liked, useful service. However, more structured record keeping processes should be put in place along with quality assurance of the data. It is also recommended that, in order to maintain the high level of knowledge, training of RCMs should be included as newer, less experienced staff are brought in to handle the RCM activities.

RC Retrofit Pilot Description and Tracking: The program retrofit 42 relocatable classrooms across 30 different schools with various energy efficient equipment. Twenty of the retrofit rooms were monitored, along with adjacent, otherwise identical, non-retrofit rooms for comparison. Energy impacts were identified for all of the currently analyzed technologies installed except for programmable thermostats. It is recommended that PG&E closely follow the planned statewide assessment of relocatable portables that is slated to occur in 2006 and use the information from the pilot project to determine the cost effectiveness of putting in place a large scale program to retrofit this type of classroom.

Youth Education Pilot Description: A small program component, which was pilot tested in the spring of 2005, brought an energy efficiency auditing curriculum to select high school students at the Metropolitan Education District in San Jose. This pilot component of the SRP was successful in educating these students about energy conservation, energy efficiency, and energy management. It had hands-on aspects that melded well with the approach of other classes at MetroEd. The students appeared to retain the information and apply it later in an internship environment. The use of an energy efficiency auditing curriculum to select high students was successful and may be a positive (albeit long-term) aspect of attempting to transform the market. It is recommended that this component be continued.

[1] An impact evaluation (outside the scope of this evaluation) would be required to confirm the specific level of influence the RCM's had on the energy efficiency hardware and practices at the school sties. However, the current analysis indicated that the RCM's were definitely influential.

2 INTRODUCTION

This section provides a brief overview of the two programs being evaluated, and provides context to how the evaluation was structured. It is followed by a description of the evaluation approach accepted by the CPUC on 9/29/2004 and revised on 12/27/04. Specific findings of previous evaluations of the two programs are included as background on the research approach. The programs were evaluated together because they were both information-only programs targeted at the school sector.

2.1 Overview of Programs

The two programs being assessed in this evaluation are the Program Year (PY) 2004-2005 Energenius® Program (EP) and the School Resources Program (SRP).

Energenius® Program - According to the PG&E description, the Energenius® program (EP) educates students, teachers, energy management staff, custodial staff, and parents on energy efficiency and electric and gas safety to help shape their energy use behavior at home, at school and at work. The 2004-2005 program included kindergarten through eighth grade curricula and built on the previous Energenius® structure consisting of five Educational Series of complete curricula on energy efficiency and gas and electric safety. EP also included Energy Patrol, an activity-based learning program where student groups actively investigate no-cost and low-cost energy efficiency and conservation opportunities within the school. Two stated changes to the program for 2004-2005 incorporated recommendations from teachers, including the addition of a middle school lighting audit and training component and piloting a give-away program of compact fluorescent lamps to participating students who were doing a take-home energy survey with their parents. At the beginning of the program, EP indicated that it may help the schools by providing CFLs free of charge that the students then sell for fund-raising activities. The program also was looking into an Energy Rewards pilot in which students are rewarded for helping play a part in their parents' decision to purchase energy efficient equipment. Neither of these potential pilot programs, if they occurred, were assessed by the evaluation team.

School Resources Program – From the PG&E description, this program was an enhanced version of the 2003 SRP information program. It had three primary components: (1) Resource Conservation Managers that provided direct assistance to school districts in energy use and rate analysis, energy benchmarking, energy system surveys and investment-grade audits, development of energy efficient equipment installation implementation plans, design reviews of new school facilities, retrofit recommendations for existing school buildings, energy policy and action plans, and energy information management activities; (2) Information and Education Workshops for school district business officers, facility managers, custodial and food service staff, and faculty; and (3) Relocatable Classroom Retrofit Pilot that designed and implemented a demonstration and direct installation pilot program to retrofit both portable and tilt-up relocatable classrooms with higher efficiency lighting, HVAC systems, daylighting systems, controls or envelope improvements to attempt to significantly reduce electricity and gas consumption and utility bills. There were stated to be two new types of workshops being offered by SRP in PY2004/2005: a faculty workshop on how to operate classrooms more effectively and a Facility Planner / Design Team Workshop on best practices for new school design, in cooperation with the Collaborative for High Performance Schools (CHPS).

2.2 Evaluation Approach

Pacific Gas & Electric's (PG&E) original objectives for the Measurement and Evaluation Study of the 2004-2005 SRP and EP followed closely the CPUC required objectives. Originally, the evaluation team was to:

1) Update the market assessment as required;
2) Provide ongoing feedback and corrective and constructive guidance regarding the implementation of the programs;
3) Measure indicators of the effectiveness of the programs, including the testing of assumptions that underlie the program theory and approach;
4) Assess the overall level of performance and success of the programs, and;
5) Help to assess whether there is a continuing need for the programs.

However, because only 1.5% of the program's budget had been provided for the evaluation of these two programs and there had been previous evaluation of the program theory for both programs, the original objectives were re-evaluated. The requirement for a comprehensive upfront market assessment and baseline analysis was considered moot since one was conducted as a part of the PY2001 evaluation and another market characterization occurred during the PY2003 Schools evaluation. Program theory and assessment of the linkages within the theory had been tested (finding of the previous evaluations are provided in Appendix A). Previous evaluations found positive impacts. This combined with the fact hat there were no significant changes in the program implementation, indicated that an identical assessment would provide little new information.

The agreed evaluation for the PY2004-2005 programs used both the CPUC Energy Efficiency Policy Manual and the California Framework for Evaluation to help determine the best and most cost effective approach to assess these programs. The approach chosen was targeted towards examining new elements and looking more at outstanding issues from past evaluations. The three main areas of interest within the PY2004-2005 programs that could be evaluated and would give both the program implementers and the CPUC useful information were:

1) The Energenius® Program was planning a new marketing and instructional approach in which teachers were invited to a 3-day conference in Calistoga, California during the summer of 2004. It was expected that the information provided to the teachers during this conference would lead to an increase in energy efficiency actions. The evaluation team assessed, through a mail survey to the teachers, the impact of the conference on actions taken in the fall and early winter of 2004.
2) The SRP had implemented a Resource Conservation Managers component. The Resource Conservation Managers (RCMs) directly provide information and assistance to schools. The evaluation interviewed 5 RCMs and 15 school participants to assess the effectiveness of this component.
3) The SRP implemented the Relocatable Classroom (RC) Retrofit Pilot. This pilot examined the enhanced energy performance in 20 portable classrooms by end-use monitoring two side-by-side portable classrooms per school site, one of which has been

retrofit and is considered "efficient" while the other is considered "standard".[2] The evaluation team, through information provided by PG&E, assured that the sites were appropriately monitored to provide the needed information for an impact analysis of energy savings. The original evaluation plan was to obtain the monitored data for an analysis of energy impacts. However, a detailed analysis of energy savings at the sites was already planned by the consultant performing the monitoring. Once this was understood, a change in the evaluation plan was requested and agreed to by the CPUC. These relatively small evaluation resources were put to a new component as shown in point #4. The evaluation team tracked and described the RC pilot component.

4) The SRP implemented a pilot project during the 2004-05 program years that provided energy auditing education to youth. Partnering with the Central County Occupational Center (CCOC), part of the Metropolitan Educational District (MetroEd - a vocational/technical public school located in San Jose), the SRP organized and subsidized a semester long program for high school students in the electric and HVAC tracks of CCOC. This training, called Student Energy Auditing Training, or SEAT, was monitored by the evaluation team and is described in this report.

2.3 CPUC Stipulated Items

This section covers the items specifically stipulated by the CPUC. There are both specific objects and components of an EM&V plan that require discussion. The eight objectives are presented first followed by the EM&V components.

1. Measuring level of energy and peak demand savings achieved. – *These are information programs - no energy or demand impacts are expected. However the Relocatable Pilot Program energy savings estimated for those classrooms included in the pilot are included as much as possible within this report.*
2. Measuring cost-effectiveness (except information-only) – *These are information-only programs and do not need to measure cost-effectiveness.*
3. Providing up-front market assessments and baseline analysis, especially for new programs – *The PY2003 evaluation provided an update to the PY2001 market characterization (completed September 2005). There was no need to use current evaluation resources to provide this information again within this evaluation.*
4. Providing ongoing feedback, and corrective and constructive guidance regarding the implementation of programs. – *The evaluation team provided feedback on issues found during the course of the evaluation both orally and by e-mail memos to the SRP program manager. A mid-program year memo provided a structured feed-back to the program (memo is provided in Appendix B.)*
5. Measuring indicators of the effectiveness of specific programs, including testing of the assumptions that underlie the program theory and approach. *The Equipoise Team created and tested the program theory in previous evaluations of these programs. (Program Theory logic models are provided in Appendix A.) All indications were of positive*

[2] The program installed energy efficient retrofit measures in 42 RCs. However, only 20 were monitored in the side-by-side approach, in accordance with the two-phase program plan for this component.

impacts from the program. The evaluation resources were targeted elsewhere this time to provide the most useful information for the programs.

6. Assessing the overall levels of performance and success of programs. *In previous evaluations of these programs, all program goals were exceeded. Because of the need to closely focus evaluation resources, no verification or auditing of program goals were planned. However, the evaluation report will summarize the results towards the goals as outlined in the PG&E monthly reports.*
7. Informing decisions regarding compensation and final payments. – *This point is not required for information programs.*
8. Helping to assess whether there is a continuing need for the program. – *The evaluation team drew conclusions from the information gathered to help assess a continuing need for the program components that were assessed.*

EM&V Components

Baseline Information

As this is an information only program, no baseline information is required.

Energy Efficiency Measure Information

As this is an information only program, no energy efficiency measure information is required.

Measurement and Verification Approach

As this is an information only program whose elements have not changed significantly from the previous evaluation, no M&V is required.

Evaluation Approach

The evaluation approach is covered in detail in this and the following section.

3 METHODS AND DATA SOURCES

This section outlines the methods used to analyze the data collected during the evaluation, followed by the data sources used in the analysis.

3.1 Analysis Methods

There were four areas of assessment in this evaluation as shown at the end of Section 2.2. The following sections cover the analysis method applied in each area.

3.1.1 Assessment of Impact of the Summer Energy Education Institute 2004

The Energenius "Summer Energy Education Institute 2004" occurred in mid-July, 2004 before the evaluation team was in a position to create any type of survey for the attendees of the Institute. However, the program performed an exit-type survey of the participants to obtain feedback on the conference. The evaluation team obtained the survey and the participants responses from the conference organizers. In addition the Team obtained a copy of the conference agenda and hand outs provided during the conference to inform the post-participation survey.

All participants were sent a follow-up survey by the evaluation team with questions identified to elicit possible impacts of the conference. Responses were analyzed through descriptive statistics such as averages. However, due to the small number of respondents to the survey, this analysis was considered qualitative in nature.

3.1.2 Process Assessment of RCM Interactions

In this process evaluation, all five RCMs were interviewed to assess their role within the SRP. The interview covered the following topics:

- General information regarding the program and their role.
- Program training and staffing.
- Program goals and strategies.
- Program target population.
- Program promotion and marketing.
- Program delivery.
- Customer tracking.
- General suggestions and other comments.

Additionally, a select group of participants were interviewed to determine the process of interacting with the RCM. Information gathered from the fifteen participant interviews consisted of:

- Satisfaction with the program.

- Satisfaction with RCM (i.e., timeliness of interactions, professionalism, knowledge, etc. of the RCM).
- How the participant interacts with the RCM / ease of that interaction.
- What the participant feels is gained through the interactions with the RCM.
- What decisions were made due to their interactions with the RCM.
- Do they feel that the assistance of a financing advisor would help school districts finance energy efficiency improvements?
- General suggestions and other comments.

A qualitative analysis was used due to the small number of data points. It provided a snapshot of how this component of the SRP is working and provided a list of issues raised at that point.

3.1.3 Efficient Relocatable Classrooms

The SRP retrofitted 42 and monitored 20 of those 42 relocatable classrooms throughout the PG&E service territory. An additional 18 relocatable classrooms were monitored, but not retrofit. The evaluation team reviewed metering plans and worked with secondary data as it was available. Energy savings data was metered and analyzed by a different consultant with a full report on that particular effort to be publicly available in the second half of 2006. The evaluation of this component used descriptive statistics and qualitative analysis to provide a description of the component and its impacts.

3.1.4 Other Assessments

Throughout the approximately two years of this study, the evaluation team continuously assessed the possibility of performing a rudimentary evaluation of some of the new pilot programs planned for SRP or EP. The opportunity to more closely assess a SRP pilot arose in Spring 2005. At this time the program began a Student Energy Auditing Training (SEAT) pilot for high school aged students in conjunction with the Metropolitan Education District (MetroEd). The evaluation team interviewed the SRP personnel regarding this pilot, attended a classroom activity at MetroEd in the middle of the curriculum period and attended the final reporting performed by the students. In the Fall of 2005, the evaluation team performed a follow up interview with the head maintenance person at Metro Ed[3] and emailed one of the MetroEd teachers to determine if the school had chosen to implement a similar curriculum in the 2005-2006 school year.

3.2 Data Sources

Both primary and secondary data collection was used in the evaluation. The evaluation team collected new data from the Resource Conservation Managers (RCMs), SRP participants and during the in-person visits that took place to assess the SEAT program. There were two existing data sources used for the secondary data collection. The first was the EP and SRP program

[3] Two of the students in the pilot worked for the head maintenance person during the summer of 2005. The interview sought to determine if the curriculum increased the awareness or knowledge of these students so that their work performance was enhanced.

databases. The EP database was used to gather the contact information from the teachers at the Summer Energy Education Institute 2004. The SRP database was used to obtain contact information for those participants who have had interactions with the RCMs. The second data source was the teacher survey performed by PG&E at the end of the Summer Energy Education Institute 2004. The Equipoise Team obtained all the handouts from the conference, a copy of the survey provided, and each teacher's response to the questions on that survey.

3.2.1 Data Collected and Sampling Design

The evaluation collected the data shown in Exhibit 3.1.

Exhibit 3.1
Data Collection Planned and Actual

Data Source	How Gathered	Sample Plan	N Planned	N Actual
Follow-Up Survey of Summer Energy Education Institute 2004 Participants	Mail Survey	Census	24	12
RCM	In-depth Interview	Census	5	5
SRP Participants	In-depth Interview	Stratified Random Selection	15	15

The follow-up survey of the Summer Energy Education Institute participants was mailed to the 24 Institute participants on November 19, 2004. They were asked to send back their survey by December 5, 2004. After waiting until December 16, 2004, the data were analyzed.

The SRP had been in touch with the Energy Institute respondents prior to the mailing out of the survey to let them know the survey would arrive soon and requesting that they respond. As shown in Exhibit 3.2, half of the teachers returned the survey.

Exhibit 3.2
Summer Energy Institute Survey Disposition

Disposition	N
Mailed Out	24
Returned	12
Response Percent	50%

All five RCMs currently active in 2004 were interviewed, but only four of the interviews were relevant. At that time, the program was using a third party to perform the RCM activities for two schools. However, there had been little activity with one of the schools serviced by this third party RCM and the other school had no person to contact at the site. Thus these two schools

were not included in the SRP participant survey. As such, only school sites for the four main RCMs were interviewed.

In order to capture the program as it was actually offered (i.e., capture data from schools serviced by all four RCM), the SRP participant population of 53 were stratified by the four main RCMs serving the school site. After three completed interviews for each RCM, the remaining data points were randomly selected across all four RCMs for the final three surveys. Exhibit 3.3 presents a clear picture of the completed surveys for the different RCMs. It is extraordinary that only two data points were incomplete. For one of these two points, the participant had retired and was no longer available to be interviewed. For the second incomplete point, a call was made but the person was out sick. Meanwhile, the fifteen required surveys were completed and this data point was never called again. The disposition shows that virtually every call made by the evaluation team was completed. For a group of school administrators and facility operators, who are often difficult to contact for interviews, this level of survey participation is unprecedented and may speak to the level of satisfaction regarding the SRP.

Exhibit 3.3
SRP Participant Survey Disposition

Disposition	**N**	**Percent**
Completed	15	28%
RCM 1	*3*	
RCM 2	*4*	
RCM 3	*4*	
RCM 4	*4*	
Data points incomplete	2	4%
Data points never called	36	68%
Total	53	100%

The primary and secondary data was analyzed using the methods outlined in Section 3.1.

4 RESULTS

This section presents the results for the three areas of focus from the original evaluation plan, followed by the fourth area of assessment included later. A summary of the program related performance and goals from the last monthly report for PY2004-2005 is provided in the last section.

4.1 Summer Energy Education Institute 2004

The Energenius® Program created and implemented a 3-day conference for teachers called the Summer Energy Education Institute 2004. The Institute took place in Calistoga, California on June 29, 30, and July 1, 2004 and covered various topics and curricula focused on energy, possible grant applications, and field studies. The participants were made aware of three different programs: 1) the NEED Project, 2) The Project Learning Tree (PLT), and 3) PG&E's Energenius® Program (EP).

The mission of the NEED Project (www.need.org), is: " . . . to promote an energy conscious and educated society by creating effective networks of students, educators, business, government and community leaders to design and deliver objective, multi-sided energy education programs." Among the activities, NEED provides curricula units at four levels (primary, elementary, intermediate, and secondary) to help teachers implement energy units in their classrooms. In conjunction with British Petroleum (BP, a petrochemical company with a renewable and alternative energy component), NEED provides the training and educational materials for the teachers in California who are awarded funding from the A+ energy grants while BP awards several million dollars per year to teachers in the state.

PLT (www.plt.org) is a program of the American Forest Foundation. Their website states:

> Project Learning Tree® is an award winning, multi-disciplinary environmental education program for educators and students in PreK-grade 12. PLT, a program of the American Forest Foundation, is one of the most widely used environmental education programs in the United States and abroad. PLT continues to set the standard for environmental education excellence.

This program provides curricula material on energy as well as forest ecology, municipal solid water, and other areas.

The PG&E EP website (see www.pge.com/education_training/energenius/) states:

> Pacific Gas and Electric Company's Energenius Educational Series teaches kids to use energy wisely and safely with interactive, engaging programs for grades one through eight. If you are an educator in Pacific Gas and Electric Company's service territory, you qualify to receive Energenius instruction materials free.

The PY2004/2005 EP program includes kindergarten through eighth grade curricula and builds on the current Energenius® structure consisting of five Educational Series of complete curricula on energy efficiency and gas and electric safety.

In addition to being made aware of the various curricula available to them, the participants of the Institute visited a geothermal energy plant and the Solar Living Center in Hopland, California.

It was hypothesized that the information provided to the teachers during the Institute would lead to an increase in energy efficiency actions. It was also hypothesized that the ability of the teachers to use the Institute to obtain continuing education units (CEUs) would be an important factor in their decision to attend.

Decision to attend. When asked about why they choose to attend, all respondents said that their high level of interest in the environment and energy conservation had a major effect on their decision to attend (Exhibit 4.1). The next highest draw was the information to be presented, followed by the location.[4] The effect of the opportunity to earn CEUs was split among the respondents – half indicating a moderate to major effect and the other half a minor to no effect. While only a small group responded to the survey, it appears clear that the original hypothesis of the CEUs as a major draw for the Institute was not supported. The split of responses for this question, though, makes it difficult to clearly ascertain whether the program should continue to provide this option. It is suggested that CEUs be included in any future Institutes and be re-evaluated at that time through discussion with the future participants.

Exhibit 4.1
Decision to Attend

	Made no effect on decision		Minor effect on decision		Moderate effect on decision		Major effect on decision		Total	
	N	%	N	%	N	%	N	%	N	%
Location in Calistoga	0	0%	2	18%	4	36%	5	46%	11	100%
Ability to obtain CEUs	4	33%	2	17%	3	25%	3	25%	12	100%
Materials correlated to standards	1	8%	2	17%	3	25%	6	50%	12	100%
Information planned for presentation	0	0%	0	0%	3	25%	9	75%	12	100%
Field study at Calpine Geothermal Center	0	0%	2	17%	4	33%	6	50%	12	100%

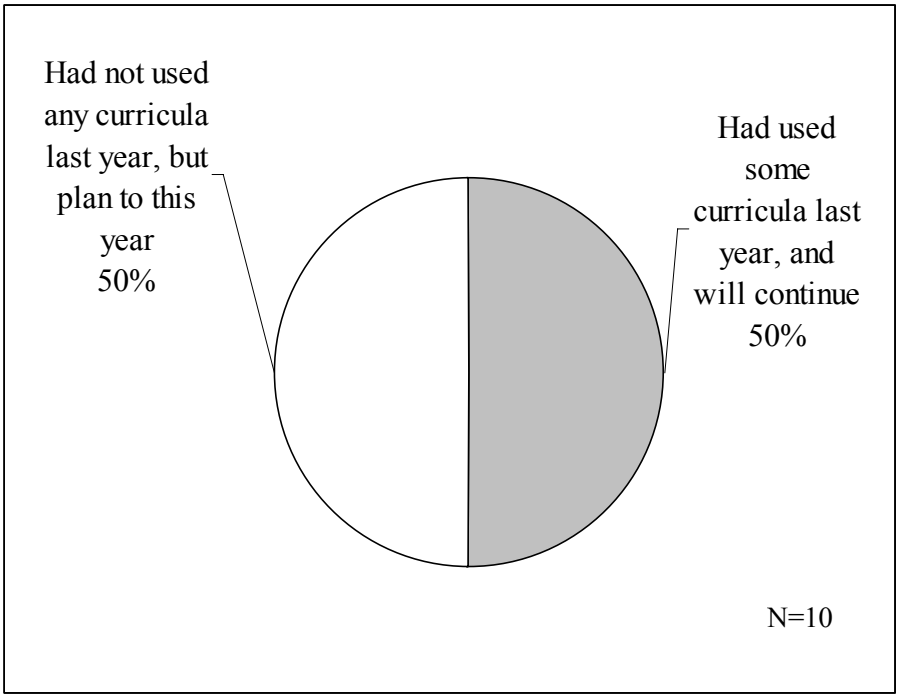
[4] The shortest distance traveled to attend the conference was 17 miles, the longest distance was 167 miles, and the average distance was 73 miles.

	Made no effect on decision		Minor effect on decision		Moderate effect on decision		Major effect on decision		Total	
	N	%	N	%	N	%	N	%	N	%
Field study at Solar Living Center	0	0%	3	25%	5	42%	4	33%	12	100%
Interest in environment and energy efficiency	0	0%	0	0%	0	0%	12	100%	12	100%

Increase in Action. There were three different pieces of survey data analyzed to attempt to determine if the Institute increased the actions taken by the teacher. The first two pieces of data, self-reported teaching of the various curricula and other activities questions, were assessed to see if the teachers were planning to perform one of these actions (i.e., teach a curriculum or a different activity) this school year, and had not last school year. It was assumed that if the teacher was planning an action this year and had not previously performed the action, the Institute played a crucial role in causing the action to happen. It is understood that full causality has not been shown in the analysis as the short survey precluded a full questioning of motives and knowledge. However, taking into account the response from the third piece of evidence, the influence question, helps to strengthen the linkage between the Institute and actions taken by the teachers.

Of the twelve surveys returned, two respondents failed to turn over page one and respond to questions regarding what they taught or the influence question, reducing the number of respondents to these questions to ten. Of these ten, half had not taught any of the curricula provided during the Institute (i.e., NEED, PLT, or PG&E curricula) and half were already using one or more of the available curricula. All five teachers who had previously taught one or more of the curricula plan to continue teaching from one of the available curricula in the 2004/2005 school year. Each of the five teachers who had *not* used the curricula previously either had included one or more of the various units in the fall of 2004 or planned to include them in 2005. These five who are teaching the curricula for the first time indicated they would use one or more of the NEED units, three indicated they would use PLT units, and three indicated they would use PG&E units. This is a strong indication of the increase in actions taken due to the Institute.

Exhibit 4.2
Teachers who had and had not used curricula last year



The second indicator of influence of the Institute, the actions other than teaching taken by the respondents, supports the previous indication of a positive influence by the Institute. One teacher applied for an "A+ for Energy" grant sponsored by BP, three teachers plan to implement the "GreenWorks!" Service Learning activities, one teacher started an Energy Patrol in the fall of 2004 and another plans to begin one in the winter of 2005, two teachers were active in coordinating a workshop on energy efficiency for other teachers in the fall of 2004 and one planned to do so in 2005. All these actions were taken by teachers that had not previously performed the activity.

The last indicator of influence of the Institute was the self-reported answer to the question about the level of influence of the Institute presentation had on the teacher to include the curriculum lessons in their teaching plans. Of the 10 answers, the average response was 8.5 (where 1=no influence and 10=very influential) with a range of 6 to 10. The respondents were asked to give a short explanation of the indicated the level of influence they provided. Among the responses were:

> *"I have wanted to include a unit on energy/conservation topics for awhile. The wealth of appropriate materials and information presented throughout the Institute provided me with everything that I needed to begin!"*
>
> *"I feel that Energy Education is extremely important at all grade levels. The children can influence their parents now. When the children grow up, they can make better, more informed decisions about energy issues. The Institute reminded me of this. Thus I will be including it in my teaching this year."*
>
> *"I've found myself referring other teachers to the resources, knowledge that I gained at the Energy Institute. It was life-changing for me."*

> *"The presentations brought the curriculum to life; we could see how it worked and how it related to content standards."*

In addition to the follow-up survey by the evaluation team, the participants completed an eight-page evaluation form created by EP. These results support the findings of the mail-in survey performed by the evaluation team.

4.2 Assessment of the Resource Conservation Managers

This assessment had two parts – a process survey of the RCMs and a survey with participants of the various school staff who worked with the RCMs. The interviews with the school staff collected process type information as well as attempting to determine the influence of the RCM in the staff's awareness of energy efficiency and possible actions taken by the school. The results of the process interview with the RCMs is presented first.

4.2.1 Process Assessment of the RCMs

There were nine areas covered during the in-depth interviews, which averaged 66 minutes in length (range of 58 to 75 minutes). Finding from each of these nine areas are presented separately.

4.2.1.1 General Information

This group of Resource Conservation Managers have all had a long history of working with schools and/or in energy efficiency. One was a principal for many years before becoming a Certified Energy Manager (CEM) and working in that role for four years. The others have worked in energy efficiency from 14 years to 25 years. They have extensive experience performing energy audits and working with customers. One has been involved with the RCM concept for 5-6 years and another has worked with schools in other programs. The set of skills they bring to the program fits the work required.

While only one RCM devotes his time exclusively to SRP, each understands their role within the program. (The others vary between 25 percent and 70 percent of their time allotted to RCM activities.) All but one indicated that there is sufficient time to meet their job expectations, albeit all indicated a juggling of activities to perform the work in the agreed time period. One RCM stated that the work could fill up 1.5 days every day because of the need and interest, although his SRP work activities are scaled to the time available.

The actual organization structure for the RCM component of the SRP was unclear. Conflicting statements were provided by the group. However, most indicated that the arrangement worked well for them, with one stating that more defined roles would be helpful. Within the group, bi-weekly meetings occurred early on in the program and then slowly moved to once a month and now may be on a hiatus as a regular meeting. Two are in daily contact via phone or email, while the other three call or email others within the group once a week or so. Because it is such a small group and they contact each other regularly, the lack of a specified organizational structure does not appear to be a hindrance.

4.2.1.2 RCM Training / Staffing

No formal training of the RCMs took place. As indicated earlier, there was substantial existing experience in energy efficiency amongst the group. The one RCM with less energy experience took classes at the PG&E Stockton Training Center and PG&E Pacific Energy Center on areas such as energy auditing, solar energy, etc. The level of training worked for this set of individuals, although it was acknowledged that a better training mechanism may be needed as PG&E may not always have a pool of experienced applicants to pull from for these positions. Although not a training issue, a suggested improvement was to provide access to the stream of information available to the account services personnel. He stated that this information (rate information, customer issues, etc.) is relevant to their job, but is not accessible to the RCMs.

The group felt that the current level of staffing was correct for now, but did indicate that if goals were to increase, more RCMs would be needed. The RCMs believed that six to seven school districts per RCM was the optimal number. According to one person, if there were more RCMs available now, a better geographical coverage may be possible.

4.2.1.3 RCM Goals

Each of the RCMs had specific numbers of districts to meet with, energy audits to perform, or benchmarking studies to complete. Each knew their goals and stated they were on-track to meet or exceed the goals. One person stated that the program underestimated the customer response to the program. He stated that the schools talk with each other and want the services provided by the RCM.

4.2.1.4 Program Target Population

The program targets the school market with special interest in the geographically (outside the nine Bay area counties) and economically (i.e., low income) hard-to-reach (HTR) categories. A list of schools, based on zip code, that qualify as a HTR customer based on their economics is kept in the Marketing & Evaluation (M&E) group at PG&E. The program references that list when they look at a new school. This approach appeared to work well for the program as they exceeded their HTR goals.

4.2.1.5 Program Promotion and Marketing

Four of the five RCMs are responsible for promoting the program in their respective areas. The fifth helps out with the implementation of the program once a school has been recruited. They find customers using different approaches: initial letters followed up by phone calls, cold calls in person, workshops, word of mouth from other participants, and working in conjunction with the local PG&E service representative. No mass marketing of the program occurs.

The RCMs contact the schools anywhere from one to five times in their attempts to elicit participation. They indicate a 60 percent to 80 percent recruitment rate overall. They feel that the school districts find the free service, potential cost savings, and the analytical services of the audit and benchmarking studies most influential in inducing them to participate. Actually committing school staff person-resources to work with the program and lack of belief that money could be saved are seen as the largest obstacles when attempting to recruit a new school district.

Since the program exceeded their goals for recruiting new school districts by 37 percent, the program promotion component was considered to be working well.

4.2.1.6 Program Delivery

Three of the RCMs indicate they coordinate with the school district personnel to determine the program options implemented by the school, while two indicate that the RCM decides. A benchmarking study is encouraged by one RCM. All of the tasks they carry out were thought to be cost effective by the RCMs. While there are a myriad of tasks performed for the school by the RCM (providing data fact sheets for equipment, walk through audits, billing issues, benchmarking studies, financing information, etc.), each considered their most crucial task to be the ability to provide energy savings information to the school district, generally in the form of an energy audit. Providing the school district with a way to take the next step and implement possible energy savings measures was also seen as critical.

As they work with the district, the RCMs indicate an average turn around time of one to two days to provide information when asked by the district, although one RCM indicated no more than a week and faster if possible. They felt that this timeline was appropriate.

The RCMs generally felt that the program delivery was smooth. One expressed slight frustration with schools that indicate they will participate, but fail to respond to future calls by the RCM. Another indicated that it is sometimes difficult to meet the needs of two disparate functions within a school – the business and maintenance areas. However, while it was seen as difficult to bridge the gap between these two groups, a special workshop tailored to help meet this need had been created.

Information generally flows throughout the program delivery via email. Hardcopy of results of studies are also kept.

4.2.1.7 Customer Tracking and Program Database

Throughout much of the program period, each RCM kept their own notes of customer interactions. An Excel spreadsheet compiled activities, and a Access database was being set up to incorporate much of this information centrally and allow easier development of relational data, but was not completed at the time of the interviews. According to the plan, each RCM would eventually be able to enter data into the database from their remote location, but that had not yet been set up. However, without this database, when the evaluation team requested information on each site, it took varying lengths of time to actually collect the information, depending on the RCM. At the end of the evaluation period, the program manager was queried again about the status of the customer tracking database with the following comment:

> *It was developed but not fully populated, basically because of lack of support staff. We basically abandoned it when we learned that the 2006-08 program would require SRP to have energy savings goals (instead of just "info only" tracking content). We reviewed the tool as it had been built in terms of what we thought we would need, were advised that a unified (i.e., all market segments) tool would be developed for 2006-08, and decided that further investment was not justifiable at that point in time.*

4.2.1.8 Data Quality Control

This area was one that only a couple of the RCMs knew much about. Even then, there was no set data quality control that was indicated during the interviews, other than a loosely described "completeness" criteria. The RCMs have provided paperwork to more than one person in the past. This area should be improved upon in the future.

4.2.1.9 RCM Impacts

All the RCMs feel they have engendered energy impacts at some of the schools. One stated that his clients are telling him that the schools are saving, one found savings from the benchmarking billing analysis, another brought in energy efficient measures to the school, and one helped instigate a delamping project. Lack of money and turnover of district personnel were indicated to be issues that adversely effect energy efficient changes. However, while the staff turnover cannot be influenced by the program, a financing expert was brought in the program to attempt to overcome the funding difficulties of the schools (i.e., the second issue that adversely effected change).

4.2.1.10 Other Comments

The RCMs feel that this integrated approach works well and would like to see the concept applied to other business sectors. The suggestion was made that goal setting with the client may need to be improved upon and that letting the client know that maintaining future free services from the program would depend on taking actions to meet those goals. This would help focus the SRP human resources to schools with the most interest. Another area that it was felt the program could focus upon was the non-energy benefits associated with energy efficiency changes. By identifying in these benefits for the schools, the program could become the 'quality of the environment' experts as well as the energy experts.

4.2.2 Process Assessment of the SRP Participants

The 15 interviews averaged 11 minutes in length with a range of 5 to 16 minutes. One school district completed only part of the survey questions as it became clear that they had not truly participated in the program. This site, while they felt that the SRP was a good program, indicated that it was not a good match for their school. The school was also working with the PG&E Savings By Design program because of the new construction they were planning.

The schools were generally introduced to the program through the RCM or a workshop put on by the SRP program. One person was browsing the web when she came across the program and then contacted PG&E. About half (53 percent) stated they had only one contact before deciding to participate. The potential for savings was the reason most often given for their decision to participate, followed by the 'free stuff" and then energy audits. When queried about why they thought other districts would not be interested in participating, three-quarters could not think of any reason, while only two indicated that the time required could be an issue.

Half the participants felt that they worked in conjunction with the RCM to determine what information or services were offered to the school, a quarter felt they decided, and two thought that the RCM decided on what to act upon for the school. When asked what the most crucial task performed by the RCM was 40 percent of the participants said the energy audit , 27 percent said

presentations the RCM made to various school personnel , and 20 percent said the information provided by the RCM. Only one of the 14 participants interviewed felt that the RCM conducted activities that were not considered effective. In this case, the RCM performed an energy audit on a leased building that the district had previously informed the RCM that there would be no changes made because of the lease.

The communication between the school and the RCM varied depending on the task being performed. At times there were daily emails or phone calls, other times the RCM would simply email the district once a month or so with relevant information. All participants felt that the communication worked well for them. They felt that the RCM was very available and met all their needs. The timeline of obtaining information from the RCM was considered appropriate as well.

With the exception of the one school district for whom the question was not asked, all felt that the RCM was knowledgeable about energy efficiency and how it could help their school. The RCMs were given an average satisfaction score of 4.97 out of 5, where 5 is completely satisfied. All thought that the interactions with the RCM brought about an increase in awareness of the energy efficiency potential at their schools.

The schools had taken a number of different recommended actions to implement energy savings in their schools. These ranged from new LED exit sign installation to taking out vending machines to behavioral actions. Not all recommendations could be implemented, although some of the schools are working their way through the list. One school stated that they talk with the RCM whenever they purchase a new piece of their infrastructure (i.e., roof, boiler, chiller) to attempt to get the best piece of equipment for their site.

Ten of the school districts indicated that they would not have performed the energy actions they took without the program, two stated that the intervention of the RCM decreased the timeline in which the measures were installed, and two more indicated that the RCM was partially responsible for some of the measures. When asked if there were reductions in their bills, seven indicated seeing a difference in their bills, while four stated that they assumed savings would occur based on the analysis. This indicates that the program influenced actual energy savings, at least to some degree.

The open ended comment question yielded positive remarks from just about all the participants. These included:

> *"Hope the program continues. RCM is very helpful and knowledgeable."*
>
> *"Great, keep the program coming."*
>
> *"Thank them for the program. They [the school] try to get all her peers involved because they will save nearly 15% on their energy bills."*

4.2.3 Synthesis of the two process assessments

Both the RCMs and the participants were queried on similar subjects. For those overlapping areas, all responses from one group were very similar to the other group. The RCMs felt that they provided a useful, timely service - to which the participants agreed. The participants felt that the RCMs were knowledgeable; thus supporting the RCMs statements that training may be needed for future groups, but not this current set of RCMs. The way the schools were brought

into the program were similarly stated by both groups. The high regard for and actions taken towards enabling the school districts to implement energy saving measures held by the RCMs was mirrored by the participants in their indication of actual energy efficiency changes made within the districts because of the RCMs influence. While some of the "behind-the-scenes" processes (such as meetings and paperwork) may need improvement, these did not appear to impair the ability of the program to provide a well-liked, useful service.

4.3 Relocatable Classroom Pilot

The relocatable classroom (RC) pilot was briefly assessed mid-program. The memo covering the entire assessment is provided in Appendix B, while parts of it are included in this section of the report.

The February 2004 Program Implementation Plan (PIP) provided a detailed plan for implementing the pilot in the field. In addition to this information, the September 2004 monthly report notified the CPUC of a minor redefinition that there would be no more than two study *sites* per school district, rather than two *RC units* per district. According to the monthly report, SRP had identified opportunities where there are 3 or 4 "matched pairs" of RC's at a single site. This would enable one "control" RC to be monitored and compared against 2 or more retrofit variations of lighting or thermal improvements in identical RC's. This was expected to result in increased data accuracy and lower cost for installation and monitoring time, and travel expense. At the time of the mid-program interview with PG&E, the pilot had been following the planned implementation well. There had been some deviations to assess more advanced technologies and expand the depth of information gathered and disseminated. The PIP indicated certain processes that were planned such as contracting with third parties to perform parts of the work, coordination with other agencies, and possible measures to be installed. The evaluation followed up on these processes during the mid-year memo and the results are presented next.

4.3.1 Contracting with third parties

Following the plan in the PIP, there were three contractors working with PG&E on the implementation of the RC pilot. The design/build contractor was responsible for assessing the sites and construction management contractor for installing the measures. The monitoring contractor was responsible for the creation of the monitoring protocol, installation of performance measurement equipment, data collection, and analysis of data. The last of the three contractors was responsible for the creation, fielding, and analysis of the occupancy survey.[5] This is a short description of the exact responsibilities of each contractor since both the parties that performed the monitoring and the occupancy survey have been intrinsically involved in field program design, how to assess a site, the choice of potential sites, and which measures were installed at each site.

[5] According to the program implementer, a fourth contractor was included after the mid-year memo to introduce a variation on an emerging technology lighting system initially developed under co-funding from the CEC-PIER program.

4.3.2 Coordination with other agencies

The pilot project had planned to coordinate with the PG&E Emerging Technologies Program (ETP), California Energy Commission (CEC) Public Interest Energy Research (PIER), and the multi-agency Relocatable Classroom Working Group (RCWG)[6]. All of the relationships were functioning at the time of the mid-program assessment and are assumed to have continued functioning. At the time of the assessment SRP and ETP were coordinating on demonstrations of three technologies[7] recently developed under PIER funding (2002-03) that appeared to have application to RC's. Two more measures from PIER were actually installed in the RC's (Bard "Quiet Climate II" HVAC system and Bard CS-2000 "Smart" controller).[8] According to the program manager, the metered data would be used to help calibrate and enhance an RC energy use computer simulation model that was developed by the ETP in 2003. This calibration was meant to enable SRP/ETP to conduct modeling of many combinations of energy efficiency measures in different climate zones.

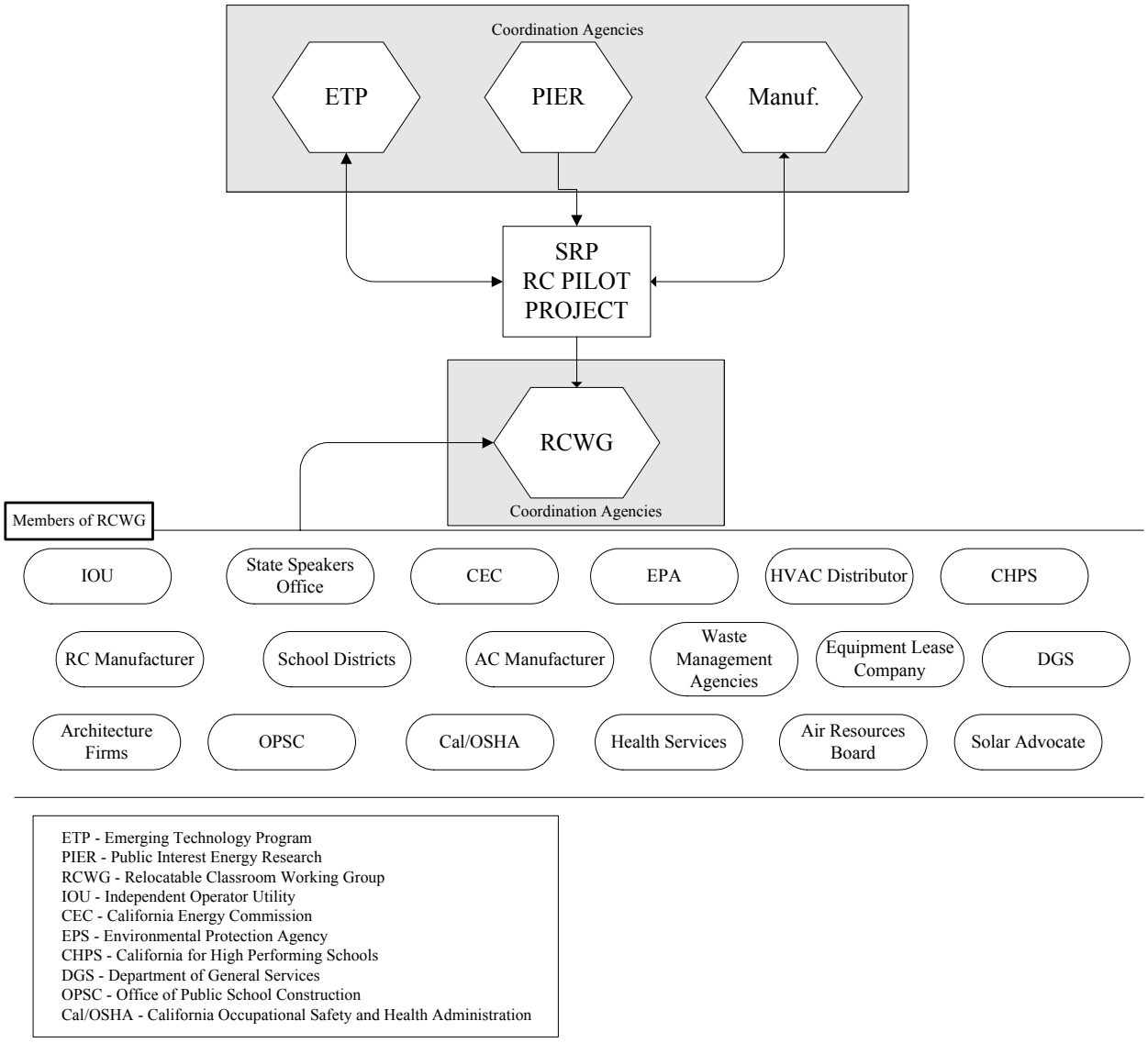
RCWG is a subset of the Sustainable Buildings Task Force, a multi-agency team coordinated by the Division of the State Architect (DSA). This group pulls in many other actors in the market as shown in Exhibit . Through interactions during meetings and networking made possible by the RCWG, the pilot project had an extensive group with which to interact, and through which market acceleration was expected to occur. The State Speakers Office has tasked RCWG with directing a survey of the physical condition of the 80,000+ existing RC's in the state. The SRP work may be influential in future policy and funding decisions for improving school facilities. SRP was also working with various manufacturers of different energy efficiency equipment for the demonstration sites. Some of the manufacturers have donated equipment and/or technical assistance or provided it at a discount (about $50,000 worth of equipment). RC manufacturers were also involved at appropriate times.

[6] While SRP coordinates with more agencies than shown on this list, these agencies are those that work specifically with the RC Pilot Project.

[7] Indirect-Direct Evaporative Cooler (IDEC), Integrated Classroom Lighting System (ICLS), and Integrated Ceiling-Daylighting Systems.

[8] All five technologies were ultimately installed in an RC.

Exhibit 4.3
Coordination within the RC Pilot Project



4.3.3 Information from Implemented Sites

The program planned installations in two phases. Phase I covered the metering of 18 retrofit and 18 non-retrofit sites. Phase II planned another 22 retrofit sites with no monitoring. The Phase I sites with monitoring actually covered 20 classrooms which have had energy efficiency measures installed, plus 18 similar RCs with no installed measures. The sites and dates in which the monitoring occurred are shown in Exhibit 4.4.

Exhibit 4.4
Phase I - Relocatable Classroom Monitoring Days

School District	County	PG&E Climate Zone	CEC Climate Zone	School	Monitoring Install Date (2005)	# of Non-Retrofit RCs at Site	# of Retrofit RC's at Site	Classroom Days Monitored
Amador Unified	Amador	3,4	12,16	Argonaut High	May 20	1	1	450
Amador Unified	Amador	3,4	12,16	Pioneer Elementary	August 11	1	1	284
Atwater Elementary	Amador	3,4	12,16	Mitchell Sr. Elementary	April 27	1	1	496
Auburn Union	Nevada	3,4	11,16	Skyridge Elementary	April 20	3	3	1,476
Dos Palos-Oro Loma	Madera	4	12	Bryant Middle	August 4	1	1	298
Dos Palos-Oro Loma	Madera	4	12	Marks Elementary	August 4	1	1	298
Eureka Union	Placer	3,4	11	Oak Hills Elementary	August 19	1	1	268
Fremont Unified	Alameda	2	3	Forest Park Elementary	August 15	1	1	276
Fremont Unified	Alameda	2	3	Hopkins Jr. High	April 21	1	1	508
Fremont Unified	Alameda	2	3	Parkmont Elementary	April 21	1	1	58
Madera Unified	Madera	4	13,16	Alpha Elementary	April 28	1	1	494
Madera Unified	Madera	4	13,16	Jefferson Middle	April 29	1	2	738
Merced City	Merced	4	12	Fremont Elementary	August 1	1	1	304
Merced City	Merced	4	12	Rivera Middle	August 1	1	2	456
Riverbank Unified	Stanislaus	3	12	Rio Altura	August 11	1	1	284
Santa Cruz City	Santa Cruz	1	3	Bay View Elementary	August 5	1	1	296
					Total	18	20	6,984
					Total Monitored	38		

PG&E Climate Zones: 1= Coastal / cool, 2= Hill / moderate, 3= Valley / hot, 4= Desert-Mountain / extremely hot.
CEC Climate Zones: 10 zones in PG&E service territory

As shown in Exhibit 4.5, each classroom did not have identical treatment and many had multiple measure types installed.

Exhibit 4.5
Phase I - Relocatable Classroom Measure Types Installed and Monitored

District	School	Lighting	Daylighting	HVAC	Controls	Other
Amador USD	Argonaut High	X		X	X	
Amador USD	Pioneer Elementary				X	Cool roof
Atwater Elem SD	Mitchell Sr. Elem.	X				Cool roof
Auburn Unified	Skyridge Elem	X				
Auburn Unified	Skyridge Elem	X	X	X	X	Cool roof + reflective ceiling tiles + ceiling insulation
Dos Palos – Oro Loma	Bryant Middle	X	X			Cool roof
Dos Palos – Oro Loma	Marks Elem	X		X		
Eureka Elem	Oak Hills Elem	X	X		X	
Fremont USD	Forest Park Elem	X	X			ceiling insulation
Fremont USD	Hopkins Jr. High				X	
Fremont USD	Parkmont Elementary	X				
Madera USD	Alpha Elementary				X	Cool roof
Madera USD	Jefferson Middle			X	X	Cool roof on #35.
Merced City SD	Fremont Elem				X	
Merced City SD	Rivera Middle			X	X	
Riverbank USD	Rio Altura				X	Cool roof
Santa Cruz City SD	Bay View Elem	X			X	
	Total	**10**	**4**	**5**	**11**	**8**

The specific technologies that were installed varied as well. The lighting measures had standard T8 retrofits as well as Finelite installations. Finelite fixtures use fluorescent tubes as the light source, but have specialized housing and the potential for various control of the lighting that can provide options to create lighting levels for different teaching environments (e.g., using the overhead projector). Daylighting measures included the Solatube® as well as Traco windows (highly efficient windows that have small reflective louvers between the windows panes that bring additional light into the classroom). Solatubes® bring sunlight from the roof through a highly reflective tube and diffuse it into the living space. One of the RCs has had an indirect-direct evaporative cooler (IDEC) installed. The Public Interest Energy Research (PIER) program has worked to develop this specific IDEC system and the unit was provided for installation into an RC in collaboration with the Emerging Technology Program (ETP). Other RCs had high SEER air conditioning units installed. Controls were used to create bi-level lighting, improve control of the HVAC system, and use occupancy detectors to turn off lights in the RC when it was not in use. Building shell measures such as Cool Roofs and ceiling insulation were installed as well.

At the time that this report was written, some of the energy analysis and a rough draft of the RC energy analysis project was available. The analysis results for the measures available at the time of this report shown in Exhibit 4.6.

Exhibit 4.6
Phase I - Energy Savings for Select Measures Installed[9]

Measure	# of retrofit data points in average	Average kWh/Day Savings
Programmable thermostat	3	-1.7
Occupancy Sensor	8	0.2
Finelite retrofit	2	1.7
T8 lighting retrofit	4	1.8
Cool Roof*	7	5.0
Ceiling Insulation	1	1.4
Skylight products	-	NA**
IDEC	-	NA
Other lighting controls	-	NA
High SEER Unit and Controls	-	NA
Window products	-	NA

*Savings is for a typical day with 1 degree delta temperature difference.

**Not available at the time of this report.

In addition to the energy savings calculated from the metered data, the program hired an evaluation firm to assess occupant comfort. Similar to the energy savings, the results are also provided by measure. However the ability to summarize is minimal compared to energy savings, since the responses were varied due to the different aspects of comfort (i.e., "glare" or "too hot"). The reader is directed to the completed report on the entire RC Pilot project due out in the last half of 2006.

Noteworthy from the draft report available to the evaluation team was the categorization of the different technologies into groups that merit further pursuit, should be explored further, and were not recommended. These recommendations, determined by the program manager and his team, are summarized in Exhibit 4.7.

Exhibit 4.7
Phase I - Recommendations on Measures within RCs [10]

Measure	Recommendation	Reason
T-8 Lighting Retrofits	Definitely pursue	Successful, easy projects to implement from start to finish
Lighting Controls (occupancy sensors)	Definitely pursue	

[9] The values in this table are subject to change as the RC report analysis is completed.

[10] Similar to the previous table, these recommendations are subject to change as the analysis is completed and report finalized.

Cool Roofs	Definitely pursue	
Ceiling Insulation	Definitely pursue	
HVAC Thermostat Controls	Definitely pursue	
HVAC Retrofits	Explore further	Difficulties with installation issues.
HVAC Advanced Controls	Explore further	Compatibility difficulties
Skylights and Solatubes	Explore further	Difficult to find qualified installation vendors
Finelite lighting systems with integrated controls	Explore further	More costly than expected.
IDEC HVAC Units	Not recommended	Difficult to find qualified installation vendors; best in only certain climate zones; limited water in some RCs
Daylighting controls with 3rd party devices	Not recommended	No proper construction documentation for installation or troubleshooting the system
Traco window upgrades	Not recommended	Difficulty with coordination between architect, window manufacturer, and portable manufacturer

Phase II of the RC pilot project installed either Finelite lighting, 13.5 SEER Bard HVAC units, or programmable thermostats in 22 classrooms that had not been part of the monitoring in Phase I. The sites and measures installed are shown in Exhibit 4.8.

Exhibit 4.8
Phase II RC Installations

District	School	Class rooms	Lighting	High SEER HVAC	Programmable Thermostat	Project completion dates
Amador USD	Ione Elementary	#25	X			12/17/05
Amador USD	Ione Jr. High	#10		X		12/26/05
Atwater Elem SD	Mitchell Sr. Elementary	#110	X	X		12/28/05
Auburn USD	E.V. Cain School	#P-34	X			12/18/05
Auburn USD	E.V. Cain School	#P-35		X		12/23/05
Byron USD	Discovery Bay Elementary	#29	X			2/1/06
Fremont USD	Ardenwood Elementary	#5	X			12/22/05
Fremont USD	Oliveira Elementary	#19		X		1/20/06
Gilroy USD	El Roble Elementary	#P-23		X		12/29/05
Gilroy USD	Brownell Academy	#32			X	12/29/05
Gilroy USD	Brownell Academy	#34			X	12/29/05
Gilroy USD	Brownell Academy	#43			X	12/29/05
Lucerne Elem SD	Lucerne Elementary	#C-19	X			12/28/05
Lucerne Elem SD	Lucerne Elementary	#C-9		X		12/29/05
Nevada Joint UHSD	Bear River HS	#G-4		X		12/17/05
Nevada Joint UHSD	Nevada Union HS	#G-6		X		12/31/05
Riverbank USD	Rio Altura	#20		X		12/29/05
River Delta USD	D.H. White Elementary	#21		X		1/7/06
River Delta USD	Delta HS	#18	X			1/4/2006*
River Delta USD	Delta HS	#28	X			1/20/06
River Delta USD	Delta HS	#30	X			12/30/05
Upper Lake UHSD	Upper Lake HS	#5	X	X		12/21/05
	Total	**22**	**10**	**11**	**3**	

*Project was begun prior to the end of 2005

4.4 Energy Audit Curricula Pilot

The Metropolitan Education District (MetroEd) is a joint powers district made up of 6 school districts. Within MetroEd is the Central County Occupational Center Program (CCOC/P). The CCOC/P educates eligible high school and adult students for careers and college in a professional hands-on environment. CCOC/P provides a wide variety of technical training options at the CCOC/P campus, and on high school and other campus locations throughout the county. Courses offered include training in over 32 occupational choices including electronics, manufacturing, business, automotive, construction, and health occupations. CCOC/P training serves over 25,000 high school juniors, seniors and adults.

High school students go to the CCOC/P facility for 3 hours/day, 5 days/week. Two specific areas, electrical maintenance and HVAC repair, appeared to be a good fit for energy management training. SRP worked with MetroEd to provide energy audit training for interested

and eligible[11] students within these two areas. The students taking the Student Energy Auditing Training (SEAT) course had to complete an application, but MetroEd stated there was not a plethora of kids to begin with. Only a few of the students in the electrical section and a few in HVAC section were turned down (mainly based on past attendance and grades). The morning class had 22 students in attendance and the afternoon class was reported to have a similar number of students.

A contractor (Wilson Educational Services) was hired by SRP to bring the Wilson Educational Savings Through Energy Management (STEM) curriculum to students in the Spring of 2005. While the original STEM programming is 30 hours of training over 5 days, PG&E requested a tailoring of this time to fit better into the available MetroEd schedule (i.e., the 30 hour curricula was taught over a longer period with shorter daily periods). A listing of the sessions covered by the STEM curricula is provided in Appendix C. The curricula became the property of MetroEd after the pilot.

An evaluation team member attended a CCOC seminar at MetroEd on 05-11-05 from 7:30 AM to 10:30 AM. The seminar took place in the students regular classroom at CCOC. Just outside of the classroom was a large HVAC lab that was used during the seminar. The seminar for this day planned to cover 6 items: 1) a review of the homework (calculating U-value and square footage of buildings, etc.), 2) education about hot water/hot air heating systems, 3) a hands-on lab that determined burner efficiency for a gas furnace, 4) a demonstration of equipment used to assess energy by Christine Condon of the Pacific Energy Center, 5) discussion of various surveys, and 6) math needed calculate energy use of hot water tanks. The morning class was able to move through points 1-4 before running out of time. While not all points were covered during the one seminar attended by the evaluation team, The Wilson Education teacher indicated that he would probably be able to get through all the curricula, especially because MetroEd teachers were very good about allowing extra time if needed.

Short discussions with Scott Hall, the Electrical Teacher at MetroEd, indicated that they had been approached by Richard Flood of PG&E to bring in the SEAT/STEM curriculum. Because PG&E was funding it, MetroED choose to include the 30 hour curriculum this year. According to Mr. Hall, MetroEd will possibly include some sort of energy management curricula into their program in the next school year. He stated that they would work with PG&E to create their own curricula, though, and most likely not go with Wilson - mainly because MetroEd tends to put together their own lesson plans, not contract it out. However, even with these indications, a follow-up email as of December 2005 showed that they had not incorporated this type of curricula into their teaching.

When assessing educational programs, it is useful to know if the information taught is applied in the future. In the case of MetroEd, summer interns are hired by the school to help with preventative maintenance, lamping, and other types of work. In the summer of 2005, the Maintenance & Operations Manger (Jerry Bradley) had six summer interns working for him. Since it was known that at least some of the six interns had gone through the SEAT program, the evaluation team talked with the Mr. Bradley on October 4, 2005 to attempt to discern if he saw any evidence of what had been taught within the STEM curricula.

[11] Students must have met MetroEd eligibility requirements regarding grades and attendance before they were allowed to participate in this curriculum.

Mr. Bradley indicated he is a conservation advocate and that he stresses that concept with his student interns and helpers. He didn't know how many had been through the SEAT program, but some of the students mentioned it. One said that they learned what Mr. Bradley was discussing with them when the student had gone through the energy audit component of SEAT. The manager felt that the group was more vocal about the audit and what they had learned. They appeared to be more aware than other groups he has worked with. For example, it was the first year in which he had vocalization by interns that they were aware of energy management and conservation. The interns all had lots of questions about the Energy Management System that MetroEd uses, which was also a new behavior compared to previous years when he had worked with the students. Additionally, during one of the lamping work tasks, one of the students indicated that he was doing work on a T12 system and said MetroEd should have T8's. This same intern discussed energy conservation on campus with Mr. Bradley.

According to the O&M manager, the STEM curricula made a big difference in this set of students and how they interacted with him. He hopes that the curriculum is continued.

This pilot component of the SRP was successful in educating high school students about energy conservation, energy efficiency, and energy management. It had hands-on aspects that melded well with the approach of other classes at MetroEd. The students appeared to retain the information and apply it later in a work-type environment.

4.5 Summary of Program Goals

As indicated in the research plan, the evaluation did not perform a verification of the program performance compared to goals. However, a summary of what occurred during the PY2004/2005 programs is shown in Exhibit 4.9. The evaluation did not confirm the attainment of these goals, but presents the data based on the 12/05 PG&E monthly report, dated 01/12/06 for a complete picture of the activities stated to have been performed by the programs.

Exhibit 4.9
Percentage of Other Performance Goals

Program	Other Performance Goals	Goal	Recorded	% of Goal	HTR Goal	HTR Recorded	% of HTR Goal
SRP	Continue Resource Conservation Manager services to participating school districts	12	20	167%	-	-	-
SRP	Resource Conservation Manager services to new school districts	30	41	137%	24	40	167%
SRP	Energy Utilization Index (Benchmarking) studies	24	30	125%	20	28	140%
SRP	Energy Audits for 5 school districts	5	12	240%	4	12	300%
SRP	Energy Efficiency Workshops	42	62	148%	32	54	169%
SRP	Pilot Direct Install Relocatable Classroom Demonstration Sites	18	18	100%	-	-	-
SRP	Direct Install Relocatable Classroom Sites	22	25	114%	-	-	-
SRP	Website Upgrade	1	1	100%	-	-	-
SRP	Energy Audit Training for Students and Custodians	1	2	200%	-	-	-
SRP	2004 Program Plan	1	1	100%	-	-	-
SRP	2005 Program Plan	1	0	0%	-	-	-
SRP	Subcontractor and M&V contractor selection and agreements	6	11	183%	-	-	-
SRP	Total School Districts Served	100	197	197%	-	-	-
EP	New Program Catalogue	1	1	100%	-	-	-
EP	Translate Spanish Parent Home Survey (Measures 2004, Habits 2005)	2	3	150%	-	-	-
EP	Update Bill Buster Program	1	1	100%	-	-	-
EP	Pilot CFL Participants	1,000	1,407	141%	-	-	-
EP	Update Website	2	2	100%	-	-	-
EP	Development of Light Right Program	1	1	100%	-	-	-
EP	Video of Energy Patrol	1	1	100%	-	-	-
EP	Development of High School Curriculum	1	1	100%	-	-	-
EP	Video for Energy Efficiency	1	1	100%	-	-	-
EP	Total Students participating in Program	60,000	125,842	210%	20,000	66,987	335%

As shown, the programs exceeded the performance goals in all areas except one (the 2005 Program Plan). According the program manager, they had reported “no significant changes” to the 2004 program plan – hence no actual 2005 Program Plan report was required to be done.

5 CONCLUSIONS AND RECCOMMENDATIONS

The evaluation of the Energenius® and School Resources Programs did not cover the myriad of actions taken by the program in 2004 and 2005. However, for those areas assessed, each of the program elements provided high quality activities that brought about changes either to the classroom environment or in participant's behavior.

5.1 Energenius® Program

The Summer Energy Education Institute 2004 brought about self-reported changes in behavior by the participants. Half of the teachers indicated that they would incorporate one or more of the energy curricula learned about during the Institute. One of the teachers applied for an energy grant, three implemented a service learning activity, one started an Energy Patrol in 2004 with a second planning to in the winter of 2005, two teachers were active in coordinating a workshop on energy efficiency for other teachers in the fall of 2004 and one planned to do so in 2005. All these actions were taken by teachers that had not previously performed such activities. When asked about the level of influence of the Institute presentation on the teacher to include the curriculum lessons in their teaching plans, the average response was 8.5 (where 1=no influence and 10=very influential) with a range of 6 to 10. The Summer Energy Education Institute was a successful venue for both the program and the teachers.

Recommendation:
The Summary Energy Efficiency Institute was successful and should be continued.

5.2 School Resources Program

5.2.1 RCM Assessment

The core of this program uses resource conservation managers (RCMs) as the outreach approach to provide program services to the schools. Both the RCMs and the participants were queried on similar subjects. For those overlapping areas, all responses from one group were very similar to the other group. The RCMs felt that they provided a useful service in a timely manner - to which the participants agreed. The participants felt that the RCMs were knowledgeable; thus supporting the RCMs statements that training may be needed for future groups, but not this current set of RCMs. The ways the schools were brought into the program were similarly stated by both groups. The high regard for and actions taken towards enabling the school districts to implement energy saving measures held by the RCMs was mirrored by the participants. The actual energy efficiency changes implemented within the school districts reflected the RCMs influence. While some of the "behind-the-scenes" processes (such as meetings and paperwork) need improvement, these did not appear to impair the program's ability to provide a well-liked, useful service.

Interviews with the RCMs and participants of their services indicated that assumed energy and informational impacts were seen by the schools. While not a resource acquisition program, the RCMs focused on creating avenues to allow the schools to decrease their energy use. Ten of the school districts indicated that they would not have performed the energy actions they undertook without the program, two stated that the intervention of the RCM decreased the timeline in

which the measures were installed, and two more indicated that the RCM was partially responsible for some of the measures. When asked if there were reductions in their bills, seven indicated seeing a difference in their bills, while four stated that they assumed savings would occur based on the analysis. This indicates that the program influenced actual energy savings, at least to some degree.

Recommendations:
The RCM approach appears to be successful at influencing the installation of energy efficiency hardware and practices at school sites and should be continued.[12]

In order to maintain the high level of knowledge, training of RCMs should be included as newer, less experienced, staff are brought in to handle the RCM activities.

More structured record keeping processes should be put in place. Quality assurance of the data should occur.

5.2.2 Relocatable Classroom Assessment

The program retrofit 42 relocatable classrooms (RCs) with various energy efficient equipment across 30 different schools. Twenty of the retrofit rooms were monitored as well as a comparable number of adjacent non-retrofit RCs. Energy impacts were observed for all of the currently analyzed technologies installed except for programmable thermostats.

Recommendation:
PG&E should closely follow the planned statewide assessment of relocatable classrooms that is slated to occur in 2006 and use the information from the pilot project to determine the cost effectiveness of putting in place a large scale program to retrofit this type of classroom.

5.2.3 SEAT Pilot

A small component was pilot tested in the spring of 2005 to bring an energy efficiency auditing curricula to select high school students at the Metropolitan Education District in San Jose. This pilot component of the SRP was successful in educating these students about energy conservation, energy efficiency, and energy management. It had hands-on aspects that melded well with the approach of other classes at MetroEd. The students appeared to retain the information and apply it later in a work-type environment.

Recommendation:
The use of an energy efficiency auditing curricula for selected high school students was successful and may be a positive (albeit long-term) aspect of attempting to transform the market. Because there was evidence of actions taken due to the program, this component should be continued. It is recommended that any future assessment perform a thorough determination of changes in energy efficiency behavior to help determine if the behaviors are long-lasting and if program could be considered cost-effective.

[12] An impact evaluation (outside the scope of this evaluation) would be required to confirm the specific level of influence the RCM's had on the energy efficiency hardware and practices at the school sties. However, the current analysis indicated that the RCM's were definitely influential.

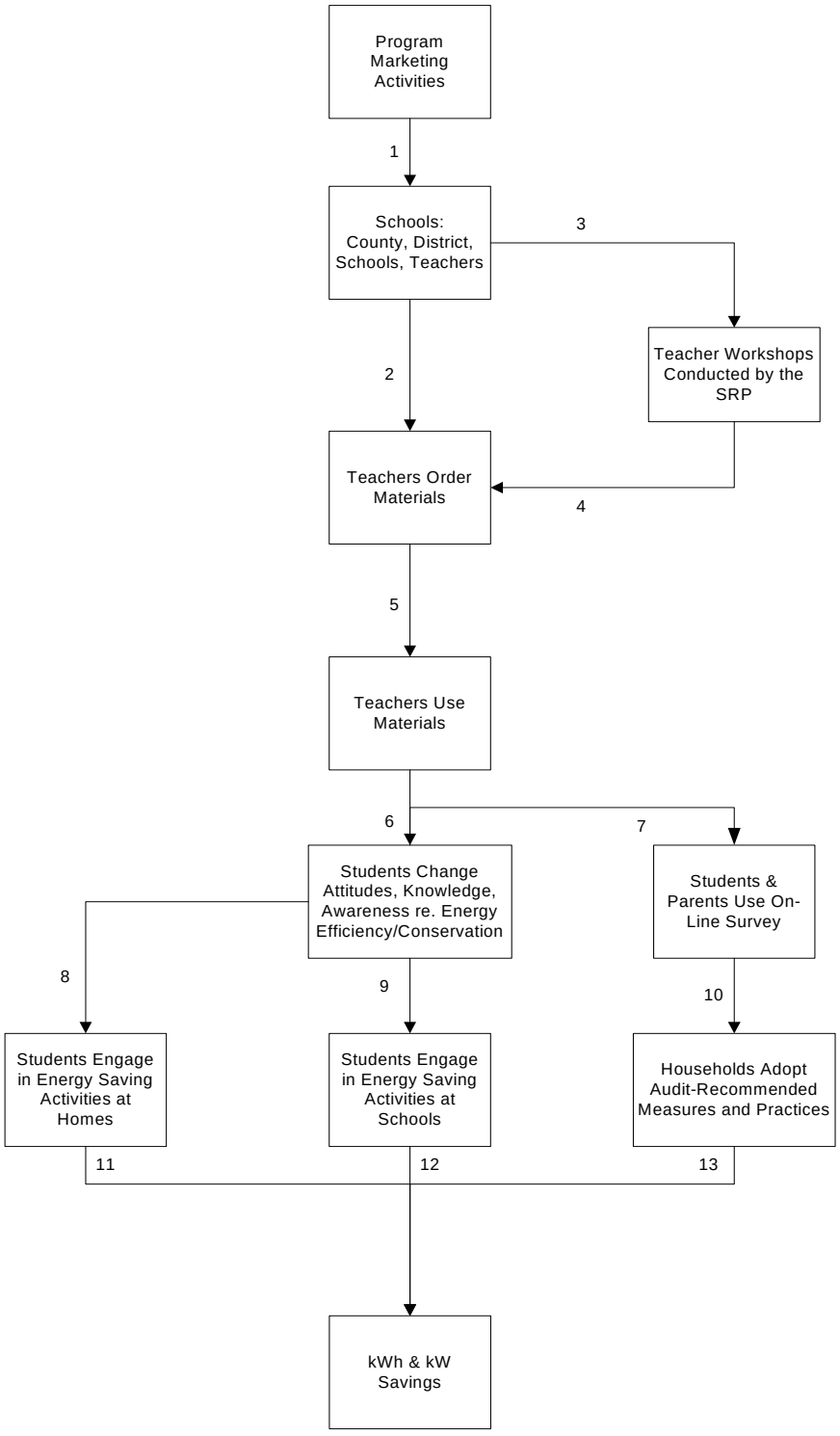
A. APPENDIX A - PROGRAM THEORY

Program Theory

The program theory for both EP and SRP were developed during the PY2002 evaluation effort. The logic models for each program are provided herein for completeness.

Energenius® Program Exhibit 1 shows 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 was 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 the identification and selection of indicators for the immediate, intermediate, and long-range outcomes during the PY2002 evaluation and allowed that evaluation to test the key linkages in the program logic.

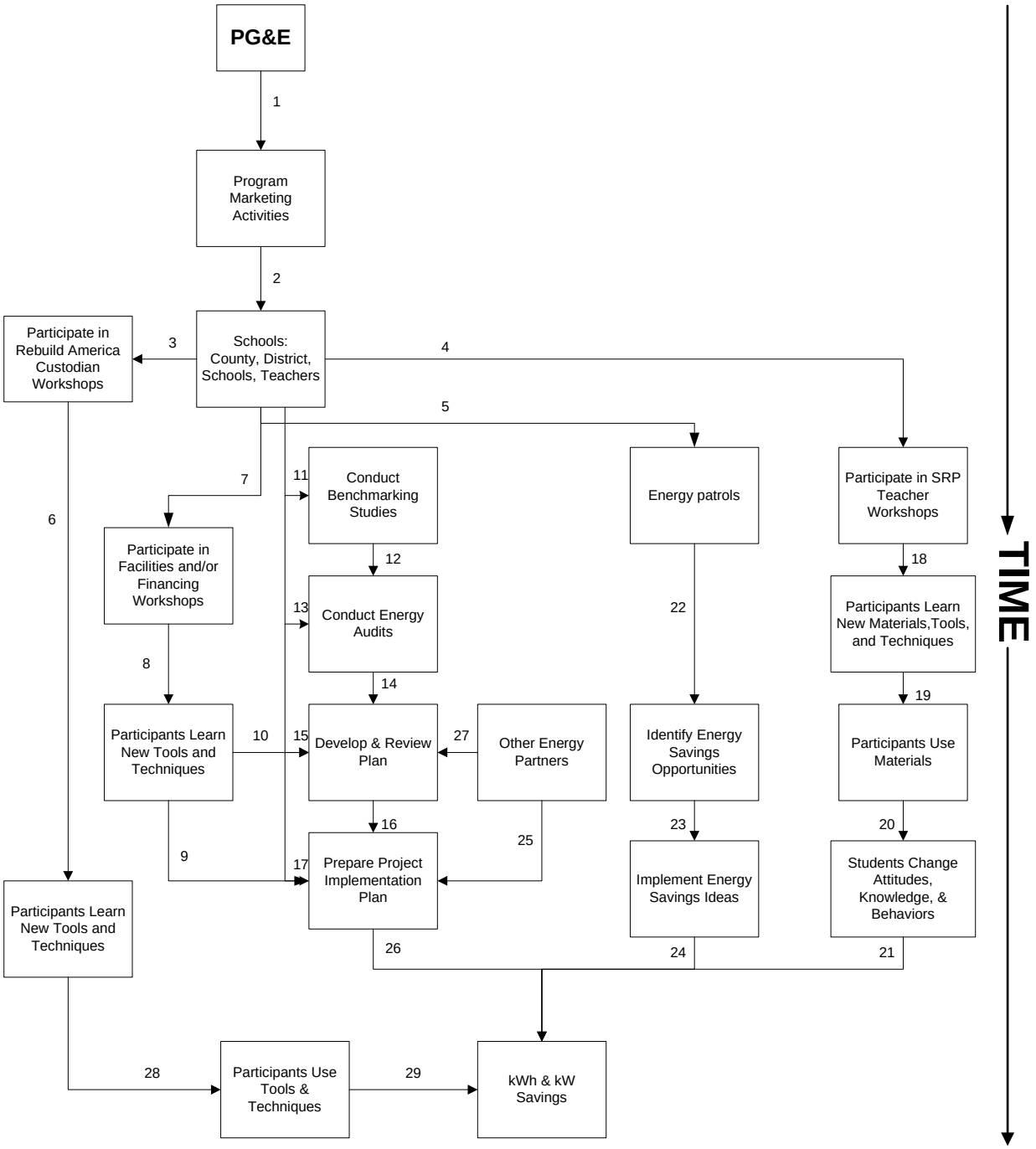
Exhibit 1
Program Logic Model for the EP



School Resources Program Exhibit 2 presents 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 was 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 the identification and selection of indicators for the immediate, intermediate, and long-range outcomes and allowed the PY2002 evaluation to test the key linkages in the program logic. 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.

Exhibit 2
Program Logic Model for the SRP



FINDINGS FROM PREVIOUS EVALUATIONS

The PY2000-2001 evaluation of EP and PY2002 evaluation of both EP and SRP collected data to determine the increase in awareness and changes in behavior due to the programs. The PY2000-2001 evaluation of EP found the following impacts:

- Teachers felt that the EP materials 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.
- In the in-depth interviews, nine of the twelve teachers indicated that their students used some of the Energenius materials at home, suggesting that the students are incorporating the lessons from school into the home.
- Overall the EP was well received. The vast majority of the teachers rated the EP as "Excellent" or "Very Good".
- Almost three-quarters of the teachers indicated they are "Very Likely" to teach another PG&E-sponsored energy efficiency program.
- Over three-quarters of the teachers indicated they are "Very Likely" to recommend the EP 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.

The PY2002 EP exceeded all the set goals for the program and the evaluation found virtually identical 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.

The PY2002 SRP also exceeded the set goals and the evaluation found the following 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[13]%.
- 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%.[14]
- 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.

[13] 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 by lowering them slightly.

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

B. APPENDIX B – MID-PROGRAM MEMO

February 4, 2005

MEMO

To: Rafael Friedman, PG&E

From: Mary Sutter, Equipoise Consulting Inc.

Re: Mid-Program Memo on the PY2004/2005 Schools Evaluation

This memo is a mid-program update covering the evaluation of the PY2004/2005 Schools Resource Program (SRP) and Energenius® Program (EP). These two programs are being jointly evaluated by the evaluation team of Equipoise and Ridge & Associates. It is expected that the memo will be included in total as an appendix in the final report or included in full in different sections of the final report.

As written in Task 5B of the evaluation research plan:

> There will be a mid-program memo that will cover the findings to date for the program. This will consist of the analysis of the teacher survey and an update on the pilot program metering. As the RCM interviews will not have occurred at the time of the memo, no data will be available on this topic.

This memo is divided into three sections – a summary of the memo, details on the Energy Institute, and details on the Relocatable Classroom (RC) Pilot Project.

Summary

The Energenius® Program created and implemented a 3-day conference for teachers called the Summer Energy Education Institute 2004. The Institute took place in Calistoga, California on June 29, 30, and July 1, 2004 and covered various topics including different curricula focused on energy, possible grant applications, and field studies. It was hypothesized that the information provided to the teachers during the Institute would lead to an increase in energy efficiency actions. It was also hypothesized that the ability of the teachers to use the Institute to obtain continuing education units (CEUs) would be an important factor in their decision to attend. The evaluation team assessed, through a mail survey to the 24 participants, the reasons why they attended and the impact of the Institute on actions taken in the fall of 2004 or planned for the spring of 2005.

The results of the testing of these two hypotheses were mixed. The CEUs did not appear to be as influential in bringing teachers to the Institute as other parts of the Institute. However, once in attendance, the information provided did appear to bring about changes in actions. More energy education curricula are planned by the participating teachers now

than before the Institute. The self-reported influence of the Institute on these plans was high.

The second area to be covered in the mid-year memo is the Relocatable Classrooms (RC) Pilot Project. As the project is ongoing, this memo reflects the status of the pilot as of mid-December, when an interview with Richard Flood of PG&E was conducted to obtain an update. This taped interview was 1.5 hours in length and covered specific questions created before the meeting by the evaluation team as well as expanding on areas not originally planned to be discussed. There are two main areas of assessment at this point: 1) to what extent is the Pilot following the design put forth in the Program Implementation Plan (PIP) and 2) how much progress has been made.

The SRP RC pilot is adhering to the PIP. SRP has contracted with three third parties to implement the RC pilot program, coordinated with other agencies, selected the first set of retrofit sites, and determined measures to be installed in the RC retrofits. The implementation of the retrofits is taking longer than expected mainly due to program's late start (the program received official approval from the California Utilities Public Commission in April 2004). The time allotted by this late start was too short to perform planning, site selection, and measure selection, and then obtain school agreements and building permits was in order to perform construction prior to the start of school. There will be 8 retrofits in early 2005, with 16 monitored classrooms. These will be matched pairs in which one RC will be retrofit and monitored and an adjacent RC next to the retrofit classroom will be monitored, but not retrofitted. The pilot continues to review the different sites toward their goal of 40 RC retrofits by the end of 2005.

Summer Energy Education Institute 2004

The Energenius® Program created and implemented a 3-day conference for teachers called the Summer Energy Education Institute 2004. The Institute took place in Calistoga, California on June 29, 30, and July 1, 2004 and covered various topics including different curricula focused on energy, possible grant applications, and field studies. The full agenda is provided as Attachment 1. The participants were made aware of three different programs: 1) the NEED Project, 2) The Project Learning Tree (PLT), and 3) PG&E's Energenius®. The mission of the NEED Project (www.need.org), is: " . . . to promote an energy conscious and educated society by creating effective networks of students, educators, business, government and community leaders to design and deliver objective, multi-sided energy education programs." Among the activities, NEED provides curricula units at four levels (primary, elementary, intermediate, and secondary) to help teachers implement energy units in their classrooms. In conjunction with BP (a petrochemical company with a renewable and alternative energy component) , NEED provides $2 million dollars in grants to teachers in California to cover the cost of energy related teaching activities and materials.

PLT(www.plt.org) is a program of the American Forest Foundation. Their website states:

> Project Learning Tree® is an award winning, multi-disciplinary environmental education program for educators and students in PreK-grade 12. PLT, a program of the American Forest Foundation, is one of the most widely used

> environmental education programs in the United States and abroad. PLT continues to set the standard for environmental education excellence.

This program provides curricula material on energy as well as forest ecology, municipal solid water, and areas. The PG&E EP website (see www.pge.com/education_training/energenius/) states:

> Pacific Gas and Electric Company's Energenius Educational Series teaches kids to use energy wisely and safely with interactive, engaging programs for grades one through eight. If you are an educator in Pacific Gas and Electric Company's service territory, you qualify to receive Energenius instruction materials free.

The PY2004/2005 EP program includes kindergarten through eighth grade curricula and builds on the current Energenius® structure consisting of five Educational Series of complete curricula on energy efficiency and gas and electric safety.

In addition to being made aware of the various curricula available to them, the participants of the Institute visited a geothermal energy plant and the Solar Living Center in Hopland, California.

It was hypothesized that the information provided to the teachers during the Institute would lead to an increase in energy efficiency actions. It was also hypothesized that the ability of the teachers to use the Institute to obtain continuing education units (CEUs) would be an important factor in their decision to attend. The evaluation team assessed, through a mail survey to the participants, the reasons why they attended and the impact of the Institute on actions taken in the fall of 2004 or planned for the spring of 2005.

The follow-up survey (provided in Attachment 2) was mailed to the 24 Institute participants on November 19, 2004. They were asked to send back their survey by December 5, 2004. After waiting until December 16, 2004, the data were analyzed.

The SRP had been in touch with the Energy Institute respondents prior to the mailing out of the survey to let them know the survey would be arrive soon and requesting that they respond. As shown in Exhibit 1, half of the teachers returned the survey.

Exhibit 1
Energy Institute Surveys

Survey Type	Mailed Out	Returned
Mail	24	12
Response Percent		50%

Decision to attend. When asked about why they choose to attend, the one common response was a high level of interest in the environment and energy conservation. As shown in Exhibit 2, all teachers indicated that this predisposition was a major effect on their decision to attend. The next highest draw was the information to be presented,

followed by the location.[15] The effect of the opportunity to earn CEUs was split among the respondents – half indicating a moderate to major effect and the other half a minor to no effect. While only a small group responded to the survey, it appears clear that the original hypothesis of the CEUs as a major draw for the Institute was not supported. The split of responses for this question, though, makes it difficult to clearly ascertain whether the program should continue to provide this option. It is suggested that CEUs be included in any future Institutes and be re-evaluated at that time through discussion with the future participants.

Exhibit 2
Decision to Attend

	Made no effect on decision		Minor effect on decision		Moderate effect on decision		Major effect on decision		Total	
	N	%	N	%	N	%	N	%	N	%
Location in Calistoga	0	0%	2	18%	4	36%	5	46%	11	100%
Ability to obtain CEUs	4	33%	2	17%	3	25%	3	25%	12	100%
Materials correlated to standards	1	8%	2	17%	3	25%	6	50%	12	100%
Information planned for presentation	0	0%	0	0%	3	25%	9	75%	12	100%
Field study at Calpine Geothermal Center	0	0%	2	17%	4	33%	6	50%	12	100%
Field study at Solar Living Center	0	0%	3	25%	5	42%	4	33%	12	100%
Interest in environment and energy efficiency	0	0%	0	0%	0	0%	12	100%	12	100%

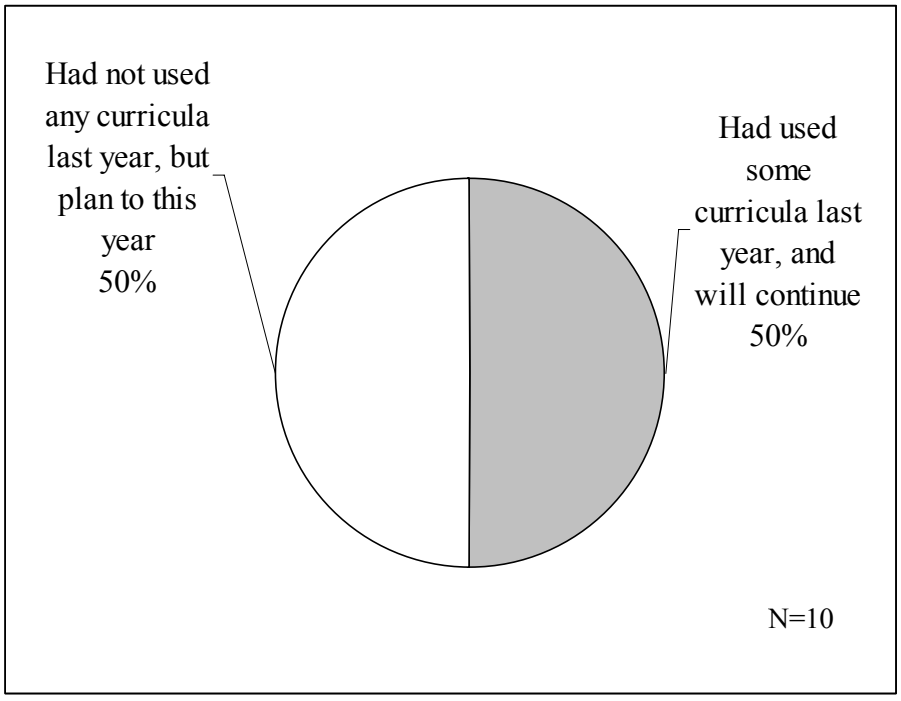
Increase in Action. There were three different pieces of survey data analyzed to attempt to determine if the Institute increased the actions taken by the teacher. The first two pieces of data, self-reported teaching of the various curriculum and other activities

[15] The shortest distance traveled to attend the conference was 17 miles, the longest distance was 167 miles, and the average distance was 73 miles.

questions, were assessed to see if the teachers were planning to perform one of these actions (i.e., teach a curriculum or a different activity) this school year, and had not last school year. It was assumed that if the teacher was planning an action this year and had not previously performed the action, the Institute played a crucial role in causing the action to happen. It is understood that full causality has not been shown in the analysis as the short survey precluded a full questioning of motives and knowledge. However, taking into account the response from the third piece of evidence, the influence question, helps to strengthen the linkage between the Institute and actions taken by the teachers.

Of the twelve surveys returned, two respondents failed to turn over page one and respond to questions regarding what they taught or the influence question, reducing the number of respondents to these questions to ten. Of these ten, half had not taught any of the curricula provided during the Institute (i.e., NEED, PLT, or PG&E curricula) and half were already using one or more of the available curricula. All five teachers who had previously taught one or more of the curricula plan to continue teaching from one of the available curricula in the 2004/2005 school year. Each of the five teachers who had *not* used the curricula previously either had included one or more of the various units in the fall of 2004 or planned to include them in 2005. These five who are teaching the curricula for the first time indicated they would use one or more of the NEED units, three indicated they would use PLT units, and three indicated they would use PG&E units. This is a strong indication of the increase in actions taken due to the Institute.

Exhibit 3
Teachers who had and had not used curricula last year



Looking at the second indicator of influence of the Institute, the actions other than teaching taken by the respondents, supports the previous indication of a positive influence by the Institute. One teacher applied for an A+ for Energy grant sponsored by

BP, three teachers plan to implement the GreenWorks! Service Learning activities, one teacher started an Energy Patrol in the fall of 2004 and another plans to begin one in the winter of 2005, two teachers were active in coordinating a workshop on energy efficiency for other teachers in the fall of 2004 and one plans to do so in 2005. All these actions were taken by teachers that had not previously performed the activity.

The last indicator of influence of the Institute was the self-reported answer to the question about the level of influence of the Institute presentation on the teacher to include the curriculum lessons in their teaching plans. Of the 10 answers, the average response was 8.5 (where 1=no influence and 10=very influential) with a range of 6 to 10. The respondents were asked to give a short explanation of why the indicated the level of influence they provided. Among the responses were:

> *"I have wanted to include a unit on energy/conservation topics for awhile. The wealth of appropriate materials and information presented throughout the Institute provided me with everything that I needed to begin!"*
>
> *"I feel that Energy Education is extremely important at all grade levels. The children can influence their parents now. When the children grow up, they can make better, more informed decisions about energy issues. The Institute reminded me of this. Thus I will be including it in my teaching this year."*
>
> *"I've found myself referring other teachers to the resources, knowledge that I gained at the Energy Institute. It was life-changing for me."*
>
> *"The presentations brought the curriculum to life; we could see how it worked and how it related to content standards."*

In addition to the follow-up survey by the evaluation team, the participants were asked to fill out an evaluation form created by EP. These results are provided in Attachment 4 and support the findings of the mail-in survey performed by the evaluation team.

Relocatable Classrooms Pilot Project

The second area to be covered in the mid-year memo is the Relocatable Classrooms (RC) Pilot Project. As the project is ongoing, this memo reflects the status of the pilot as of mid-December, when an interview with Richard Flood of PG&E occurred to obtain an update. This taped interview was 1.5 hours in length and covered specific questions created before the meeting by the evaluation team as well as expanding on areas not originally planned to be discussed. There are two main areas of assessment at this point: 1) how well is the pilot project adhering to the Program Implementation Plan (PIP) and 2) how far has the pilot progressed.

The February 2004 PIP provides details about how this pilot was planned to be implemented in the field. In addition to this information, the September 2004 monthly report notified the CPUC of a minor redefinition that there would be no more than two study *sites* per school district, rather than two *RC units* per district. According to the monthly report, SRP had identified opportunities where there are 3 or 4 "matched pairs" of RC's at a single site. This would enable one "control" RC to be monitored and compared against 2 or more retrofit variations of lighting or thermal improvements in

identical RC's. This was expected to result in increased data accuracy and lower cost for installation and monitoring time, and travel expense. Based on the interview with PG&E, the pilot is following the planned implementation well. While there have been some deviations, they have been to assess more advanced technologies and expand the depth of information gathered and disseminated. The PIP indicates certain processes that were planned such as contracting with third parties to perform parts of the work, coordination with other agencies, and possible measures to be installed.

Contracting with Third Parties – There are three contractors working with PG&E on the implementation of the RC pilot. This follows the plan in the PIP. The design/build contractor is responsible for the assessment of the sites and construction management for the installation of measures. The monitoring contractor is responsible for the creation of the monitoring protocol, installation of performance measurement equipment, data collection, and analysis of data. The last of the three contractors is responsible for the creation, conduct, and analysis of the occupancy survey. This is a short description of the exact responsibilities of each contractor as both the party that is performing the monitoring and the occupancy survey have been intrinsically involved in field program design, how to assess a site, the choice of potential sites, and which measures are to be installed at each site.

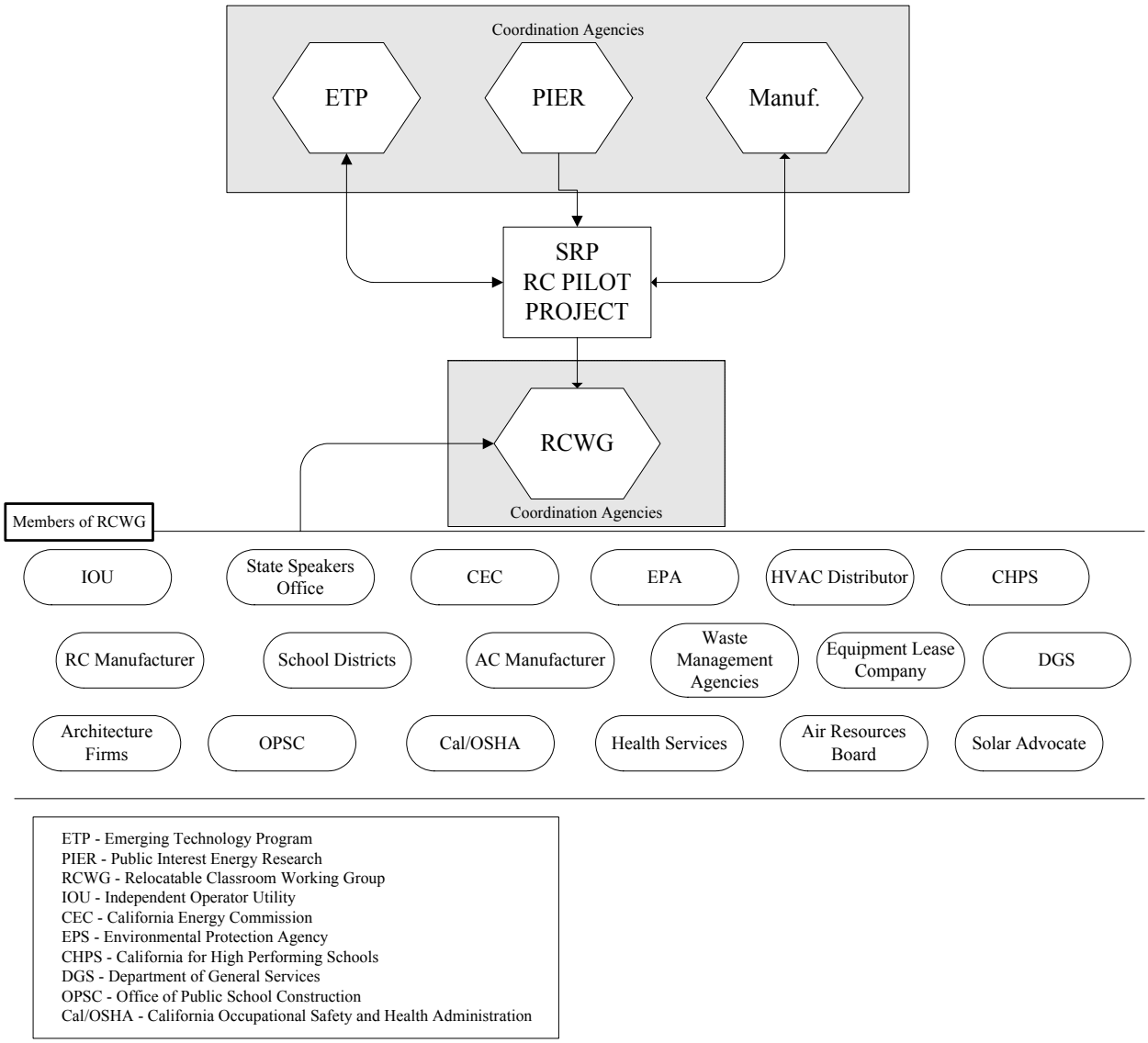
Coordination with other agencies – The pilot project was planning to coordinate with the PG&E Emerging Technologies Program (ETP), California Energy Commission (CEC) Public Interest Energy Research (PIER), and the Relocatable Classroom Working Group (RCWG)[16]. All of the relationships are functioning. SRP and ETP are coordinating on demonstrations of three technologies[17] recently developed under PIER funding (2002-03) that appear to have application to RC's. The metered data will also be used to help calibrate and enhance a RC energy use computer simulation model that was developed by the ETP in 2003. This will enable SRP/ETP to conduct modeling of many combinations of measures in different climate zones. There are measures planned for installation in late December 2004 and early spring 2005 that are directly from PIER. The metered data that will be an output from the pilot will also be very useful for PIER. RCWG is a subset of the Sustainable Buildings Task Force, a multi-agency team coordinated by the Division of the State Architect (DSA). This group pulls in many other actors in the market as shown in Exhibit . Through interactions during meetings and networking made possible by the RCWG, the pilot project now has an extensively larger group with which to interact, and through which market acceleration is expected to occur. The State Speakers Office has tasked RCWG with directing a survey of the physical condition of the 80,000+ existing RC's in the state. The SRP work may be influential in future policy and funding decisions for improving school facilities. SRP is also working with various manufacturers of different energy efficiency equipment for the demonstration sites. Some of the manufacturers have donated equipment and/or technical assistance or provided it at a

[16] While SRP coordinates with more agencies than shown on this list, these agencies are those that work specifically with the RC Pilot Project.

[17] Indirect-Direct Evaporative Cooler (IDEC), Integrated Classroom Lighting System (ICLS), and Integrated Ceiling-Daylighting Systems.

discount (about $50,000 worth of equipment so far). RC manufacturers are also involved at appropriate times.

Exhibit 4
Coordination within the RC Pilot Project



Possible measures to be installed – The PIP stated that the measures would include, but not be limited to, those approved for the statewide Express Efficiency and Standard Performance Contract (SPC) programs. The PIP also stated that elements of the best practices design guide of the Collaborative for High Performance Schools (CHPS) and other industry-recommended measures and operations and maintenance (O&M) practices would be incorporated into the selection process. Installations of many of the measures listed in the PIP are being planned at some of the RC sites. Additionally, the SRP program has investigated potential measures outside of the Express and SPC programs (such as the PIER designs) that could be used that have the potential to provide not only energy savings, but non-energy benefits such as reduction in ambient noise, improvement

in indoor air quality, and lighting that reduces direct and veiled reflection glare and improves illumination for various visual tasks. The stated SRP intention is to both reduce energy consumption and to improve the learning environment in RC's.

The RC pilot, as of December 2004, is adhering to the PIP. It appears to be working on creating classrooms that will not only be more efficient, but provide a better working environment for the teachers and students. However, the pilot is behind schedule. Progress to date and reasons for slower than expected progress are discussed next.

As with many of the PY2004/2005 programs, SRP received the official approval for this program from the California Public Utilities Commission (CPUC) in April 2004. The original timeline for the RC pilot provided approximately nine months before the planned summer installations. This delay in the beginning of the program was the main reason for some of the subsequent setback in getting the first installations underway. It is more difficult to perform retrofits during a school year when the students are in the portables as there is less likelihood of obtaining agreement for construction activities.

Regardless of the reason for the delay, the people involved with the RC pilot have not been idle. As of the middle of December 2004 there have been site assessments in 11 school districts at 35 different schools. A total of 109 RCs at these schools have been assessed for possible inclusion in the pilot. School districts have accepted SRP proposals for installations at 18 sites. The assessment of the sites was well planned to assure that all the data needed for decision making was gathered. (See Attachment 5). The assessment covered the physical condition, orientation and operation and maintenance of the RCs; specified photographic documentation of the portables, and obtained detailed information on the envelope, HVAC, windows, and lighting. Illuminance readings were taken at specific locations and heights to assure comparable readings. As each of the sites is assessed and the data analyzed, a short feedback memo is prepared and provided to the SRP Resource Conservation Manager (RCM) responsible for contact with each respective school. This ensures that timely feedback is provided to schools about whether one of their RCs may be chosen for a demonstration, coordination of installation schedules, etc.

A set of monitoring metrics have been developed to ensure a specified level of metering accuracy. The decision was made to use only those metering tools that were available through the Pacific Energy Center (PEC) tool lending library. While this reduced some precision in the energy monitoring (from +1% to +2% watts) and relative humidity (from 2% to 3% in RH), it was thought to be negligible and a more cost-effective trade off to purchasing more accurate metering equipment. There are one-time and continuous monitoring planned at the sites – what these are and where the metering will occur have been indicated in the monitoring metrics documentation. The monitoring metrics were disseminated to the RCWG for comment. The final version (Attachment 6) incorporates comments from this group.

With assessments made and monitoring protocols established, the pilot has chosen the initial six sites for the Phase I demonstrations covering eight matched pairs of portables (i.e., eight portables that will be retrofit and monitored and eight matching portables to be monitored) These sites were scheduled to be installed before the beginning of 2005. However, project manager for the construction management contractor was called away

on a family emergency in mid-December and was not available to oversee the installations planned for the holiday break period. As of January 10, 2005, the installations are currently planned to occur as soon as possible with work being conducted on weekends, evenings, Martin Luther King holiday, etc. depending on school availability. There are two lighting retrofits planned, one HVAC retrofit, five lighting controls measures, five HVAC control measures, and cool roofs on two to four sites. One site may have either a cool roof or ceiling insulation. The sites are located in three climate zones and five school districts. The RC pilot has five sites planned for back-up installation in 2004 in case any of the current sites do not pan out. SRP plans to install 10 more matched pairs in 2005 to complete the 18 demonstration sites in Phase 1. All of these sites will be monitored.

Phase 2 of the pilot will complete 22 additional retrofits in 2005. While the original plan envisioned using data from the Phase 1 to inform Phase 2, the timing of the data collection will not allow for a full analysis of metered data before the Phase 2 RC installations need to begin. The Phase 2 sites were not originally scheduled to be monitored. However, if there is funding available, these retrofit RCs will be monitored and the data used to further calibrate the ETP computer simulation. The pilot continues to review the different sites toward their goal of 40 RC retrofits by the end of 2005.

Summary

At the mid-point for these two programs, the two hypotheses put forward for the analysis of the Energenius® 2004 Energy Institute had mixed results. The Continuing Education Units (CEUs) did not appear to be as influential in bringing teachers to the Institute as other parts of the Institute. However, the split of responses around CEUs made it difficult to clearly ascertain whether the program should continue to provide this option. It is suggested that CEUs be included in any future Institutes and be re-evaluated at that time through discussion with the future participants. Once in attendance, the information provided did appear to bring about changes in actions. More energy education curricula are planned by the participating teachers now than before the Institute with a self-reported high level of influence of the Institute.

For the RC pilot within the School Resources Program, while the installations are behind schedule, there appears to be a solid work plan in effect with metered data available for in-depth analyses of 18 (9 matched pairs) of relocatable classrooms by mid-2005. Eventually a total of 40 classrooms are slated to be retrofit with energy efficiency updates by the end of 2005.

Attachment 1

Attachment 2
Energy Institute Follow-up Mail Survey

Thank you for taking the time to complete our follow-up survey. While we have specific questions below, we have also provided a general comment section for you to add anything you would like us to know. ---Evaluation Team---

REASONS FOR ATTENDING

There may have been many reasons why you chose to attend the 2004 Summer Energy Education Institute in Calistoga last June and July. Below are some possible reasons. Please indicate how much the reasons below affected your decision to attend by putting an "X" in the appropriate box:

Reason	**This made no effect on my decision to attend [1]**	**This had a minor effect on my decision to attend [2]**	**This had a moderate effect on my decision to attend. [3]**	**This had a major effect on my decision to attend [4]**
1. Location in Calistoga				
2. Ability to obtain continuing education credits (CEUs)				
3 . The fact that the materials were correlated to content standards				
4. Information planned to be presented				
5. Field study at the Calpine Geothermal Visitor Center				
6. Field study at the Solar Living Center				
7. Interest in the environment and energy conservation and/or efficiency				
8. Other (you write in):				

ENERGY EDUCATION LESSONS

During an Institute session, you created Action Plans In this follow-up survey, we would like to find out what, if any, energy education lessons were taught during this fall 2004 semester. Please put an "X" in all appropriate columns.

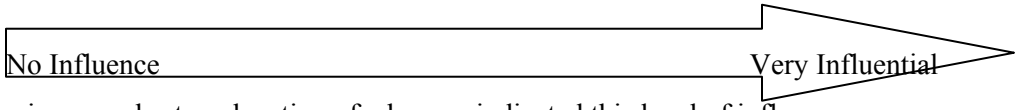
Lesson (or lessons from the curriculum components)	**Taught in previous school years [1]**	**Taught this fall (August-December, 2004) [2]**	**Plan to teach later this year (January – June, 2005) [3]**	**No plans to teach this academic year (2004-2005) [4]**
NEED Project Curriculum				
9. Science of Energy				
10. Sources of Energy				
11. Electricity				
12. Conservation & Efficiency				
13. Synthesis & Reinforcement				
Project Learning Tree Curriculum				
14. Energy & Society				
15. Forest Ecology				
16. Municipal Solid Waste				
17. Risk				
18. Places We Live				
19. Biodiversity				
20. Forests of the World				
PG&E Energenius Curriculum				
21. Primary Safety				
22. Habits				
23. Measures				
24. Intermediate Safety				
25. Bill Buster				

If you taught any of the above lessons this fall or plan to teach any later this year, please answer the next set of questions. Otherwise, please skip to the "Other Activities" section

On a scale of 1 to 10, please circle the number that best indicates the level of influence of the Institute presentations in causing you to include the above curriculum lessons in your teaching plan for the 2004/2005 school year. If you don't know the level of influence, please indicate that in the explanation section.

26.

1 2 3 4 5 6 7 8 9 10



27. Please give us a short explanation of why you indicated this level of influence:

OTHER ACTIVITIES

In addition to curriculum materials, other energy efficiency activities were discussed during the Institute. Please indicate which of these activities you conducted by putting an "X" in all appropriate columns.

Activity	Last school year (20003-2004 [1]	This fall (August-December, 2004) [2]	Later this year (January – June, 2005) [3]	No plans for this academic year (2004-2005) [4]
28. Applied for a NEED Grant				
29. Obtained a NEED Grant				
30. GreenWorks! Service-Learning activities (through PLT)				
31. PG&E Energy Patrol				
32. Helped coordinate workshop on energy efficiency / conservation for other teachers in the school				

33. Additional Comments

(i.e., how could the Institute be more valuable to you, topics it could focus on more or less)

Attachment 3
Follow-up Survey Frequencies

Frequencies

Location in Calistoga

Statistics

Location in Calistoga

N	Valid	11
	Missing	1

Location in Calistoga

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Minor effect on decision	2	16.7	18.2	18.2
	Moderate effect on decision	4	33.3	36.4	54.5
	Major effect on decision	5	41.7	45.5	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

Ability to obtain CEUs

Statistics

Ability to obtain CEUs

N	Valid	12
	Missing	0

Ability to obtain CEUs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Made no effect on decision	4	33.3	33.3	33.3
	Minor effect on decision	2	16.7	16.7	50.0
	Moderate effect on decision	3	25.0	25.0	75.0
	Major effect on decision	3	25.0	25.0	100.0
	Total	12	100.0	100.0	

Materials correlated to standards

Statistics

Materials correlated to standards

N	Valid	12
	Missing	0

Materials correlated to standards

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Made no effect on decision	1	8.3	8.3	8.3
	Minor effect on decision	2	16.7	16.7	25.0
	Moderate effect on decision	3	25.0	25.0	50.0
	Major effect on decision	6	50.0	50.0	100.0
	Total	12	100.0	100.0	

Information planned for presentation

Statistics

Information planned for presentation

N	Valid	12
	Missing	0

Information planned for presentation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Moderate effect on decision	3	25.0	25.0	25.0
	Major effect on decision	9	75.0	75.0	100.0
	Total	12	100.0	100.0	

Field study at Calpine Geothermal Center

Statistics

Field study at Calpine Geothermal Center

N	Valid	12
	Missing	0

Field study at Calpine Geothermal Center

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Minor effect on decision	2	16.7	16.7	16.7
	Moderate effect on decision	4	33.3	33.3	50.0
	Major effect on decision	6	50.0	50.0	100.0
	Total	12	100.0	100.0	

Field study at Solar Living Center

Statistics

Field study at Solar Living Center

N	Valid	12
	Missing	0

Field study at Solar Living Center

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Minor effect on decision	3	25.0	25.0	25.0
	Moderate effect on decision	5	41.7	41.7	66.7
	Major effect on decision	4	33.3	33.3	100.0
	Total	12	100.0	100.0	

Interest in environment and energy efficiency

Statistics

Interest in environment and energy efficiency

N	Valid	12
	Missing	0

Interest in environment and energy efficiency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Major effect on decision	12	100.0	100.0	100.0

Other reasons

Statistics

Other reasons

N	Valid	12
	Missing	0

Other reasons

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		5	41.7	41.7	41.7
	.	3	25.0	25.0	66.7
	Great to spend time with others who care about our planet [4]	1	8.3	8.3	75.0
	Location. Affordability [3]	1	8.3	8.3	83.3
	The chance to meet and exchange ideas with other educators [4]. Low out-of-pocket costs [4].	1	8.3	8.3	91.7
	The finite nature of fossil fuels and our blind dependency on them [4]	1	8.3	8.3	100.0
	Total	12	100.0	100.0	

Because of the ability of the respondents to answer more than one choice in each of the energy education lessons section of the survey, there can be more than one valid data point (choice) per case (teacher). The case summary for the next set of frequencies shows that there were twelve cases (teacher respondents), with some valid data points and some missing data points.

Case Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
$Science_of_Energy(a)	8	66.7%	4	33.3%	12	100.0%
$Sources_of_Energy(a)	8	66.7%	4	33.3%	12	100.0%
$Electricity(a)	7	58.3%	5	41.7%	12	100.0%
$Conservation(a)	9	75.0%	3	25.0%	12	100.0%
$Synthesis(a)	5	41.7%	7	58.3%	12	100.0%
$Energy_and_Society(a)	7	58.3%	5	41.7%	12	100.0%
$Forest_Ecology(a)	6	50.0%	6	50.0%	12	100.0%
$MSW(a)	7	58.3%	5	41.7%	12	100.0%
$Risk(a)	5	41.7%	7	58.3%	12	100.0%
$Places_We_Live(a)	6	50.0%	6	50.0%	12	100.0%
$Biodiversity(a)	7	58.3%	5	41.7%	12	100.0%
$Forests_of_World(a)	5	41.7%	7	58.3%	12	100.0%
$Primary_Safety(a)	8	66.7%	4	33.3%	12	100.0%
$Habits(a)	9	75.0%	3	25.0%	12	100.0%
$Measures(a)	6	50.0%	6	50.0%	12	100.0%
$Intermediate_Safety(a)	4	33.3%	8	66.7%	12	100.0%
$Bill_Buster(a)	5	41.7%	7	58.3%	12	100.0%

a Group

As an example, the first frequency ($Science of Energy) has 8 teachers who responded to the question (shown in the case summary table above). The frequency shown below indicates 13 actual data points from these eight teachers (shown in the column "N"). The percent of responses is self-explanatory as it sums to 100 percent. The percent of cases does not sum to 100 percent because it shows how many teachers chose the specific response. Five teachers indicated they plan to teach this lesson plan later this year for a percent of cases of 62.5 percent (5 of 8 cases). If a response is not included in the frequency table, that response was not chosen by any of the respondents.

$Science_of_Energy Frequencies

		Responses		Percent of Cases
		N	Percent	
$Science_of_Energy (a)	Taught in previous school year	3	23.1%	37.5%
	Taught this fall (Aug-Dec 2004)	3	23.1%	37.5%
	Plan to teach later this year (Jan-Jun 2005)	5	38.5%	62.5%
	No plans to teach this academic year (2004/05)	2	15.4%	25.0%
Total		13	100.0%	162.5%

a Group

$Sources_of_Energy Frequencies

		Responses		Percent of Cases
		N	Percent	
$Sources_of_Energy (a)	Taught in previous school year	3	23.1%	37.5%
	Taught this fall (Aug-Dec 2004)	4	30.8%	50.0%
	Plan to teach later this year (Jan-Jun 2005)	6	46.2%	75.0%
Total		13	100.0%	162.5%

a Group

$Electricity Frequencies

		Responses		Percent of Cases
		N	Percent	
$Electricity (a)	Taught in previous school year	2	25.0%	28.6%
	Taught this fall (Aug-Dec 2004)	1	12.5%	14.3%
	Plan to teach later this year (Jan-Jun 2005)	4	50.0%	57.1%
	No plans to teach this academic year (20004/05)	1	12.5%	14.3%
Total		8	100.0%	114.3%

a Group

$Conservation Frequencies

		Responses		Percent of Cases
		N	Percent	
$Conservation (a)	Taught in previous school year	3	23.1%	33.3%
	Taught this fall (Aug-Dec 2004)	4	30.8%	44.4%
	Plan to teach later this year (Jan-Jun 2005)	6	46.2%	66.7%
Total		13	100.0%	144.4%

a Group

$Synthesis Frequencies

		Responses		Percent of Cases
		N	Percent	
$Synthesis (a)	Taught in previous school year	1	16.7%	20.0%
	Taught this fall (Aug-Dec 2004)	1	16.7%	20.0%
	Plan to teach later this year (Jan-Jun 2	2	33.3%	40.0%
	No plans to teach this academic year (20	2	33.3%	40.0%
Total		6	100.0%	120.0%

a Group

$Energy_and_Society Frequencies

		Responses		Percent of Cases
		N	Percent	
$Energy_and_Society (a)	Taught in previous school year	1	12.5%	14.3%
	Taught this fall (Aug-Dec 2004)	3	37.5%	42.9%
	Plan to teach later this year (Jan-Jun 2	3	37.5%	42.9%
	No plans to teach this academic year (20	1	12.5%	14.3%
Total		8	100.0%	114.3%

a Group

$Forest_Ecology Frequencies

		Responses		Percent of Cases
		N	Percent	
$Forest_Ecology (a)	Taught in previous school year	1	14.3%	16.7%
	Taught this fall (Aug-Dec 2004)	1	14.3%	16.7%
	Plan to teach later this year (Jan-Jun 2	3	42.9%	50.0%
	No plans to teach this academic year (20	2	28.6%	33.3%
Total		7	100.0%	116.7%

a Group

$MSW Frequencies

		Responses		Percent of Cases
		N	Percent	
$MSW (a)	Taught in previous school year	2	22.2%	28.6%
	Taught this fall (Aug-Dec 2004)	1	11.1%	14.3%
	Plan to teach later this year (Jan-Jun 2	5	55.6%	71.4%
	No plans to teach this academic year (20	1	11.1%	14.3%
Total		9	100.0%	128.6%

a Group

$Risk Frequencies

		Responses		Percent of Cases
		N	Percent	
$Risk (a)	Plan to teach later this year (Jan-Jun 2	3	60.0%	60.0%
	No plans to teach this academic year (20	2	40.0%	40.0%
Total		5	100.0%	100.0%

a Group

$Places_We_Live Frequencies

		Responses		Percent of Cases
		N	Percent	
$Places_We_Live (a)	Taught in previous school year	3	33.3%	50.0%
	Taught this fall (Aug-Dec 2004)	2	22.2%	33.3%
	Plan to teach later this year (Jan-Jun 2	2	22.2%	33.3%
	No plans to teach this academic year (20	2	22.2%	33.3%
Total		9	100.0%	150.0%

a Group

$Biodiversity Frequencies

		Responses		Percent of Cases
		N	Percent	
$Biodiversity (a)	Taught in previous school year	3	30.0%	42.9%
	Taught this fall (Aug-Dec 2004)	2	20.0%	28.6%
	Plan to teach later this year (Jan-Jun 2	4	40.0%	57.1%
	No plans to teach this academic year (20	1	10.0%	14.3%
Total		10	100.0%	142.9%

a Group

$Forests_of_World Frequencies

		Responses		Percent of Cases
		N	Percent	
$Forests_of_World (a)	Taught in previous school year	2	28.6%	40.0%
	Plan to teach later this year (Jan-Jun 2	4	57.1%	80.0%
	No plans to teach this academic year (20	1	14.3%	20.0%
Total		7	100.0%	140.0%

a Group

$Primary_Safety Frequencies

		Responses		Percent of Cases
		N	Percent	
$Primary_Safety (a)	Taught in previous school year	2	22.2%	25.0%
	Taught this fall (Aug-Dec 2004)	2	22.2%	25.0%
	Plan to teach later this year (Jan-Jun 2	2	22.2%	25.0%
	No plans to teach this academic year (20	3	33.3%	37.5%
Total		9	100.0%	112.5%

a Group

$Habits Frequencies

		Responses		Percent of Cases
		N	Percent	
$Habits (a)	Taught in previous school year	4	30.8%	44.4%
	Taught this fall (Aug-Dec 2004)	4	30.8%	44.4%
	Plan to teach later this year (Jan-Jun 2	3	23.1%	33.3%
	No plans to teach this academic year (20	2	15.4%	22.2%
Total		13	100.0%	144.4%

a Group

$Measures Frequencies

		Responses		Percent of Cases
		N	Percent	
$Measures (a)	Taught in previous school year	2	25.0%	33.3%
	Taught this fall (Aug-Dec 2004)	3	37.5%	50.0%
	Plan to teach later this year (Jan-Jun 2	1	12.5%	16.7%
	No plans to teach this academic year (20	2	25.0%	33.3%
Total		8	100.0%	133.3%

a Group

$Intermediate_Safety Frequencies

		Responses		Percent of Cases
		N	Percent	
$Intermediate_Safety (a)	Taught this fall (Aug-Dec 2004)	1	25.0%	25.0%
	Plan to teach later this year (Jan-Jun 2	1	25.0%	25.0%
	No plans to teach this academic year (20	2	50.0%	50.0%
Total		4	100.0%	100.0%

a Group

$Bill_Buster Frequencies

		Responses		Percent of Cases
		N	Percent	
$Bill_Buster (a)	Taught in previous school year	1	16.7%	20.0%
	Plan to teach later this year (Jan-Jun 2	4	66.7%	80.0%
	No plans to teach this academic year (20	1	16.7%	20.0%
Total		6	100.0%	120.0%

a Group

Level of Influence of Institute

Statistics

Level of Influence of Institute

N	Valid	10
	Missing	2

Level of Influence of Institute

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	6	1	8.3	10.0	10.0
	7	1	8.3	10.0	20.0
	8	3	25.0	30.0	50.0
	9	2	16.7	20.0	70.0
	10	3	25.0	30.0	100.0
	Total	10	83.3	100.0	
Missing	System	2	16.7		
Total		12	100.0		

Description of why the choice of the level of influence

Statistics

Description of why the choice of the level of influence

N	Valid	12
	Missing	0

Description of why the choice of the level of influence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	16.7	16.7	16.7
	Great stuff but there is so little time to teach "extras"	1	8.3	8.3	25.0
	I've found myself referring other teachers to the resou4ces, knowledge that I gained at the Energy Institute. It was life-changing for me.	1	8.3	8.3	33.3
	I feel that Energy Education is extremely important at all grade levels. The children can influence their parents now. When the children grow up, they can make better, more informed decisions about energy issues. The institute reminded me of this. Thus I will be including it in my teaching this year.	1	8.3	8.3	41.7

I have wanted to include a unit on energy/conservation topics for awhile. The wealth of appropriate materials and information presented throughout the Institute provided me with everything that I needed to begin!	1	8.3	8.3	50.0
The new materials (especially NEED stuff) are wonderful and have increased the depth and understanding of these important concepts.	1	8.3	8.3	58.3
The presentations brought the curriculum to life; we could see how it worked and how it related to content standards.	1	8.3	8.3	66.7
The workshop inspired me to teach the Energenius curriculum in more detail than previous years.	1	8.3	8.3	75.0
They gave me the easy way to use materials and spurred my interest.	1	8.3	8.3	83.3
This workshop re-inspired me to keep on doing what I do and gave me some new ideas, materials, sources of info., etc.	1	8.3	8.3	91.7
Through attending this workshop I was able to apply and received an A+ for Energy grant which has funded curriculum purchases & set a theme for my instruction this year.	1	8.3	8.3	100.0
Total	12	100.0	100.0	

Similar to the lesson choices, the teachers had the ability to choose more than one responses for the other activities. Below is the same frequency set up as previous – the case summary is provided first to show how may teachers gave a responses (the valid N values) followed by the frequency for each question.

Case Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
$NEED_Grant_Application (a)	9	75.0%	3	25.0%	12	100.0%
$NEED_Grant_Obtained(a)	6	50.0%	6	50.0%	12	100.0%
$GREENWORKS(a)	7	58.3%	5	41.7%	12	100.0%
$ENERGY_PATROL(a)	10	83.3%	2	16.7%	12	100.0%
$WORKSHOP(a)	9	75.0%	3	25.0%	12	100.0%

a Group

$NEED_Grant_Application Frequencies

		Responses		Percent of Cases
		N	Percent	
$NEED_Grant_ Application(a)	Last school year (2003-2004)	2	22.2%	22.2%
	Later this year (Jan-Jun 2005)	1	11.1%	11.1%
	No plans for this academic year (2004/05	6	66.7%	66.7%
Total		9	100.0%	100.0%

a Group

$NEED_Grant_Obtained Frequencies

		Responses		Percent of Cases
		N	Percent	
$NEED_Grant_Obtained(a)	No plans for this academic year (2004/05	6	100.0%	100.0%
Total		6	100.0%	100.0%

a Group

$GREENWORKS Frequencies

		Responses		Percent of Cases
		N	Percent	
$GREENWORKS (a)	Later this year (Jan-Jun 2005)	3	42.9%	42.9%
	No plans for this academic year (2004/05	4	57.1%	57.1%
Total		7	100.0%	100.0%

a Group

$ENERGY_PATROL Frequencies

		Responses		Percent of Cases
		N	Percent	
$ENERGY_PATROL (a)	Last school year (2003-2004)	1	7.7%	10.0%
	This fall (Aug-Dec 2004)	2	15.4%	20.0%
	Later this year (Jan-Jun 2005)	4	30.8%	40.0%
	No plans for this academic year (2004/05	6	46.2%	60.0%
Total		13	100.0%	130.0%

a Group

$WORKSHOP Frequencies

		Responses		Percent of Cases
		N	Percent	
$WORKSHOP (a)	This fall (Aug-Dec 2004)	2	22.2%	22.2%
	Later this year (Jan-Jun 2005)	2	22.2%	22.2%
	No plans for this academic year (2004/05	5	55.6%	55.6%
Total		9	100.0%	100.0%

a Group

Additional Comments

Statistics

Additional Comments

N	Valid	12
	Missing	0

Additional Comments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		3	25.0	25.0	25.0
	.	1	8.3	8.3	33.3
	Give me a chance to share what I've done with Energy Efficiency education in my class & for my school. Teachers sharing with teachers - understand time, money constraints. Celebrate our successes, next steps to take, support for further education of teachers and class. I'd love to have NEED kits, any donors out there?	1	8.3	8.3	41.7
	I also wanted to comment on how instructive and helpful the facilitators were. Both Olga Claymire and Carol Adair went out of their way to impart knowledge and get us materials. The speakers they were able to obtain for us were excellent. The field trips added a lot to my knowledge. Everything was well organized so that we could "make the most" out of this wonderful opportunity. Thank you for supporting this type of educational workshop which I found practical and valuable.	1	8.3	8.3	50.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	I was so focused on the grant, that when it didn't happen, all my enthusiasm went out the window.	1	8.3	8.3	58.3
	I was surprised how many of my students live "off the grid"; independent of PG&E. 6 of 10 students use alternative energy sources: solar, hydroelectric, biodeisel, etc. and were really quite well informed about energy conservation. We visited the local biofuel station (owned by a parent) as well as the CALPINE visitor's center and the geothermal field. This was valuable and I'm glad we were able to visit during the Institute to learn about it. I now wish I had written a NEED grant, and would have liked more support to have done this.	1	8.3	8.3	66.7
	I would have liked to have done more with the PG&E Energy Patrol and helping to coordinate workshop on EE, but at this time there wasn't any staff support.	1	8.3	8.3	75.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	I would have liked to spend more time exploring/learning both NEED and PLT. I felt I was given too much information, too quickly and just couldn't digest it all. It was all excellent info. I think next time I'll take some post-its to mark relevant pages and write quick notes.	1	8.3	8.3	83.3
	It was just great. I would participate again and encourage my colleagues to do so also.	1	8.3	8.3	91.7
	With BP offering money for Energy activities in the classroom through their A+ for Energy grants, the timing is great for teachers to focus on this topic. {Respondent indicated a application for an A+ for Energy grand in July of last school year and obtained it this fall}\	1	8.3	8.3	100.0
	Total	12	100.0	100.0	

Attachment 4
Energy Institute Survey Results

(The following results are based on the survey created by
the program and fielded at the end of the Institute by the program.)

Attachment 5
RC Assessment Instruments

The following two instruments were used in the assessment of each relocatable classroom to obtain the needed information to determine possible participation in the program.

School Name:_____ **Phone No:** _____

Interviewee 1: _____ **Position:** _____
Interviewee 1: _____ **Position:** _____
Interviewee 1: _____ **Position:** _____

Surveyor: Date:_____

DURING PHONE SCHEDULING CALL:

- ☐ Obtain a day-by-day schedule for the 2004-05 yr. (for multi-track schools there will be more than one)
- ☐ Obtain an 8 ½ x 11" school site plan (and/or emergency exit plan).
  - ☐ Make one copy for on-site notes. Keep one clean copy.
  - ☐ Use this to make a list of portables, with school room number. Review with school secretary
- ☐ Are there aerial photos of the school site available? Can one be obtained?
- ☐ Is there a fairly current architectural landscape or site plan available? Can one be obtained?
- ☐ Will a facilities or maintenance person be available during the site visit?

SITE INTERVIEW

1. SITE LAYOUT

1. Are there any plans to change layout of the playground or other site activities? (repave playground, re-grade play area, install new equipment) _____
2. Are there any plans to cut down or severely trim any trees in the next 12 months? _____
3. Is any major construction planned for the immediate neighborhood? (road closure or widening, buildings next door) _____
4. Are there any other bothersome site issues? (noxious flumes, loud noises, such as from traffic or airplanes, sources of dust, security problems?) _____
5. Have you had to make any special adjustments to the school operation to accommodate any of theses issues? _____

2. SCHEDULE

1. Which school schedule(s) do the portables follow?

a. _____

b. _____

c. _____

2. In the next 12 months, will any of the portables get used for (list room number):

   a. Before school programs? _____

   _____

   b. After school programs? _____

   _____

   c. Night or weekend community meetings? _____

   _____

   d. Special classes, such as art, science, special ed, computer lab, or tutoring? _____

   _____

3. PORTABLES

For each portable on the school site (based on list from site plan), note:

Room # changes code*)	Grade level 2004-05	Schedule (a, b or c from Q.1)	Vintage	At current site how many yrs?	Past changes (provide code*)	Future (provide

* codes: **A**.HVAC renovation **B**. Lighting renovation **C**. electrical renovation **D**. surfaces (carpet, painting, ceiling) renovation **E**. Repair leaks **F**. Repair HVAC **G**. To be relocated **H**.To be removed **Other**: describe

4. PORTABLE OPERATION

1. How are the heating and cooling systems controlled? Who has control? _____

2. How is the fan controlled? Who has control? _____

3. Are the teachers allowed to open the windows? _____

4. Are the teachers asked to follow any special procedures in operating the portables? (such as close the blinds every night, turn off the lights when leaving for recess, leave the fan running at all times….) _____

5. How consistently do you think the teachers follow these procedures? _____

6. Have any teachers complained about conditions in any of the portables in particular? (such as too noisy, safety/security concerns, lack of thermal comfort?) _____

7. Do you collect any information about the operation of the portables? (such as separate electric, gas or water meters, EMS data on temperatures, equipment run time) _____
   If yes, can you share this information with us? _____

5. PORTABLE MAINTENANCE

1. What is their cleaning schedule? Vacuuming, carpet cleaning, other… _____

2. Do any of the portables have pest problems? (Squirrels, skunks, ants, spiders…) _____

3. Do any of the portables have water leakage or mold problems? _____

4. Have any of the portables had special safety or security issues such as thefts, vandalism? _____

5. Have you had to take any special measures to combat any of these problems? ___

WALK THE SITE

SITE PHOTOS

Take the following photos, noting photo number and location on school site plan: Photo Number(s):

- ☐ 1 Establishing shot of school sign with name _____
- ☐ 1 Entry to school office from front sidewalk _____
- ☐ 3-5 Overall view of portables on site, showing trees and neighboring buildings
- ☐ 3 Overall view from playground (3 panoramic shots)
- ☐ 1 Electrical panel _____

Walk the site and note location of trees on site plan. Note approximate height for trees within shading distance of the portables. If possible, pace out or measure distance to shade trees on site plan.

Take a compass reading and note location of magnetic north on site plan.

IDENTIFY CANDIDATE PORTABLES

Ask the most knowledgeable staff member (likely the head of maintenance)

1. Which two portables do you think are the most alike? _____

   _____

   _____

   (In terms of A. physical condition, B. siting/shading, C. grade level assignment, D. operating schedule, and E. any changes planed in the next 12 months?)

2. Can you identify three other portables which are also similar to this pair? _____

   _____

   _____

---

3. Can you identify a different pair of portables which are also very similar? _____

   _____

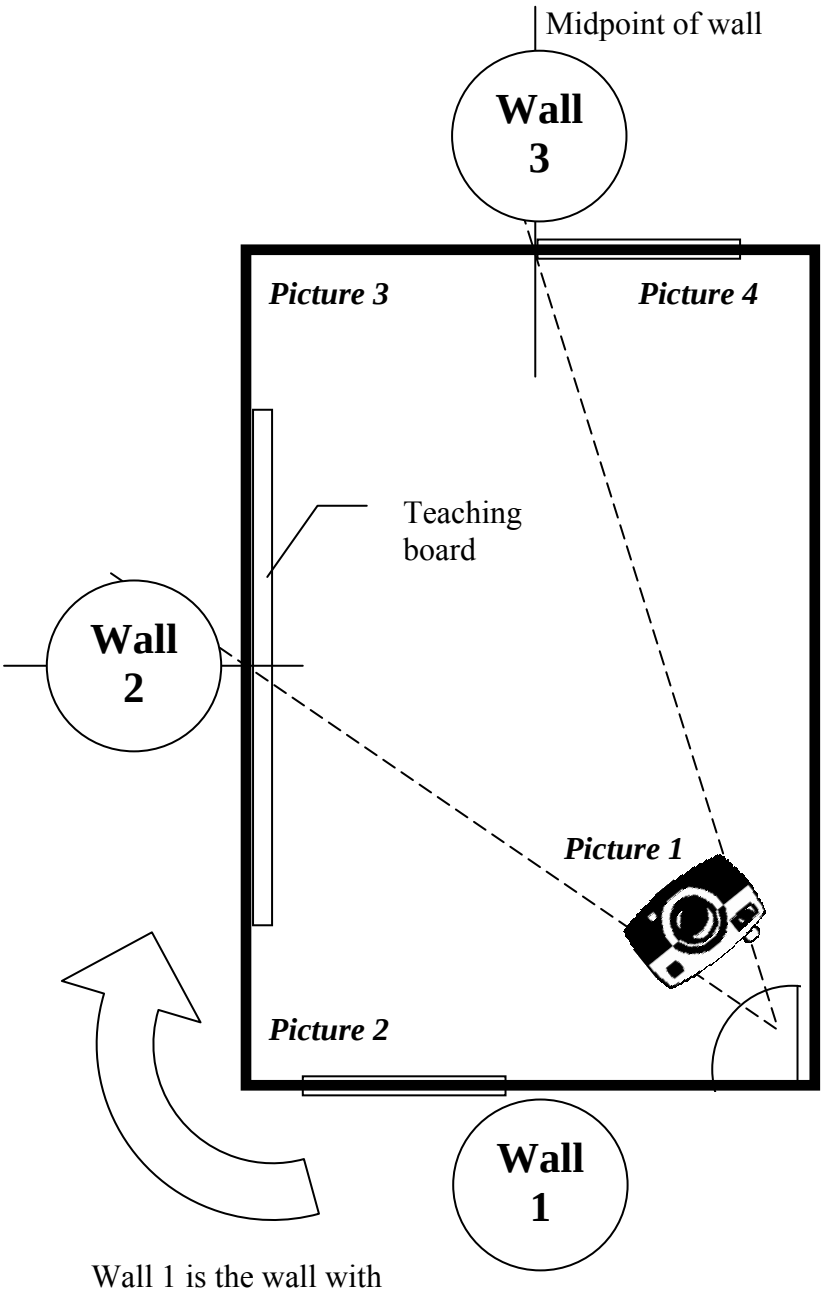
   _____

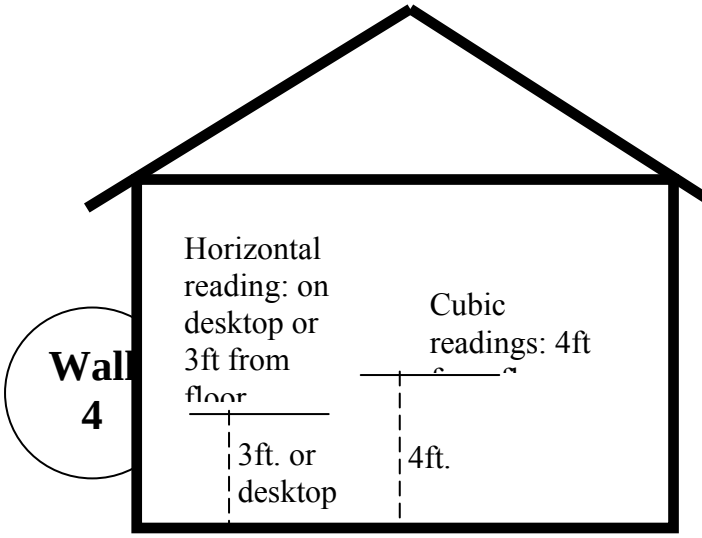
4. Can you identify two other portables which are also similar to this second pair? __

   _____

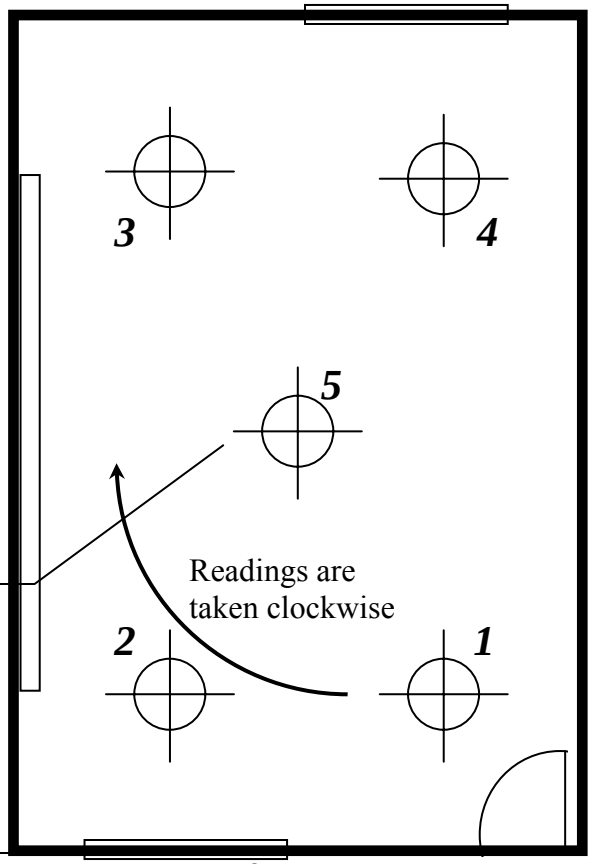
   _____

From this candidate list, conduct a formal survey for at least five portables (one pair and three back ups), and up to eight portables (two pairs and two back ups) on site. Carefully note room number and location of each portable included in survey. Complete a Classroom Survey Form for each of the selected portables.





Wall 1 is the wall with the door, walls 2 3 and 4 are counted clockwise from wall 1



Cubic readings only taken at center of classroom

Take one picture of the interior from each corner of room, starting at door, and moving clock-wise around room looking at center of wall (at approximately 10 o'clock) and opposite corner

School Name_____ **Rm #** _____

Surveyor _____ **Date** _____

CLASSROOM SURVEY FORM

Manufacturer Name: _____

Mfg ID #_____ **Sch ID #**_____

Length_____ **Width**_____

Orientation (long direction - as you enter thru door)_____

Wall material plywood ☐ metal ☐ vinyl ☐ other (describe) _____ color (describe) _____

Ext. Roof material composition ☐ metal ☐ mopped ☐ gravel ☐ wood ☐ color (describe) _____

Entry porch none ☐ ramp ☐ wood ☐ metal ☐ concrete ☐ stairs ☐

Entry door wood ☐ metal ☐ window? ☐ window dim _____

Foundation const. at grade? ☐ ventilated? ☐ wood ☐ concrete ☐ other (describe) _____

Ground material (front) dirt ☐ gravel ☐ conc ☐ asphalt ☐ grass ☐ other (describe) _____

Ground material (under) ☐ ☐ ☐ ☐ ☐ _____

Ground material (back) ☐ ☐ ☐ ☐ ☐ _____

Teach wall: ☐ marker board ☐ chalk board wall number? __

Flooring: _____% carpet_____% vinyl_____% other describe _____

Walls: _____% hard_____%vinyl (tackable) _____%acoustic tiles

Ceiling: ☐ T-bar tile ☐ glued-on tile ☐ ducts visible? ☐ other:_____

Ceiling insulation: ☐ Batt ☐ Rigid _____ in. thickness ☐ at ceiling ☐ at roof

Amenities: ☐ sink ☐ built in storage ☐ phone ☐ port. Fan ☐ TV ☐ pets/aquarium ☐ OH proj ☐ # computers

Condition: ☐ stale air ☐ moldy/musty ☐ water damage ☐ brand new

Classroom Comments:

HVAC

Equip Mfg Name _____ Model _____ Size _____ Plate ID _____

Heating ☐ HP ☐ gas ☐ resistance ☐ roof ☐ wall ☐ other _____

Cooling ☐ none ☐ same as **heating** ☐ other _____

Thermostat Controls ☐ central (EMS) ☐ programmable ☐ Fan only option ☐ by-pass timer

Ventilation Controls ☐ H/C only ☐ auto timer ☐ sensor cont ☐ separate exhaust

Fan Condition (turn on) ☐ silent ☐ audible ☐ noisy ☐ room vibration ☐ open to exterior

Supply/Return # of registers _____ location: _____ ☐ ducted? O/A damper type____

HVAC Comments:

WINDOWS

Entry wall window dimensions _____ % operable _____

Shading: ☐ awning ☐ louvers ☐ shade screen ☐ trees ☐ roof overhang _____ inches

Opposite window, dimensions: _____ % operable _____

Shading: ☐ awning ☐ louvers ☐ shade screen ☐ trees ☐ roof overhang _____ inches

Glazing:

fc in / fc outside	clear	gray	bronze	dbl glzd
_____ / _____	☐	☐	☐	☐

Frame: ☐ Aluminium ☐ Vinyl ☐ Wood

Security

none	glazing	mesh	bars	plywood
☐	☐	☐	☐	☐

Condition broken graffiti scratched not operable

☐ ☐ ☐ ☐

Interior window control none ☐ blinds ☐ curtains ☐ louvers ☐ paper ☐ other ☐

ELECTRIC LIGHTING (remember to turn lights on upon entering classroom to warm up)

Count _____# luminaires _____lamps/luminaire _____Total count lamps

Lamps Mfg code_____ can't read ☐ inconsistent ☐

Condition ☐ audible hum ☐ flicker ☐ burned out lamps:__ _____number

Luminaire Type prismatic ☐ louv'd ☐ indirect ☐ recessed ☐ surface mount ☐

Luminaire Condition deteriorated/yellowed ☐ aged ☐ average ☐ good ☐ brand new ☐

Ballast ☐ magnetic ☐ electronic ☐ can't tell

Lighting Controls 1 switch ☐ 2+switch ☐ oc sen ☐ photosensor ☐ can't tell ☐

ILLUMINANCE READINGS (Refer to diagram)

Cubic: lights on _____ door _____ w2 _____ w3 _____ w4 _____ up_____ down

Horizontal: lights on _____ 1 _____ 2 _____ 3 _____ 4 _____ 5

Horizontal: ½ lights on _____ 1 _____ 2 _____ 3 _____ 4 _____ 5

Cubic: lights off _____ door _____ w2 _____ w3 _____ w4 _____ up_____ down

Horizontal: lights off _____ 1 _____ 2 _____ 3 _____ 4 _____ 5

PORTABLE PHOTOS

Take the following photos, noting photo number and location on school site plan: Photo Number(s):

- ☐ 1. Establishing shot of classroom number _____
- ☐ 2. Front end and back end view, showing entry porch and all equipment _____
- ☐ 2. Side views, showing ground ventilation condition, and neighboring buildings and trees _____
- ☐ 2. HVAC equipment, thermostat _____
- ☐ 5. Interior views, one from each corner of room, starting at door, and moving clock-wise around room looking at center of wall (at approximately 10 o'clock) and opposite corner, and one of ceiling _____ _____
- ☐ 2. Exterior views from inside. View to outside from center of each window _____

☐ 1. Photo above ceiling tiles of insulation (optional) _____

Attachment 6
RC Monitoring Metrics

Continuous Data Points

Continuous data should be recorded at intervals of 15 minutes to one hour using either a central data acquisition system or individual data loggers. All data should be kept in non-volatile or battery-backed memory and should be checked at least monthly. Priority: 1 – required, 2 – recommended, 3 - optional

Point	*Priority*	*Units (accuracy)*	*Location*	*Equipment*	*Notes*
Environmental					
Temperature	1	°F (±1°)	Below thermostat	RTD, thermistor, thermocouple, AD590	
Relative Humidity	2	% (3%)	Same as temp	Capacititive	
CO_2	1	ppm (±50)	Center of room or at return	Telaire or equiv.	
Aldehydes	3	$\mu g/m^3$ (±10)	Center of room		
Ozone	3		Center of room		
Light	2	foot candles (5%)	Vertical on teaching wall		
Sound	2	dbA (5%)	Center of class	Sound meter	
Energy					
Total building	1	watts (2%)	Breaker panel	Power transducer, or CT	Measure power factor if using CT
Lights	1	watts (2%)	Breaker panel	Power transducer, or CT	Measure power factor if using CT
HVAC	1	watts (2%)	Breaker panel, disconnect, or unit	Power transducer, or CT	Measure power factor if using CT
Gas	1	cuft (2%)	Supply	Gas meter with pulse output	If gas heat
Fan	2	status	HVAC unit	Current switch	Combine with one-time measurement of power
Strip heat	2	status	HVAC unit	Current switch	Combine with one-time measurement of power
Meterological					
Temperature	1	°F (±1°)	Under overhang	RTD, thermistor,	

			or in gill radiation shield	thermocouple, IC	
Relative Humidity	2	% (3%)	Same as temp	Capacititive	
CO_2	2	ppm (±50)	Same as temp	Telaire or equiv.	
Wind speed	3	mph (5%)	Five foot mast	Anemometer	
Rain	3	Inches (10%)	Roof	Tipping bucket	
Insolation	2	W/m2 (5%)	Roof	Silicon pyranometer	Total horizontal
Other					
Water	3	gallons (2%)	Supply line	Flow meter	
Opening	2	status	Door and windows	Magnetic	
Occupancy	3	status	Corner or center	IR or ultrasonic	

5.2.8 One-time Measurements

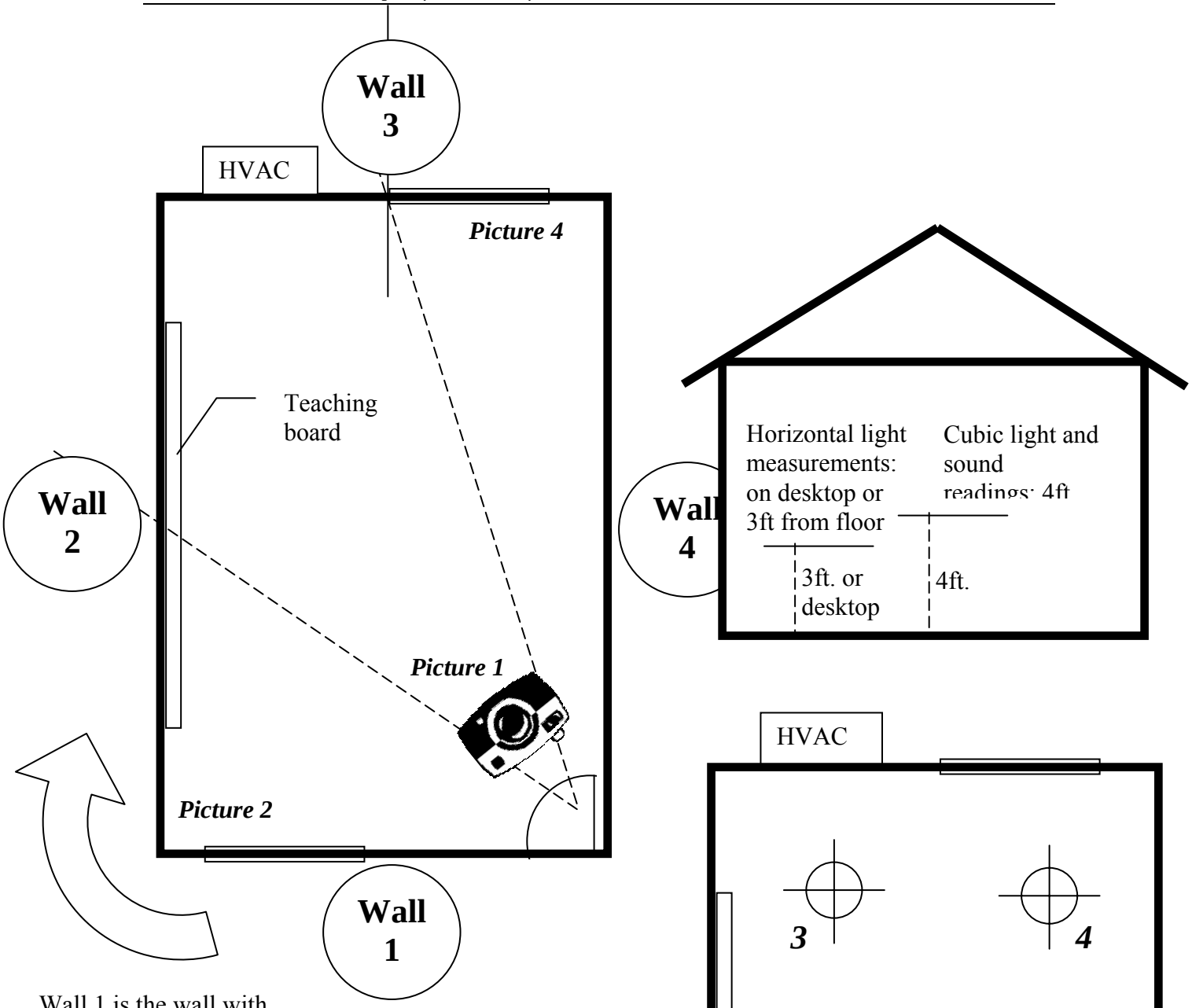
One-time measurements should be performed before and after the study period in order to check for physical changes in the classroom. Measurements should be performed with an unoccupied classroom and time and date should be noted. Priority: 1 – required, 2 – recommended, 3 - optional

Point	*Priority*	*Units (accuracy)*	*Location*	*Equipment*	*Notes*
Environmental					
Air flow	1	cfm (±10)	Supplies, return, outside air damper	Flow-hood or pitot tube	With HVAC in heating, cooling, and fan mode
Aldehydes	2	$\mu g/m^3$ (?)	Center of room	Passive sampler	During school day only
Illuminance	1	foot candles (±2%)	Horizontal at 4 locations (see diagram)	Light meter	With lights at each level and off
Sound	1	dbA (±2)	4 readings at each location (see diagram)	Sound meter	With HVAC in off, heating, and cooling modes
CO_2	1	ppm (±50)	Supply, return, outside	Telaire or equiv.	With HVAC fan on
Energy					
Lights	1	watts (±10)	Breaker panel	True RMS power meter	Also measure PF and THD
HVAC	1	watts (±10)	Breaker panel or disconnect	True RMS power meter	Also measure PF and THD
Fan	1	watts (±10)	HVAC unit	True RMS power meter	Also measure PF and THD
Strip heat	1	watts (±10)	HVAC unit	True RMS power meter	
Envelope					
Infiltration	2	cfm_{50} (±10)	Door	Blower door	
Duct leakage	2	cfm_{25} (±10)	Supply register	Duct blaster	
Roof reflectivity	1	% (±5%)	Roof	Albedometer	Or record type and color of roof
Other					
Water	3	gpm (±0.1)	at fixture	Container or micro-weir	

Observations

Point	*Priority*	*Options*	*Notes*
Classroom			
Manufacturer	1	Name, date, ID #	
Dimensions	1	Length, width, height	
Occupancy	1	Grade level, # students	
Supplies	1	Art/Craft, science, cleaning	
Traffic	1	Loading/unloading, freeway, dumpsters, etc.	
Construction			
Frame	1	Wood, metal	
Foundation	2	At grade, ventilated, wood, concrete	
Ground material	2	Dirt, gravel, concrete, asphalt, grass	Front, back, under
Floor covering	2	% carpet, % vinyl, % other	
Wall covering	2	% hard, %vinyl, % acoustic tile	
Teaching wall	2	Marker board, chalk board	Note location
Ceiling	2	T-bar, glued-on acoustic, sheetrock	
Wall material	2	Plywood, metal, vinyl, other	Note color
Roof material	2	Comp, metal, mopped, gravel, wood	Note color
Insulation	1	Wall, ceiling, floor, mod beam	Type and R-value
HVAC			Note model/serial #
Type	1	Heating only, HP, gas, resistance	Note location
Thermostat	1	EMS, programmable, by-pass timer	
Ventilation	1	H/C only, timer, sensor, separate exhaust	
Ducts	2	# supplies, # returns, insulation level	Note condition
O/A damper	1	None, barometric, motorized	
Windows			
Type	1	Clear, gray, bronze, # panes	
Frame	2	Aluminum, vinyl, wood	
Security	2	Glazing, mesh, bars, plywood	
Exterior shading	2	Awning, louvers, shade screen, trees, overhang	
Interior shading	2	Blinds, curtains, louvers, paper	

Electric Lights			
Lamps	1	Code, quantity	
Fixtures	1	Prismatic, louvered, indirect, recessed, surface	Note condition
Ballast	1	Magnetic, electronic	
Controls	1	Bi-level, dimming, occupancy, photosensor	
Pictures			
Site	1	Overall view of portable on site, showing trees and neighboring buildings	
Exterior	1	Front and back end view, showing entry porch, door, and all equipment	
Equipment	2	Thermostat, inside of electrical panel, close up of HVAC	
Interior	1	One from each corner, one of ceiling	See diagram
Windows	2	View to outside from inside at each window	



Wall 1 is the wall with the door, walls 2 3 and 4 are counted clockwise from wall 1

Take one picture of the interior from each corner of room, starting at door, and moving clock-wise around room looking at center of wall (at approximately 10 o'clock) and opposite corner

Cubic light readings only taken at center of classroom

C. APPENDIX C – STEM CURRICULA

This information was copied from the STEM information provided during the on-site audit by the evaluation team member. The information stated it had last been revised on 7/11/02.

Objectives:

- to improve academic skills, especially in math and science
- to apply academic skills to real school energy problems
- to identify ways to save energy and dollars in the school
- to convince students that they can be influential in solving real life problems

The STEM program has four major components:

- Thirty hours of classroom instruction for STEM team of students and teacher(s)
- Energy audit done by STEM team; reviewed by Wilson Educational Services, Inc.
- Preparation and presentation of report to the school administration
- Establishment of an ongoing energy conservation/management program

The curriculum of the training sessions is as follows:

- Introduction
- Overview of regional, national, and global energy use patterns and resources
- Potential for dollar savings through low cost/no cost measures
- Introduction to dimensional analysis
- Introduction to energy audits
- Building survey and walk-through
- Dealing with people
- Dealing with math concepts which relate to large numbers
- Conversion of fuels to energy (BTU or kWh) units
- R (RSI) and U (USI) values
- Finding areas from measurements and blueprints
- Calculating heat loss through building envelope
- Using calculations in manual to determine energy and fuel savings
- Conversion of fuel savings to CO2 reduction
- Heating
- Ventilation
- Air conditioning
- Domestic hot water
- Calculation of a heat balance
- Lighting and electrical use
- Renewable energy sources
- Design of the energy conservation/management plan
- Preparation of the energy audit presentation
- Review of course
- Exam for STEM Energy Auditor Certification*
- Complete report & prepare presentation

**To be certified, each person in the course must pass the exam and participate significantly in doing the team's initial energy audit.*