

# **Final EM&V Report for Green Action Program (CPUC 1300-04)**

CALMAC Study ID: SDR0005.01

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October 2006

Green Action Program  
Table of Contents

1. Introduction .....	1
2. Comparative Program Literature Review.....	2
2.1 Introduction .....	2
2.2 Energy Education Program Evaluations.....	3
2.3 Energy Education Curricula.....	3
2.4 Programs Similar to the Green Action Program .....	4
2.5 EM&V Studies of Schools Programs.....	6
2.6 Lessons Learned from Comparative Program Literature Review .....	7
3. Program Specifics and Review of Program Materials and Procedures.....	8
4. Evaluation of Program 2004 – 2006 .....	9
4.1 Evaluation Relative to Program Goals .....	9
4.2 Pre- and Post-Tests .....	10
4.3 Cost Effectiveness of Retrofit Installations .....	10
4.4 Perception Survey .....	12
4.5 Self-Administered Evaluation .....	12
5. Survey Analysis.....	13
5.1 Sampling Plan .....	13
5.2 Survey Implementation .....	14
5.3 Survey Results – Teachers.....	16
5.4 Survey Results – Community Facility Administrators .....	23
6. Overall Evaluation of Green Action Program .....	24
7. References .....	28
Appendix – Survey Instruments.....	A-1
Teacher Evaluation Survey.....	A-2
Retrofit Evaluation Survey .....	A-12

## ***1. Introduction***

The Green Action Program is an education program designed to teach energy conservation concepts to tomorrow's leaders by reaching today's high school students. The program promotes energy education among high school students through energy education workshops, energy audit training, direct implementation of energy audits, a youth forum, and a survey designed to compare audience perception with actuality regarding energy conservation. The program consists of high school lectures, a youth forum, training workshops, and a public survey. The primary target beneficiaries of the program are high school students, teachers, and community facility administrators.<sup>1</sup>

Given the program goals, the EM&V activity for this program addresses the following CPUC goals (see page 26 of the Energy Efficiency Policy Manual).

- (1) *Energy and peak demand savings.* Since the Green Action program is an information only program energy and peak demand savings were not claimed. We did review SDREO ex ante estimates (savings per community service project, retention rate) and assessed both the underlying assumptions (net-to-gross ratio, estimated useful life, and the incremental measure cost) and the actual installation parameters at several community service facilities.
- (2) *Cost-effectiveness.* The program is evaluated as an information only program. However, there are some small direct implementation savings. The implementation plan uses 1.0 as the underlying net-to-gross ratio and an expected useful life (EUL) of sixteen years for T8 lamps. These figures were evaluated and conclusions drawn as to the relative cost effectiveness of the installed measures. Survey information is also utilized to estimate free-ridership (i.e., program participants who would have undertaken the activity in the absence of the program).
- (3) *Baseline analysis and market assessment.* The baseline analysis presented below includes a brief literature review and a comprehensive review of the results of

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<sup>1</sup> The purpose behind the public survey was not clear from the program implementation plan. The stated goal was to compare general perceptions with facts. However, it was not obvious who would be the ultimate consumers of this information.

SDREO's operation of the Green Schools Program over the previous two years.<sup>2</sup> We also review and analyze all data collected by the program (community service projects, attendance records, pre and post tests on student knowledge, self-evaluation measures, etc).

- (4) *On-going feedback, and corrective and constructive guidance regarding the implementation of the program.* One of the primary objectives of this report is to provide conclusions and trends in order to inform the program so that they can be used for corrective action in future manifestations of the Green Action Program. For example, if we were to discover that there was excessive free-ridership, then program details could be altered to offset this behavior (see Section 6).
- (5) *An overall assessment of the performance and success of the program.* Both performance relative to the program goals specified above and customer satisfaction with all program elements are used as measures of program success.
- (6) *An assessment of whether there is a continuing need for the program*

This report is organized as follows. In the next section, we present the baseline Analysis. Our review of program specifics and program materials and procedures is the subject of section 3. Our evaluation of program progress through June 15, 2006 is presented in sections 4, and 5. Concluding remarks are detailed in the final section.

## **2. Comparative Program Literature Review**

### **2.1 Introduction**

The objective of the comparative literature review is to determine the existence and relevance of previously utilized energy efficiency education programs.<sup>3</sup> Zebedee & Associates conducted a review of the literature, primarily using the California Measurement Advisory Committee website (<http://www.calmac.org/>) and the California Energy Commission website (<http://www.energy.ca.gov/>) to determine whether or not

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<sup>2</sup> The most relevant baseline indicator would have been the pre-test on student knowledge. However, we were not provided the opportunity to review the pre and post-tests and can not, therefore, validate the baseline or program result as an independent evaluator.

<sup>3</sup> This review of evaluations focused on similar California programs as described in the Research Plan. Future evaluations of the program should consider a more comprehensive market assessment analysis as defined in the CPUC Energy Efficiency Policy Manual. That said, the literature review did provide useful information for this evaluation as further described in this section.

data exist for programs similar to the Green Action Program (GAP) conducted by the SDREO. The literature search produced four types of relevant studies: (1) studies that provide evaluations of energy education programs; (2) a comprehensive summary of approximately 50 energy education programs conducted by the California Energy Commission; (3) the program details for approximately 30 specific energy education programs; and (4) studies that conduct evaluation, measurement, and verification.

## ***2.2 Energy Education Program Evaluations***

The following themes emerged from our review of the evaluation studies.

- Most teachers believe there is a lack of quality energy education materials available.
- Most teachers do not know materials are generally available from a variety of sources.
- Teachers find out about materials through other teachers or conferences.
- Availability does not guarantee use.
- Teachers need assistance in incorporating material into curriculum.
- Teachers need aid in preparation and/or minimal time requirement.
- Teachers need incentives to overcome hurdles.
- Teachers only teach what they are knowledgeable about – when they learn something new, they teach it.

## ***2.3 Energy Education Curricula***

Our second level of review consisted of a detailed examination of the California Energy Commission/California Department of Education (CEC/CDE) *Compendium of Energy Studies*. The compendium evaluated the curricula of 91 separate energy education programs, of which 50 scored high enough to be included in the final version. Programs were evaluated on the basis of the following five general criteria:

- general content;
- presentation;
- pedagogy;

- teacher usability; and,
- energy content.

Each study was assigned a grade ranging from A to F in each area and an overall grade, also ranging from A to F.

The compendium provides much useful information but does not adequately screen energy efficiency education programs. For example, the grade scale developed by CEC/CDE may not be relevant to the SDREO. A specific grade does not indicate whether or not the program is applicable to students in the San Diego territory, given its objectives and resources. Further, many of the programs reviewed were not focused solely on energy efficiency and hence less relevant to SDREO. Second, the compendium is not exhaustive in that several studies, including the PG&E Energenius Program, were not included. Third the evaluation criteria were not complete in that several important program characteristics were not considered. For example, user transaction costs or incentives for use were not evaluated. Thus, a program could score high in content, presentation, pedagogy, and usability and receive a high overall grade. However, teachers could have limited knowledge about or access to the materials or the transactions costs could be excessive. Either could prevent the program from attaining successful market acceptance.

#### ***2.4 Programs Similar to the Green Action Program***

Our final level of review consisted of evaluating approximately thirty specific energy efficiency programs. The programs were differentiated into three grade categories: primary (grades 3 - 6); intermediate (grades 7 -9); and secondary (grades 10 - 12). In addition, we created an evaluation template to ensure consistency.

Three general evaluation criteria were utilized. First, we focused on the student learning process. Specific components of this process included:

- the relative ratio of active to passive learning;
- the type and quantity of student activities;
- the quantity and quality of testing (pre and post, short and long term);
- the presence of student incentives;

- the use of multi-media presentation approaches; and,
- whether or not the program was multi-lingual.

In general, a program that contained significant active learning, many and varied activities, several levels of program assessment, incentives that promote student interest, used multi-media presentation, and were multi-lingual were rated higher, all else constant.

Second, we examined the usability of the program materials from the teacher's perspective. Important teacher usability criteria included:

- teacher access to program materials;
- the quality of program materials;
- the existence of supplemental teaching materials;
- program cost;
- the quality and quantity of any post-evaluation/feedback
- instructor prerequisites such as background and preparation; and,
- the presence of teacher incentives.

In general, a program for which materials were of high quality, plentiful, and were easily accessible, for which program cost were minimal, which provided incentives for teacher use, and which allowed teachers to influence program materials through a post-evaluation process were evaluated higher, all else constant.

Finally, we evaluated the programs on their specific relevance to the SDREO. In this area we attempted to identify program elements or characteristics that could be used in designing a comprehensive energy efficiency education program.

Our global findings are as follows. First, overall there is poor accessibility to program materials. The overwhelming number of programs requires that motivated and knowledgeable teachers locate and communicate with the program office to obtain program materials. This delivery mechanism requires too much of teachers and likely undermines program effectiveness. Second, there is a general lack of either teacher or student incentives to use or learn program material. Third, there is insufficient program assessment. In general, most programs do not have pre/post testing to determine student

up-take of program material, do not have short/long term testing to determine student behavior or activity modifications, and do not have any post program evaluation to improve subsequent versions of the program. Fourth, most programs make poor use of current teaching technology such as videos and CDs. Fifth, teacher transactions costs are excessive in terms of the background and/or preparation required.

Given these findings we can make the following conclusions regarding the design of the Green Action Program.

- In order to offset teacher transactions costs and the lack of incentives, the Green Action Program eliminated direct teacher involvement. That is, a presenter external to the class provided the curriculum and the presentation. This approach extended to the audit training, which was conducted by program staff.
- The Green Action Program included a pre and post-testing element, although there was no follow-up to assess any long-term behavior modification or knowledge retention.

As is evident, the program was designed to attempt to offset identified problems with previous studies.

### ***2.5 EM&V Studies of Schools Programs***

We also reviewed recently completed EM&V studies of education programs conducted in California. We focused on three specific studies: (1) Ridge and Associates, 2003; (2) Vanward Consulting, 2004; and (3) Thayer and Zebedee, 2004. The first study listed was concerned with the PG&E Energenius Program, whereas the latter two studies focused on the Green Schools Program.

The Ridge and Associates (2003) study used both pre and post-testing of students and teacher surveys to evaluate the Energenius Program, which includes gas and electricity conservation, safety, and water conservation components, and offered the following conclusions:

1. Teachers felt that the program materials were helpful, held their students' attention, were easy to incorporate into their curriculum, that their overall quality was very good and that the program affected their students' attitudes, knowledge,



and behavior. In addition, the teachers felt the pilot test of the Home Energy Efficiency Survey (HEES) was very successful.

2. A majority of respondent teachers indicated they would teach in another PG&E-sponsored energy efficiency program and that they would recommend the Energenius Program to other teachers.
3. Across all program components, students exposed to the program materials experienced statistically significant increases in knowledge as measured by the pre-tests and post-tests.

Of course, Ridge and Associates (2003) did not evaluate alternative program materials or program delivery, the cost effectiveness of the program, or the long-term sustainability of the increases in knowledge.

The Vanward Consulting (2004) and Thayer and Zebedee (2004) reports both concerned the Green Schools Program, administered in different parts of the state, and found similar results.

1. The Green Schools Program satisfied all its programmatic and performance metrics as measured by number of schools, students, proportion of hard-to-reach, etc.
2. Among teachers and custodians there was general satisfaction with program materials, the program process, and the interaction with the Alliance to Save Energy, the sponsoring entity.
3. Teachers reported that participation in the program resulted in changes in awareness, attitudes, and knowledge of energy efficiency.

However, as in the case of the evaluation of the PG&E Energenius Program, there was too little attention paid to alternatives, relative cost-effectiveness, and long-term sustainability of information transfer.

## ***2.6 Lessons Learned from Comparative Program Literature Review***

The analysis produced the following conclusions.

1. Evaluation of a specific program should be placed in the broader context that includes alternative programs.

2. Programs that require motivated and knowledgeable teachers to locate and communicate program materials will generally have limited participation, especially among the hard-to-reach population segments, thereby undermining program effectiveness.<sup>4</sup>
3. Curricula should contain a significant quantity of active learning, many and varied activities, several levels of program assessment, incentives that promote student interest, used multi-media presentation, and be multi-lingual.
4. Program materials should be high quality, plentiful, low cost, and easily accessible.
5. The availability of either teacher or student incentives to use or learn program material heightens program effectiveness.
6. Program assessment should include pre and post-testing and should focus both on short and long-term changes in knowledge and/or behavior.

Our evaluation of the success of the SDREO's Green Action Program will incorporate these lessons. We use program databases and surveys of program participants.

### ***3. Program Specifics and Review of Program Materials and Procedures***

The Green Action program is a cooperative effort between the city of San Diego and the San Diego Regional Energy Office and consists of five interrelated parts: (1) a lecture to high school students by a representative of San Diego given in the participating teacher's classroom; (2) audit training through a school energy survey/audit conducted by students in the presence of a professional engineer; (3) an optional field trip to demonstrate energy efficiency, alternative transportation, and renewable energy; (4) a community service project coordinated with a local non-profit organization in which an off-site energy audit is conducted; and (5) a youth forum.

The important materials include a program brochure, a teacher handbook that specifies the roles for the participating entities, the lecture curriculum (lecture outline and brief power point presentation), a set of pre- and post-tests to evaluate student information uptake, and a public opinion survey sponsored by the program.

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<sup>4</sup> As indicated above this is one of the primary reasons for the Green Action Program design, which eliminates the need for direct teacher involvement.

The overall program design is generally sound and requires minimal input from participating teachers/schools. The program workshops materials (brochures, teacher handbook) are well designed and informative. The school and off-site facility audits, performed by the students and a professional engineer provide a valuable service in that they are free to program participants, are sufficiently detailed, and contain information on the types of alternatives that have both energy and financial savings. The number of agencies that have implemented energy efficiency policies and projects provides evidence on the value of these services.

In reviewing the program materials, Zebedee & Associates have developed several concerns. First, the lecture curriculum is somewhat vague, in that only a general outline and a brief overview power point presentation were provided for review. There seems to be potential for significant variation in the actual lecture, which makes evaluation difficult. On the other hand, all lectures are presented by one individual, which suggests some degree of standardization. Of course, if this individual is temporarily not available or permanently leaves the program then this could create additional variation in the product. Second, there is no script for either the audit training or the audit process. Again, this provides flexibility so that different situations can be assessed. However, the lack of standardization could result in inadequate information transfer. Third, it is not clear how the pre- and post- testing is completed. For example, the questions do not seem to be drawn from a standardized test that would keep relative difficulty constant across versions. Also, there is no evidence that the tests are linked to the lecture curriculum. In addition, there is no assessment of the long-term consequences of the education aspects of the program.

#### **4. *Evaluation of Program 2004 – 2006***

##### **4.1 *Evaluation Relative to Program Goals***

The Green Action program has well-defined goals (presentations to elected officials, recruiting 31 schools, providing 31 lectures to 1500 students, conducting 31 community service projects, and completing a survey for 1,000 citizens). During the 2004/05 and 2005/06 academic years, 34 were recruited, 26 community service projects were completed, and 2,162 students received lectures and/or audit training in 67 events. In addition, several hundred students participated in pre and post testing, respectively. In terms of budget expenditures, the SDREO did not exhaust its entire budget by June 15,

2006. In summary, the Green Action Program can be considered a success in that the program satisfied or exceeded all program objectives while spending a disproportionately smaller amount of its budget.

There are several other success measures that are worth examining. Specifically, the pre- and post-test results, the cost-effectiveness of the retrofit installations at the community centers, the initial survey results for a pre-test among students, and the initial self-administered teacher evaluations of the program. Consider each of these metrics in turn.

#### ***4.2 Pre- and Post-Tests***

We evaluated the results from the pre- and post-tests that were administered to 669 students. According to the “Green Action Teacher Handbook” the pre-tests are conducted prior to the in-class presentation and after the distribution of a fact sheet (approximately one week prior to presentation). Overall, students answer approximately 35 percent of the pre-test questions correctly. In contrast, post-test results on 481 students indicate a success rate of approximately 58 percent. Based on these average data, the in-class presentation seems to be having the desired impact on student knowledge of energy related matters.

However, it should be noted that we were not provided the opportunity to review the actual pre and post tests and were not, therefore able to assess question relevance and structure, the relative question difficulty across pre- and post-versions of the examination, the consistency of the test with established testing standards, or the short-term or long-term consequences of the testing.

#### ***4.3 Cost Effectiveness of Retrofit Installations***

In order to evaluate the cost-effectiveness of the lighting retrofits relative to pre-program projections, we assessed both the underlying assumptions (net-to-gross ratio, estimated useful life, and the incremental measure cost) and the actual installation parameters for thirteen retrofits. Each of these jobs was completed in the first year of the program. We have not been able to obtain similar information for retrofits completed during the second program year.

Our analysis is presented in Table 1, in which we show the lighting jobs numbered 1-13, the quantity and description of the installed measures, and the resulting savings and cost-effectiveness calculations.

**Table 1**  
**Analysis of Lighting Retrofits**

Site	Quantity	Measure	Base KW	Enhanced	KW	KWH					
			per Fixture	KW per Fixture	Savings per unit	Hours	Days	Total Hours	Savings per unit	Total KW	Total KWH
1	12	1 Lamp 4' T8	0.043	0.031	0.012	11	248	2728	32.736	0.144	393
1	24	2 Lamp 4' T8	0.072	0.054	0.018	11	248	2728	49.104	0.432	1,178
2	11	2 Lamp 4' T8 - U tube	0.072	0.054	0.018	10	248	2480	44.64	0.198	491
2	24	2 Lamp 4' T8	0.072	0.054	0.018	10	248	2480	44.64	0.432	1,071
3	1	2 Lamp 4' T8 - U tube	0.072	0.054	0.018	10	248	2480	44.64	0.018	45
3	14	2 Lamp 4' T8	0.072	0.054	0.018	10	248	2480	44.64	0.252	625
4	12	1 Lamp 4' T8	0.043	0.031	0.012	11	248	2728	32.736	0.144	393
4	24	2 Lamp 4' T8	0.072	0.054	0.018	11	248	2728	49.104	0.432	1,178
5	22	2 Lamp 4' T8	0.072	0.054	0.018	7	248	1736	31.248	0.396	687
6	28	2 Lamp 4' T8	0.072	0.054	0.018	10	248	2480	44.64	0.504	1,250
7	21	2 Lamp 4' T8	0.072	0.054	0.018	10	248	2480	44.64	0.378	937
8	23	2 Lamp 4' T8	0.072	0.054	0.018	10	248	2480	44.64	0.414	1,027
9	20	2 Lamp 4' T8	0.072	0.054	0.018	11	248	2728	49.104	0.36	982
10	24	2 Lamp 4' T8	0.072	0.054	0.018	11	248	2728	49.104	0.432	1,178
11	24	2 Lamp 4' T8	0.072	0.054	0.018	11	248	2728	49.104	0.432	1,178
12	24	2 Lamp 4' T8	0.072	0.054	0.018	11	248	2728	49.104	0.432	1,178
13	8	2 Lamp 4' T8 - U tube	0.072	0.054	0.018	11	248	2728	49.104	0.144	393
13	10	15 Watt R-30 from 75 Watt	0.075	0.015	0.06	11	248	2728	163.68	0.6	1,637
13	5	26 Watt CFL from 60 Watt	0.06	0.026	0.034	11	248	2728	92.752	0.17	464
									<b>6.31</b>	<b>16,287</b>	

The kW impacts were estimated using a standard wattage table. Since the actual ballast factor of the installed equipment was not known, we used an enhanced case of “less than 85” from the wattage table. Based on that assumption, the kW impact per four-foot, two-lamp fixture was 0.018 as compared to 0.014 used in the GAP workbook. Thus, we estimate that the total kW savings for the thirteen jobs (6.31) is slightly higher than the estimates derived from strict application of the workbook assumptions.

Using the business hours listed by the contractor on each job, the kWh savings per four-foot, two-lamp fixture was estimated to be between 45 and 49 kWh. Since the business hours generally under estimate the actual hours of operation (excludes people working before/after hours and cleaning crews, etc.), the 51 kWh savings per four-foot fixture used in the GAP workbook appears reasonable. Thus, in terms of both peak demand and energy savings, the Green Action Program retrofits are consistent with *a priori* expectations. If anything the savings estimates are conservative. In fact, the savings from the program may be even more understated if one considers the baseline further. Since 1998 the baseline savings used by the California investor owned utilities (IOUs) has been based on a 34-Watt energy saver. One could argue that these community service agencies would not have converted to the 34-Watt lamp, as shown by the

Program's net-to-gross of 1.0 in the GAP workbook. If one used the more realistic 40-Watt fixtures as the baseline, higher savings would be generated.

On the other hand, the incremental measure cost used in the GAP workbook is significantly understated at \$10.41 per fixture. This value is approximately the incremental cost of buying T8-32 over buying a T12-34 (replace on burn-out). Based on DEER 2001 (page 4-71), the incremental measure cost is approximately \$30 per fixture or more for retrofit. The paperwork on the community service retrofits suggests a cost closer to \$40/fixture. The logic for the use of the lower incremental cost is not apparent. Given both savings and cost information, our assessment of cost-effectiveness is that the audit recommendations are likely less cost-effective than expected. That is, both savings and costs seem to be understated, but the error in the cost category seems larger than the savings error.

#### ***4.4 Perception Survey***

With regard to the perception survey, we have evaluated both the draft survey instrument and the pre-test results. The survey instrument focuses on the relative importance of various concerns such as transportation, energy conservation, etc. and is not designed to determine the level of knowledge within the community about specific issues. The latter is probably more relevant for an education program. Thus, it seems that the survey is unlikely to provide information necessary to create a more valuable education program. The results of the survey pre-test indicate that energy issues are important but that improving air quality and water quality at local beaches are relatively more important. These results are interesting but it is not obvious how the results are to be used to improve energy related education. For example, if energy matters are really (un) important how does this affect program design?

#### ***4.5 Self-Administered Evaluation***

The program design also utilized a self-administered evaluation instrument completed by participating teachers (i.e., administered by the program and not a part of any independent assessment). We have reviewed the results of eight teacher evaluations. In each case the teacher expressed a willingness to participate in the Green Action Program again. On the other hand, several teachers expressed concerns about issues such as: the quality of the presentation, the value of the audits, the link between lecture and the pre-

and post- tests, and the lack of student involvement (relatively passive activities). We explore these issues further in our independent survey of teachers.

## 5. *Survey Analysis*

Zebedee & Associates, with the assistance of our subcontractor Social Science Research Laboratory (SSRL) at San Diego State University, conducted telephone surveys using the following respondent groups: (1) teachers whose classes participated in the lectures and/or audit training; and (2) community facility administrators that oversee the facilities that received the retrofit installations. Both groups are important to help assess the success of the Green Action Program. The survey instrument focused on the specific program goals, as well as the following general issues:

- participant issues and needs;
- the success of program implementation;
- program success in raising awareness and affecting decisions of participants to implement the energy efficiency and demand reduction measures;
- the relative values of the various elements/components of the program;
- any perceived energy savings; and,
- any unanticipated outcomes/results.

This final survey instruments are attached in the appendix for the review of all interested parties.

### 5.1 *Sampling Plan*

The survey sample was developed from the list of contacts in the Green Action Program, which during the 2004-2006 period included 22 unique teachers and 14 unique community facility administrators. These values represent the relevant populations of teachers and community facility administrators.

In order to determine the appropriate sample size, we began with the following formula:

$$n = \frac{\{Z_{\alpha/2}\}^2 pq}{E^2}, \text{ where } n \text{ is the sample size, } Z \text{ is the normal distribution Z-score, } 1-\alpha \text{ is}$$

the degree of confidence,  $p$  is the population proportion,  $q = 1-p$ , and  $E$  is the margin of

error.<sup>5</sup> Since the population was not infinite we corrected the formula above by the finite correction factor. This produced the following equation:

$$n = \frac{Npq\{Z_{\alpha/2}\}^2}{pq\{Z_{\alpha/2}\}^2 + (N-1)E^2}$$

, where N is the population size (22 for teachers, 14 for

administrators) and all other variables are defined above. In addition, we used a 90 - 10 sample model, consistent with CALMAC procedures, implying  $Z = 1.60$  and  $E = 0.10$ . Since we did not possess an *a priori* estimate of p customer satisfaction with overall program, we used p equal to 0.50. Thus, our target sample sizes for teachers and administrators were seventeen and twelve individuals, respectively. In fact, we surveyed only ten teachers and six administrators. This was in spite of having the survey team call potential teacher and retrofit respondents until the survey was completed or until their sample records had eight calling attempts.

## 5.2 Survey Implementation

Individuals on the final contact list were telephoned to ascertain his/her willingness to participate in the survey. This initial inquiry resulted in one of the following outcomes:

- unknown eligibility (e.g., busy signal, answering machine, left message, unqualified refusal, etc.);
- ineligible (Fax/Modem, disconnected number, incorrect number, pager/cell, unqualified respondent such as individual no longer employed at the organization, etc.)
- unwillingness to participate; or,
- completed survey.

For those individuals in the first category, we left messages and/or telephoned again in an attempt to place them in the other categories, defined by willingness to complete the survey. This had the effect of reducing the number of unknown eligibles.

In Table 2, we present the complete attrition analysis for the two surveys, including both sampling and survey implementation. As illustrated in the table, 10 teacher and 6

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<sup>5</sup> Our focus is on the proportion of respondents that indicate they were “very satisfied” with the ERC program elements. Hence, our sample size calculation is based on interpreting scaled response questions in a yes/no proportion framework (see Triola, 2001).



administrator surveys were completed. One can calculate the following rates for the program as (all values taken from Table 2):

- Teacher Eligibility Rate =  $E^* = \text{Eligible}/(\text{Eligible} + \text{Unknown Eligible}) = 10/(10 + 10) = 50.0\%$
- Administrator Eligibility Rate =  $E^* = \text{Eligible}/(\text{Eligible} + \text{Unknown Eligible}) = 6/(6 + 8) = 42.9\%$
- Teacher Response Rate =  $R^* = \text{Completes}/(\text{Eligible} + \text{Unknown Eligibility}) = 10/(10 + 10) = 50.0\%$
- Administrator Response Rate =  $R^* = \text{Completes}/(\text{Eligible} + \text{Unknown Eligibility}) = 6/(6 + 8) = 42.9\%$
- Teacher Cooperation Rate =  $C^* = \text{Completes}/\text{Eligible} = 10/10 = 100.0\%$
- Administrator Cooperation Rate =  $C^* = \text{Completes}/\text{Eligible} = 10/10 = 100.0\%$

As is evident, the survey implementation can be characterized as quite successful, once contact with the potential respondents was established (e.g., see the cooperation rates above). However, the survey team had great difficulty establishing the relevant connection. Two problems were apparent. First, the teachers' contact numbers were generally centralized campus phone numbers. This required someone to take a message and the teacher to receive the message and return the call. This was not always accomplished. Second, the community facility administrator contact list was either incomplete or incorrect in many instances. Thus, it was not possible to identify the appropriate individual to administer the survey. A significant expenditure of effort on the part of the survey team could have been eliminated if more complete contact information would have been maintained.

**Table 2**  
**Attrition Analysis**

<b>Sampling/Survey Step</b>	<b>Number of (Potential) Respondents –Teachers</b>	<b>Number of (Potential) Respondents – Administrators</b>
<b>Initial Survey List</b>	22	14
<b>Attempted Calls</b>	22	14
<b>Remove Unknown Eligibility</b>	10	8
<b>Remove Ineligible Records</b>	2	2
<b>Remove Unwilling to Participate</b>	0	0
<b>Completed Surveys</b>	10	6

### **5.3 Survey Results – Teachers**

Respondent characteristics for teachers are presented in Table 3.<sup>6</sup> As is illustrated by the data in the table the following general statement can be made. The respondents are science teachers with relatively high educational attainment and extensive work experience. These characteristics are expected since the population is teachers and program marketing was directed at those individuals teaching science (Biology, Chemistry, Physics, Environmental Science) subject matter.

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<sup>6</sup> Again, inferences regarding teacher’s perceptions are based on a small sample size 10. There was a census attempt to interview all 22 of the teachers that participated in the program. Many of those not surveyed had attempted contacts with messages left where possible. There is no evidence that this biases the results and we would have expect those with strong opinions to have returned the calls.

**Table 3**  
**Respondent Characteristics – Teachers**

<b>Characteristic</b>	<b>Units of Measure</b>	<b>Survey Value N=10</b>
<b>Gender</b>	% Male	50
<b>Education</b>	% With Education Beyond Bachelors Degree	90
<b>Subject</b>	% Teaching Science Curriculum	90
<b>Years as Teacher</b>	Mean Years in Current Position	20.6

In order to test the level of teacher satisfaction, we examined six different aspects of the program:

- the initial organizational meeting/workshop;
- the resources provided by the Green Action program;
- the Green Action program curriculum;
- the audit training, which include implementation of an energy audit;
- implementation of energy saving measures; and
- overall satisfaction.

*Initial Meeting*

In Table 4, we present the various measures of customer satisfaction pertaining to the initial organizational meeting between the teacher and the program staff. As is evident, the five respondents who attended an initial meeting were overwhelmingly satisfied with the workshop presentation and corresponding materials (i.e., design of the presentation to be provided by the program). In fact, it is difficult to imagine doing a better job in terms of meeting the needs of the participating individuals. The most valuable aspects of the meeting, as reported by the respondents, were program details, exposure to new energy efficiency ideas, identifying linkages between the program and existing class curriculum, networking, and obtaining a better understanding of the audit process and the corresponding benefits of facility audits.

**Table 4**  
**Teacher Satisfaction – Green Action Program**  
**Initial Meeting (n=5)**

<b>Meeting Aspect</b>	<b>“Yes” (%)</b>
<b>Initial Meeting</b>	
<b>Meeting Provided Sufficient Information</b>	100.0
<b>Presenter Answered Questions Satisfactorily</b>	100.0
<b>Meeting Positive Experience</b>	100.0
<b>Allowed Participation Decision</b>	80.0

*Program Resources*

This section of the survey addressed the issue that the teachers could receive additional program resources beyond the presentation by the program staff person. Eight teachers acknowledged receiving additional Green Action Program resources for information or show-and-tell purposes. The most common resources received were meter tools, newsletters, and web-based tools. In Table 5, we present some measures of respondent satisfaction with the resources and the assistance process. As is illustrated, the respondents were not overly satisfied with either the quality of the resources and the assistance they received in obtaining the needed resources. There is also a suggestion that the staff availability was an issue.

**Table 5**  
**Teacher Satisfaction – Green Action Program**  
**Program Resources (n=8)**

<b>Aspect of Obtaining Resources</b>	<b>“Very Satisfied” %</b>
<b>Satisfaction with Obtaining Needed Resources</b>	62.5
<b>Usefulness of Resources Received</b>	37.5
<b>Satisfaction with Availability of Staff Assistance</b>	62.5
<b>Satisfaction with Courtesy of Staff</b>	87.5
<b>Satisfaction with Knowledge Level of Staff</b>	75.0

### *Green Action Curriculum*

Four teachers indicated that they continue to use portions of the Green Action curriculum in their classes. Curriculum focusing on energy use/energy transformations, energy sources, the measurement of energy, energy use and building design, insulators and conductors, energy and the environment, energy efficiency and conservation, and energy audits were most often cited as the relevant portions of the curriculum.

### *Audit Training and Audit Implementation*

In Table 6, we present the various measures of customer satisfaction pertaining to both the audit training and the lead audit trainer. As is evident, the audit training was not that well received. Specifically, there are indications that the time provided, the written materials, the technical level of the information, and the overall level of training left much to be desired. There is evidence of a marginal overall educational benefit to the trainees, but the actual training implementation should be revised in future versions of this program.

Eight teachers had students participate in an actual energy audit of a community service facility. Teachers were not required to participate in the audit process. In Table 7, we present information on the teacher's level of satisfaction with the audit process. Note that these are indirect measures since the teacher likely did not participate in the audit. As is evident, the respondents generally found the audit process to be somewhat problematic, especially the information required of the student auditors and the information produced in the audit. The audit process was praised for providing hands-on experience and increasing awareness of energy conservation but, as with the audit training, this aspect of the program seems to need an extensive review of both procedures and the expected outcomes if the program is to continue.

**Table 6**  
**Teacher Satisfaction – Green Action Program**  
**Audit Training (n=9)**

<b>Audit Training Aspect</b>	<b>“Excellent” (%)</b>	<b>“Good” (%)</b>
<b>Level of Trainer Knowledge</b>	55.6	22.2
<b>Time Provided for Training</b>	11.1	66.7
<b>Technical Level of Information</b>	33.3	33.3
<b>Usefulness of Written Materials</b>	22.2	55.6
<b>Level of Student Training</b>	11.1	55.6
<b>Overall Educational Benefit to Students</b>	44.4	55.6
<b>Overall Usefulness to Students</b>	33.3	44.4

**Table 7**  
**Teacher Satisfaction – Green Action Program**  
**Audit Process (n=8)**

<b>Satisfaction Measure</b>	<b>“Very Satisfied” (%)</b>	<b>“Somewhat Dissatisfied” (%)</b>
<b>Audit Efficiency</b>	50.0	12.5
<b>Knowledge Required of Auditors</b>	37.5	12.5
<b>Ability to Provide Information</b>	37.5	12.5
<b>Expected</b>		
<b>Usefulness of Information</b>	25.0	25.0

*Implementation of Energy Saving Measures*

The teachers were also asked whether or not their institutions had implemented any energy saving measures as a result of participating in the Green Action program. We realize that this is not a program goal but are trying to detect the magnitude of information transfer. Only three respondents indicated any action to date. The most common measure was the installation of an energy management system. In addition, none of the responding teachers indicated that their organizations had plans to adopt more extensive measures. Thus, it seems that the program has had very little, if any, impact on the teacher’s host organization.

### *Overall Satisfaction – Teachers*

The final aspect of customer satisfaction is the overall satisfaction with the program. As indicated in Table 8, 80% of the respondents expressed the sentiment that they would choose to participate again in the program. However, only one-half of the respondents indicated that they were “very satisfied” with the overall program. In addition, there seemed to be little knowledge improvement.

One other aspect of the value of the Green Action Program can be gleaned from Table 8. This relates to the potential for spillover of information; that is, the extent to which information provided through the program is shared not only throughout that organization but also with other parties. We asked, "Have you referred any other teachers at other schools?" Of the 10 respondents, six indicated that they had referred other teachers to the program. These respondents indicated that they had referred a total of 20 individuals. We also asked "Have you shared any of the information you obtained from the program with any other people?" Of the 10 respondents, eight individuals indicated that they had shared information with other individuals. These individuals indicated that they had shared information with 32 other people. It is difficult to assess what these individuals did with the information received and no attempt to quantify these impacts was undertaken. However, these data indicates that there is some spillover of information, although the magnitude seems relatively insignificant.

Finally, we also asked "Where did you first hear about the SDREO Green Action Program?" Half of the respondents first heard about the program from a direct solicitation. This indicates that the normal networking channels (e.g., workplace) are not being effectively used to transfer information about the program.

### *Suggested Program Improvements*

Suggestions for improving the program focused on two central themes. First, several respondents wanted the program to expand (e.g., addition of information related to the management of solid waste and recycling, use of additional equipment, etc.). The other theme focused on specific deficiencies of the program. This second theme included comments such as the program lacked sufficient structure, the presenter was uncomfortable with high school students, the student groups were too large and unmanageable, the tour was unfocused and unstructured, etc.

**Table 8**  
**Teacher Satisfaction – Green Action Program**  
**Overall Satisfaction**

Satisfaction Measure	Units of Measure	Survey Value N=10
<b>Number of References to SDREO Green Action Program</b>	Number of Teachers Referred to Green Action Program	20
<b>Information Sharing</b>	Number of Individuals Referred to Green Action Program	32
<b>Knowledge Improvement</b>	% of Teachers whose Knowledge increased a “Great Deal”	30.0
<b>Overall Satisfaction</b>	% “Very Satisfied”	50.0
<b>Willingness to Participate Again</b>	% “Yes”	80.0

*Overall Evaluation from Survey of Teachers*

In summary, it seems that the survey respondents were only marginally satisfied with the SDREO Green Action Program. In addition, several potential problem areas were identified in the survey. These include:

- the audit training and subsequent implementation seemed to be poorly designed and relatively unsuccessful;
- there was only marginal overall satisfaction, especially since the recipients of the program receive the program benefits free of charge;
- there seems to be little spillover or network effects;
- evidence of insufficient structure and relatively poor presentations;
- seemingly little knowledge improvement, suggesting that the technical level was inappropriate; and
- little impact on the policies/procedures in the teacher’s home institution.



#### 5.4 Survey Results – Community Facility Administrators

As we indicated above, the survey of community facility administrators was somewhat unsuccessful in that we were able to obtain only six completed surveys. This small sample size limits our ability to draw conclusions. Therefore, we focus on three specific issues:

- customer satisfaction with the energy audit;
- implementation of audit recommendations; and,
- overall satisfaction with the retrofit portion of the Green Action program.

##### *Energy Audit*

We interviewed four individuals that received energy audits. In Table 9, we present information on the respondent’s level of satisfaction with the audit process. As is evident, the respondents generally found the audit process to be less than satisfying. In fact, these satisfaction values are considerably worse than other SDREO programs that provide similar information (see Thayer and Zebedee, 2004 and Thayer and Zebedee, 2006 for a review of the Public Agency and Technical Assistance Programs, respectively). Follow-up to the audit recommendations seemed to be especially problematic.

**Table 9**  
**Community Facility Administrator Satisfaction – Green Action Program**  
**Audit Process (n=4)**

Satisfaction Measure	“Very Satisfied” (%)	“Somewhat Dissatisfied” (%)
<b>Audit Efficiency</b>	50.0	0.0
<b>Knowledge of Energy Auditor</b>	50.0	0.0
<b>Information in Energy Audit</b>	25.0	25.0
<b>Usefulness of Information</b>	25.0	25.0

##### *Implementation of Audit Recommendations*

Five individuals indicated that their organization had implemented energy savings measures as a result of participation in the Green Action Program. Measures ranged from installation of an energy management system and energy efficient lighting, and altering the light usage pattern. However, there were virtually no plans to expand energy saving measures beyond what the program offered for free. Thus, there seemed to be little impact on behavior or recognition of the importance of energy efficiency. Also,

two of the five respondents indicated that they would have undertaken the measures if the program was not available.

*Overall Satisfaction – Community Facility Administrators*

Although five of the six respondents suggested that they would participate in the program again, only half of the respondents were “very satisfied” with the retrofit process. In addition, there seems to be very little spillover since only one individual stated that he/she had referred other facilities to the Green Action Program and only two had shared information about the program to other individuals. In effect, this portion of the program did not seem to be very well received. This is especially surprising since the service were provided free of charge.

**6. *Overall Evaluation of Green Action Program***

In our original scope of work we stated that we would develop a scoring system to be used to evaluate the long-term efficacy of the program. Our scoring system uses a 1-10 scale to evaluate the following components of the program: (1) the program theory and approach; (2) the success of program implementation; (3) the level of participation, relative to projections; (4) program success in raising awareness and affecting decisions of participants to implement the energy efficiency and demand reduction measures; and (5) any unanticipated outcomes/results. The overall scale value is then used to make conclusions regarding the program future.

The program theory and approach refers to both how the program is to operate in the field (implementation theory) and why the program is expected to lead to specific outcomes (program theory). The Green Action Program is designed to flow from initial contact to school lectures and audit training, to energy audits, to a retrofit of a community center facility and ultimate energy savings. Thus, there are several linkages that affect the overall performance of the program. For example, ultimate program success (i.e., a 10 on our scale) requires that SDREO effort directly lead to participant action and corresponding energy savings. On the contrary, a flawed program theory would have linkages that are poorly designed (e.g., difficulty finding potential participants, failure to progress to participation, poorly designed audits, inaction) so that the program does not meet its stated objectives.

Success of implementation refers to the quality of the program materials, the ability of the program to reach the intended audience, and the resulting action taken by participants. Success implies that SDREO effort leads to participation and ultimate action on the part of participants.

Level of participation, relative to projections is simply an analysis of program activity compared to program goals. If the program satisfies its goals we award a value of 8 out of a maximum value of 10, thereby allowing for the program to receive extra credit for surpassing its stated goals.

Program success in raising awareness and affecting decisions is dependent on the program participant's response to program initiatives. For example, for an information only program we would expect that a large majority of program participants felt that the program changed their knowledge of energy issues. A program designed to create energy savings would be evaluated according to the magnitude of actual savings.

Finally, we account for any unexpected developments by evaluating the occurrence of any unusual program results. For example, excessive free ridership, or action that does not create energy savings would be cause for downgrading the program effectiveness.

Our overall evaluation of the Green Action Program is presented in Table 10 below. As is illustrated, we found the program theory to have several flaws. For example, the program does not effectively engage teachers in the process but rather can be considered a substitute. Also, there is no institutional buy-in regarding the lessons plans and on-going curriculum. Finally, there is no incentive for teachers or students to increase knowledge. On the other hand, the level of participation, as measured by number student participants, lectures, certainly met expectations. However, as identified in the table, there may be implementation issues.

An additional consideration concerns free-ridership, which is difficult to assess for an information only program. However, several portions of our research point to potential free riding behavior. For example, a high percentage of retrofit recipients indicated that they would have installed energy efficiency measures in the absence of the program and there was little impact on the policies/procedures in the teacher's home institution. This latter concern was not an explicit part of the program design but is an indication that the program did not have significant spillovers. Also, only 30.0% of the teachers stated that

had their students and their knowledge improved “a great deal.’ In addition, the survey respondents were highly educated. These survey elements point to a group of participants that should have been already engaged in energy efficiency activities and should have knowledge of the benefits and costs of energy efficiency alternatives. Unfortunately, we did not directly test for this aspect of free-ridership.

Finally, consider the issue of whether there is a continuing need for the Green Action Program. On the one hand the Program seemed to fulfill a market niche by providing education and audit training to high school students and met participation goals. In addition, the program-administered pre and post-tests indicated a significant improvement in student knowledge about energy and energy efficiency. On the other hand, there were some implementation problems and evidence consistent with free-ridership and the teachers surveyed indicated that the program produced almost no change the awareness and subsequent decisions of the participants. Therefore, our overall assessment is negative – the CPUC should consider replacing this type of program with either a more fundamentally sound program or a market alternative.

Either of these programmatic delivery models would have the following important characteristics that are missing from the Green Action Program.

- A systematic approach for engaging teachers. This might include providing teachers with assistance in developing and incorporating material into curriculum, aid in preparation so the teacher’s investment is minimal, and incentives to overcome implementation hurdles.
- Curriculum that is evaluated and approved by the school district. The curriculum should include a large proportion of active learning, a variety of student activities, use a multi-media presentation approach, and be multi-lingual.
- Innovative methods for ensuring student participation. The students need to be thoroughly engaged (i.e., responsible for curriculum content) and may need incentives beyond classroom credit.
- A systematic approach for independent evaluation of the program. This should include pre and post-testing that is based upon established examination protocols and uses standardized testing. There should also be both short-term and long-

term evaluation of the program so that any behavior modification and spillover effects are accounted for.

**Table 8**  
**Overall Evaluation of the Green Action Program**

	<b>Green Action Program Value</b>	<b>Comments</b>
<b>Program Theory and Approach</b>	5	Easy to follow procedure. However, some program theory flaws (teachers not sufficiently engaged, curriculum not approved by school district), information transfer seemingly poor, and the facility audits, performed by student trainees and free to potential program participants, not sufficiently detailed and do not produce significant energy and/or financial savings.
<b>Success of Implementation</b>	4	Evidence of insufficient structure and relatively poor presentations in program. In addition, the audit training and subsequent implementation seemed to be poorly designed and relatively unsuccessful. There also seems to be few spillover or network effects and seemingly little knowledge improvement. On the other hand, willingness to participate again was almost unanimous.
<b>Level of Participation</b>	7	Generally satisfied all programmatic goals, except the number of facility retrofits. In addition, the quality of the retrofit jobs not of uniform quality.
<b>Change in Awareness, Decisions</b>	3	Very little implementation of energy saving measures and only 30% of teachers indicated that they and their students had a significant knowledge improvement. On the other hand, the program-administered pre and post-tests indicated a significant knowledge improvement.
<b>Unanticipated Outcomes</b>	4	Potential free-ridership, insufficient structure to presentations and training, incomplete knowledge transfer, and only marginal overall satisfaction by teachers and facility administrators, especially since the recipients of the program receive the program benefits free of charge.
<b>Total</b>	23	

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Appendix – Final Survey Instruments



**SDREO's Green Action Program: Teacher Evaluation Survey**  
**(Fall 2006)**

INTRO. Hello, my name is \_\_\_\_\_. May I speak with...  
**{INSERT NAME FROM LIST}? [WHEN SPEAKING WITH LISTED PERSON:]**  
I'm calling from the Social Science Research Lab at San Diego State University. We're conducting a study to follow up with teachers who have participated in the Green Action Program, which is sponsored by the San Diego Regional Energy Office.  
Do you have a few minutes right now to answer some questions? **[SCHEDULE A CALL BACK IF NEEDED; MAY ONLY INTERVIEW THE PERSON LISTED]**

To ensure that my work is done honestly and correctly, this call may be monitored by my supervisor. **[ONLY IF ASKED ABOUT MONITORING:]** My supervisor randomly listens to interviews to make sure we're reading the questions exactly as written and not influencing answers in any way.

VER. **[VERSION OF INTERVIEW:]**      1 - VERSION A      2 - VERSION B\*

\* = RESPONSE OPTIONS REVERSED ON VERSION B FOR ALL QUESTIONS INDICATED

----- **QUALIFIED RESPONDENT: QUOTAS CHECKED; DATA SAVED** -----  
---

Q1. Where did you first hear about the Green Action Program? **[DO NOT READ, RECORD ONLY ONE]**

- 1 - SDREO/SDERC'S WEBSITE
- 2 - SDREO/SDERC'S FACILITY (FLYERS AT FACILITY)
- 3 - WORKPLACE
- 4 - TRADE/PROFESSIONAL ORGANIZATIONS/CONVENTIONS
- 5 - DIRECT SOLICITATION FROM SDREO / SAN DIEGO CITY REPRESENTATIVE
- 6 - OTHER, SPECIFY:

\_\_\_\_\_

9 - DK/REF

Q2. Did you attend an initial meeting with representatives from the SDREO or San Diego City?

- 1 - YES
- 2 - NO ----- > **GO TO Q5**
- 9 - DK/REF----- > **GO TO Q5**

Q3. **[IF YES:]** Thinking now about this initial meeting that you attended at the beginning of the Green Action Program, please evaluate regarding each of the following. Did the presentation...\*\*

<u>DK/REF</u>	<u>YES</u>	<u>NO</u>
1) contain sufficient information? 9	1	2
2) answer any questions you had to your satisfaction? 9	1	2
3) allow you to make a participation decision? 9	1	2
4) allow a positive experience? 9	1	2

\*\* = ITEMS ON LIST RANDOMLY ROTATED FOR ALL QUESTIONS INDICATED

Q4. Did you require an additional meeting to consider the program further?

- 1 - YES
- 2 - NO
- 9 - DK/REF

Q5. What was the one main reason why you and your organization decided to continue with the SDREO Green Action Program? **[PROBE AND RECORD ONE MAIN REASON; THEN ASK:]** Were there any other reasons? **[CLARIFY AND RECORD BELOW, ONE ISSUE PER LINE UP TO THREE REASONS]**

1) \_\_\_\_\_

99-DK/REF

2) \_\_\_\_\_

99-DK/REF

3) \_\_\_\_\_

99-DK/REF

**RESOURCE SECTION:**

**[ASK EVERYONE:]**

Q6. Have you received any resources through the Green Action Program, such as instructional materials including lesson plans, professional-quality diagnostic tools, newsletters, or web-based tools?

- 1 - YES
- 2 - NO ----- > **GO TO Q9**
- 9 - DK/REF ----- > **GO TO Q9**

Q7. **[IF YES:]** What resources have you received? **[RECORD ALL MENTIONED]**

- 1) INSTRUCTIONAL MATERIALS; LESSON PLANS  
PROFESSIONAL-QUALITY DIAGNOSTIC TOOLS, SPECIFY 2-4:
- 2) **TOOLS:** LOGGERS (LIGHTING, MOTOR OPERATION)
- 3) **TOOLS:** MONITORS (TEMPERATURE, HUMIDITY, LIGHT LEVEL, POWER COST, AIR FLOW, PRESSURE, INFRA-RED CAMERA)
- 4) **TOOLS:** METERS (VOLTAGE, LIGHTING/LUMINESCENCE, ENERGY COST, RESISTANCE)
- 5) NEWSLETTERS
- 6) WEB-BASED TOOLS
- 7) OTHER, SPECIFY:  


---
- 8) DK/REF

Q8. How satisfied were you, in terms of the following aspects of obtaining resources from the City of San Diego or SDREO through the Green Action Program? The first one is...\*\* Would you say very satisfied, somewhat satisfied, somewhat dissatisfied, or very dissatisfied?

	Very	Somewhat	Somewhat	Very	
	<u>Satisfied</u>	<u>Satisfied</u>	<u>Dissatisfied</u>	<u>Dissatisfied</u>	
DK/					
<u>REF</u>					
1) getting the resources that you needed?...	1	2	3	4	9
2) the usefulness of the resources that you received?.....	1	2	3	4	9
3) the availability of staff to assist you?.....	1	2	3	4	9
4) the courtesy of staff? .....	1	2	3	4	9
5) the knowledge level of staff? .....	1	2	3	4	9

Q9. Have you utilized the Green Action Program curriculum in your classes?

- 1 - YES
- 2 - NO ----- > **GO TO Q14**
- 9 - DK/REF ----- > **GO TO Q14**

Q10. **[IF YES:]** Was the curriculum used during regular school hours or as part of an after school program?

- 1 - SCHOOL HOURS
- 2 - AFTER SCHOOL
- 3 - BOTH
- 9 - DK/REF

Q11. Which specific areas of the curriculum did you primarily focus on?  
**[DO NOT READ; PROBE AND RECORD ALL MENTIONED]**

- 1) ENERGY USE AND ENERGY TRANSFORMATIONS
- 2) MEASURING ENERGY
- 3) ENERGY AND BUILDINGS
- 4) ENERGY SOURCES
- 5) INSULATORS AND CONDUCTORS
- 6) ENERGY AND THE ENVIRONMENT
- 7) ENERGY EFFICIENCY AND CONSERVATION
- 8) ENERGY AUDITS
- 9) RECYCLING
- 10) OTHER, SPECIFY:  
\_\_\_\_\_
- 11) DK/REF

Q12. What one aspect of the curriculum was most valuable for you?  
**[PROBE AND RECORD ONE MAIN ISSUE]**

\_\_\_\_\_  
99 - DK/REF

Q13. What one aspect of the curriculum was least valuable for you?  
**[PROBE AND RECORD ONE MAIN ISSUE]**

\_\_\_\_\_  
99 - DK/REF

**AUDIT TRAINING SECTION:**

Q14. Did your students participate in training regarding the process of conducting energy audits at home, school, or other facilities?

- 1 - YES
- 2 - NO ----- > **GO TO Q18**
- 9 - DK/REF ----- > **GO TO Q18**

Q15. **[IF YES:]** How would you rate the training in terms of each of the following? The first one is...\*\* Would you say excellent, good, fair or poor?

<u>DK/REF</u>	<u>Excellent</u>	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	
1) the amount of time provided for the training? .....	1	2	3	4	9
2) the technical level of information provided? .....	1	2	3	4	9
3) the usefulness of the written materials provided (if any)? .....	1	2	3	4	9
4) the level of knowledge of the audit trainer? .....	1	2	3	4	9
5) the level of student training? .....	1	2	3	4	9
6) the overall educational benefit to students? .....	1	2	3	4	9
7) overall usefulness to students? .....	1	2	3	4	9

Q16. Do you think that your students' participation in the training has increased their knowledge of energy issues...\*

- 1 - a great deal,
- 2 - somewhat, or
- 3 - not at all?
- 9 - DK/REF

Q17. Do you think that your students' participation in the audit training has increased their ability to conduct energy efficiency activities...\*

- 1 - a great deal,
- 2 - somewhat, or
- 3 - not at all?
- 9 - DK/REF

**ENERGY AUDIT SECTION:**

**[ASK EVERYONE:]**

Q18. Did your students conduct an energy audit of your school or a local community center, as part of the Green Action program?

- 1 - YES
- 2 - NO ----- > **GO TO Q22**
- 9 - DK/REF ----- > **GO TO Q22**

Q19. **[IF YES:]** Overall, how would you classify your student's satisfaction, in terms of the following aspects of the audit? The first one is...\*\* Would you say very satisfied, somewhat satisfied, somewhat dissatisfied, or very dissatisfied?

DK/ <u>REF</u>	Very <u>Satisfied</u>	Somewhat <u>Satisfied</u>	Somewhat <u>Dissatisfied</u>	Very <u>Dissatisfied</u>	
1) the efficiency with which the audit was performed? .....	1	2	3	4	9
2) the level of knowledge required of the energy auditor(s)? .....	1	2	3	4	9
3) being able to provide the information expected from the energy audit? .....	1	2	3	4	9
4) the usefulness of the information received? .....	1	2	3	4	9

Q20. What one aspect of the energy audit was most valuable for your students?

**[PROBE AND RECORD ONE MAIN ISSUE]**

---

99 - DK/REF

Q21. What one aspect of the energy audit was least valuable for your students?

**[PROBE AND RECORD ONE MAIN ISSUE]**

---

99 - DK/REF

**IMPLEMENTATION OF AUDIT RECOMMENDATIONS SECTION:**

**[ASK EVERYONE:]**

Q22. Has your school or local community center actually implemented any energy-saving measures as a result of participating in SDREO's Green Action Program?

1 - YES

2 - NO ----- > **GO TO Q24**

9 - DK/REF ----- > **GO TO Q24**

Q23. **[IF YES:]** What energy-saving measures have been implemented?  
**[DO NOT READ; RECORD ALL MENTIONED]**

- 1) WEATHER STRIPPING
- 2) REPLACE HVAC EQUIPMENT WITH HIGHER EFFICIENCY HVAC EQUIPMENT
- 3) CHANGE ELECTRICITY RATE SCHEDULES
- 4) REPLACE LIGHTS WITH HIGHER EFFICIENCY LIGHTS
- 5) INSTALL ENERGY MANAGEMENT SYSTEM
- 6) ALTER LIGHT USAGE PATTERN
- 7) ALTER HVAC USAGE PATTERN
- 8) OTHER, SPECIFY: \_\_\_\_\_

9) DK/REF

**[ASK EVERYONE:]**

Q24. Are there any energy-saving measures that are planned?  
**[DO NOT READ; RECORD ALL MENTIONED]**

- 1) WEATHER STRIPPING
- 2) REPLACE HVAC EQUIPMENT WITH HIGHER EFFICIENCY HVAC EQUIPMENT
- 3) CHANGE ELECTRICITY RATE SCHEDULES
- 4) REPLACE LIGHTS WITH HIGHER EFFICIENCY LIGHTS
- 5) INSTALL ENERGY MANAGEMENT SYSTEM
- 6) ALTER LIGHT USAGE PATTERN
- 7) ALTER HVAC USAGE PATTERN
- 8) OTHER, SPECIFY: \_\_\_\_\_
- 9) NO/DK/REF

Q25. Are there any energy-saving measures that were intended to be implemented that will not be implemented? **[DO NOT READ; RECORD ALL MENTIONED]**

- 1) WEATHER STRIPPING
- 2) REPLACE HVAC EQUIPMENT WITH HIGHER EFFICIENCY HVAC EQUIPMENT
- 3) CHANGE ELECTRICITY RATE SCHEDULES
- 4) REPLACE LIGHTS WITH HIGHER EFFICIENCY LIGHTS
- 5) INSTALL ENERGY MANAGEMENT SYSTEM
- 6) ALTER LIGHT USAGE PATTERN
- 7) ALTER HVAC USAGE PATTERN
- 8) OTHER, SPECIFY: \_\_\_\_\_
- 9) NO/DK/REF ----- > **GO TO Q27**

Q26. **[IF ANY MENTIONED:]** Why not? **[PROBE AND RECORD ALL REASONS]**

\_\_\_\_\_  
\_\_\_\_\_  
99 - DK/REF

**OVERALL PROGRAM SATISFACTION SECTION:**

Q27. Have you referred any other teachers at other schools to the Green Action Program?

**[IF YES:]** Approximately how many teachers have you referred?

\_\_\_\_\_ TEACHERS REFERRED TO PROGRAM

- 0 - NO/NONE
- 97 - 97 OR MORE
- 99 - DK/REF

Q28. Have you shared any of the information you obtained through this program with any other people? **[IF YES:]** Approximately how many people have you shared this information with?

\_\_\_\_\_ PEOPLE SHARED INFORMATION WITH

- 0 - NO/NONE
- 97 - 97 OR MORE
- 99 - DK/REF

Q29. Do you think that your participation in the Green Action Program has increased you and your students' knowledge of energy issues...\*

- 1 - a great deal,
- 2 - somewhat, or
- 3 - not at all?
- 9 - DK/REF

Q30. Overall, how satisfied or dissatisfied are you with the Green Action Program? Are you...\*

- 1 - very satisfied,
- 2 - somewhat satisfied,
- 3 - somewhat dissatisfied, or
- 4 - very dissatisfied?
- 9 - DK/REF

Q31. If you had it to do over again, would you choose to participate in this program or not?

- 1 - YES
- 2 - NO
- 9 - DK/REF

Q32. What one suggestion would you offer to improve this program?

**[PROBE AND RECORD ONE MAIN RESPONSE]**

\_\_\_\_\_  
99 - DK/REF



- Q33. If this program was not available, would your curriculum include energy-efficiency?
- 1 - YES
  - 2 - NO
  - 9 - DK/REF

**DEMOGRAPHICS SECTION:**

- SEX. In closing, the following questions are for comparison purposes only.  
**[RECORD GENDER OF RESPONDENT:]**

- 1 - MALE
- 2 - FEMALE

- EDU. What is the highest grade or year of school that you have completed and received credit for...

- 1 - graduated college with a bachelor's degree,
- 2 - at least one year of graduate work beyond a bachelor's degree, or
- 3 - a graduate degree?
- 9 - DK/REF

- YRS. How long have you been a teacher?

\_\_\_\_\_ YEARS  
99 - DK/REF

- SUB. What subjects do you currently teach? **[RECORD ALL MENTIONED]**

\_\_\_\_\_  
99 - DK/REF

- GRD. What grade levels do you currently teach? **[RECORD ALL MENTIONED]**

- 1) \_\_\_\_\_ LESS THAN 4<sup>TH</sup> GRADE
- 2) \_\_\_\_\_ 4<sup>TH</sup> GRADE
- 3) \_\_\_\_\_ 5<sup>TH</sup> GRADE
- 4) \_\_\_\_\_ 6<sup>TH</sup> GRADE
- 5) \_\_\_\_\_ 7<sup>TH</sup> GRADE
- 6) \_\_\_\_\_ 8<sup>TH</sup> GRADE
- 7) \_\_\_\_\_ 9<sup>TH</sup> GRADE
- 8) \_\_\_\_\_ 10<sup>TH</sup> GRADE
- 9) \_\_\_\_\_ 11<sup>TH</sup> GRADE
- 10) \_\_\_\_\_ 12<sup>TH</sup> GRADE
- 11) \_\_\_\_\_ DK/REF

**CLOSING SECTION:**

PHN. Those are all the questions I have. I'd like to confirm that I reached you at...

**[VERIFY AND INSERT TELEPHONE NUMBER:]** \_\_\_\_\_

NAM. And that I'm speaking with...

**[VERIFY AND INSERT RESPONDENT'S NAME:]** \_\_\_\_\_

Your name and phone number will be separated from your responses to these questions and destroyed after the data has been processed.

**[THANK RESPONDENT; RECORD REMAINING INFORMATION BELOW]**

TIN. **[INTERVIEWER NUMBER:]** \_\_\_\_\_

LEN. **[LENGTH OF INTERVIEW IN MINUTES:]** \_\_\_\_\_

DAT. **[DATE OF INTERVIEW:]** \_\_\_\_\_

**SDREO's Green Action Program: Retrofit Evaluation Survey**  
**(Fall 2006)**

INTRO. Hello, my name is \_\_\_\_\_. May I speak with...  
**{INSERT NAME FROM LIST}? [WHEN SPEAKING WITH LISTED PERSON:]**  
I'm calling from the Social Science Research Lab at San Diego State University.  
We're conducting a study to follow up with individuals who have participated in  
the Green Action Program, which is sponsored by the San Diego Regional  
Energy Office.

Do you have a few minutes right now to answer some questions? **[SCHEDULE  
A CALLBACK IF NEEDED; IF NOT THE PERSON MOST KNOWLEDGABLE  
ABOUT THIS ORGANIZATION'S PARTICIPATION IN THE PROGRAM,  
REQUEST THAT PERSON'S NAME]**

IC. To ensure that my work is done honestly and correctly, this call may be  
monitored by my supervisor. **[ONLY IF ASKED ABOUT MONITORING:]** My  
supervisor randomly listens to interviews to make sure we're reading the  
questions exactly as written and  
not influencing answers in any way.

VER. **[VERSION OF INTERVIEW:]** 1 - VERSION A 2 - VERSION B\*

\* = RESPONSE OPTIONS REVERSED ON VERSION B FOR ALL QUESTIONS INDICATED

----- **QUALIFIED RESPONDENT: QUOTAS CHECKED; DATA SAVED** -----

Q1. Where did you first hear about the Green Action Program? **[DO NOT READ,  
RECORD ONLY ONE]**

- 1 - SDREO/SDERC'S WEBSITE
- 2 - SDREO/SDERC'S FACILITY (FLYERS AT FACILITY)
- 3 - WORKPLACE
- 4 - TRADE/PROFESSIONAL ORGANIZATIONS/CONVENTIONS
- 5 - DIRECT SOLICITATION FROM SDREO/SAN DIEGO CITY  
REPRESENTATIVE
- 6 - OTHER, SPECIFY:

\_\_\_\_\_

9 - DK/REF

Q2. Did you attend an initial meeting with representatives from the SDREO or San  
Diego City to discuss the program?

- 1 - YES
- 2 - NO ----- > **GO TO Q5**
- 9 - DK/REF----- > **GO TO Q5**

Q3. **[IF YES:]** Thinking now about this initial meeting that you attended at the beginning of the Green Action Program, please evaluate regarding each of the following. Did the presentation...\*\*

<u>DK/REF</u>	<u>YES</u>	<u>NO</u>
1) contain sufficient information? 9	1	2
2) answer any questions you had to your satisfaction? 9	1	2
3) allow you to make a participation decision? 9	1	2
4) allow a positive experience? 9	1	2

\*\* = ITEMS ON LIST RANDOMLY ROTATED FOR ALL QUESTIONS INDICATED

Q4. Did you require an additional meeting to further consider participation in the program?

- 1 - YES
- 2 - NO
- 9 - DK/REF

Q5. What was the one main reason why you and your organization decided to continue with the SDREO Green Action Program? **[PROBE AND RECORD ONE MAIN REASON; THEN ASK:]** Were there any other reasons? **[CLARIFY AND RECORD BELOW, ONE ISSUE PER LINE UP TO THREE REASONS]**

1) \_\_\_\_\_

99-DK/REF

2) \_\_\_\_\_

99-DK/REF

3) \_\_\_\_\_

99-DK/REF

**ENERGY AUDIT SECTION:**

**[ASK EVERYONE:]**

Q6. Did your facility receive an energy audit through the Green Action program?

- 1 - YES
- 2 - NO ----- > **GO TO Q10**
- 9 - DK/REF ----- > **GO TO Q10**

Q7. **[IF YES:]** Overall, how satisfied were you, in terms of the following aspects of the audit? The first one is...\*\* Would you say very satisfied, somewhat satisfied, somewhat dissatisfied, or very dissatisfied?

DK/	Very	Somewhat	Somewhat	Very	
<u>REF</u>	<u>Satisfied</u>	<u>Satisfied</u>	<u>Dissatisfied</u>	<u>Dissatisfied</u>	
1) the efficiency with which the audit was performed .....	1	2	3	4	9
2) the level of knowledge of the energy auditor(s) .....	1	2	3	4	9
3) getting the information that you expected to get from an energy audit .....	1	2	3	4	9
4) overall usefulness of the audit .....	1	2	3	4	9

Q8. What one aspect of the energy audit was most valuable for you?  
**[PROBE AND RECORD ONE MAIN ISSUE]**

---

99 - DK/REF

Q9. What one aspect of the energy audit was least valuable for you?  
**[PROBE AND RECORD ONE MAIN ISSUE]**

---

99 - DK/REF

**IMPLEMENTATION OF AUDIT RECOMMENDATIONS SECTION:**

**[ASK EVERYONE:]**

Q10. Has your facility actually implemented any energy-saving measures as a result of participating in SDREO's Green Action Program?

- 1 - YES
- 2 - NO ----- > **GO TO Q15**
- 9 - DK/REF ----- > **GO TO Q15**

Q11. **[IF YES:]** What energy-saving measures have been implemented?  
**[DO NOT READ; RECORD ALL MENTIONED]**

- 1) WEATHER STRIPPING
- 2) REPLACE HVAC EQUIPMENT WITH HIGHER EFFICIENCY HVAC EQUIPMENT
- 3) CHANGE ELECTRICITY RATE SCHEDULES
- 4) REPLACE LIGHTS WITH HIGHER EFFICIENCY LIGHTS
- 5) INSTALL ENERGY MANAGEMENT SYSTEM
- 6) ALTER LIGHT USAGE PATTERN
- 7) ALTER HVAC USAGE PATTERN
- 8) OTHER, SPECIFY:

---

9) DK/REF

Q12. Overall, how satisfied were you, in terms of the following aspects of the installation of the energy saving measures? The first one is...\*\* Would you say very satisfied, somewhat satisfied, somewhat dissatisfied, or very dissatisfied?

	Very Satisfied	Somewhat Satisfied	Somewhat Dissatisfied	Very Dissatisfied	
DK/REF					
1) the amount of time required to complete work .....	1	2	3	4	9
2) the level of knowledge of the installer(s).....	1	2	3	4	9
3) the courtesy and punctuality of the installer(s).....	1	2	3	4	9
4) the performance of the new energy saving measures .....	1	2	3	4	9

Q13. Thinking back to before you heard about this program...\*

- 1 - were you already planning to install energy saving measures at your facility before hearing about this program, or
- 2 - did you decide to install energy saving measures at your facility as a result of hearing about this program? -----> **GO TO Q14**
- 9 - DK/REF -----> **GO TO Q14**

Q13a. **[IF ALREADY PLANNING TO INSTALL ENERGY SAVING MEASURES:]** Did your participation in the program change your installation plan(s)? **[IF YES:]** How?

- 
- 96 - NO, DID NOT CHANGE
  - 97 - N/A, NO SPECIFIC PLAN
  - 99 - DK/REF

Q14. **[IF Q10=YES:]** {Were the energy saving measures replacements for existing measures or were they new additions? / Was the light installed a replacement for an existing light or was it a new addition to your lighting?} **[WORDING DIFFERS BASED ON ANSWER TO Q11]**

- 1 - REPLACEMENT(S)
- 2 - NEW ADDITION(S)
- 3 - BOTH VOLUNTEERED
- 9 - DK/REF

**[ASK EVERYONE:]**

Q15. Are there any energy-saving measures that you still plan to implement?

**[DO NOT READ; RECORD ALL MENTIONED]**

- 1) WEATHER STRIPPING
- 2) REPLACE HVAC EQUIPMENT WITH HIGHER EFFICIENCY HVAC EQUIPMENT
- 3) CHANGE ELECTRICITY RATE SCHEDULES
- 4) REPLACE LIGHTS WITH HIGHER EFFICIENCY LIGHTS
- 5) INSTALL ENERGY MANAGEMENT SYSTEM
- 6) ALTER LIGHT USAGE PATTERN
- 7) ALTER HVAC USAGE PATTERN
- 8) OTHER, SPECIFY: \_\_\_\_\_
- 9) NO/DK/REF

Q16. Are there any energy-saving measures you intended to implement that you will not be implementing? **[DO NOT READ; RECORD ALL MENTIONED]**

- 1) WEATHER STRIPPING
- 2) REPLACE HVAC EQUIPMENT WITH HIGHER EFFICIENCY HVAC EQUIPMENT
- 3) CHANGE ELECTRICITY RATE SCHEDULES
- 4) REPLACE LIGHTS WITH HIGHER EFFICIENCY LIGHTS
- 5) INSTALL ENERGY MANAGEMENT SYSTEM
- 6) ALTER LIGHT USAGE PATTERN
- 7) ALTER HVAC USAGE PATTERN
- 8) OTHER, SPECIFY: \_\_\_\_\_
- 9) NO/DK/REF ----- > **GO TO Q18**

Q17. **[IF ANY MENTIONED:]** Why not? **[PROBE AND RECORD ALL REASONS]**

\_\_\_\_\_  
\_\_\_\_\_  
99 - DK/REF

Q18. Please indicate your hours of operation.

18a. DAYS OF THE WEEK **[RECORD ALL MENTIONED]**

- 1) MONDAY
- 2) TUESDAY
- 3) WEDNESDAY
- 4) THURSDAY
- 5) FRIDAY
- 6) SATURDAY
- 7) SUNDAY
- 8) DK/REF

18b. HOURS OF THE DAY **[HOURS OF THE DAY EQUAL TO AVERAGE NUMBER OF HOURS OPEN EACH DAY]**

- 1) WEEKDAYS \_\_\_ 99- DK/REF [0-24]
- 2) WEEKENDS \_\_\_ 99 - DK/REF [0-24]

**OVERALL PROGRAM SATISFACTION SECTION:**

Q19. Have you referred any other managers at other facilities to the Green Action Program?

**[IF YES:]** Approximately how many managers have you referred?

\_\_\_\_\_ MANAGERS REFERRED TO PROGRAM

- 0 - NO/NONE
- 97 - 97 OR MORE
- 99 - DK/REF

Q20. Have you shared any of the information you obtained through this program with any other people? **[IF YES:]** Approximately how many people have you shared this information with?

\_\_\_\_\_ PEOPLE SHARED INFORMATION WITH

- 0 - NO/NONE
- 97 - 97 OR MORE
- 99 - DK/REF

Q21. Do you think that your participation in the Green Action Program has increased your knowledge of energy issues...\*

- 1 - a great deal,
- 2 - somewhat, or
- 3 - not at all?
- 9 - DK/REF

Q22. Overall, how satisfied or dissatisfied are you with the Green Action Program? Are you...\*

- 1 - very satisfied,
- 2 - somewhat satisfied,
- 3 - somewhat dissatisfied, or
- 4 - very dissatisfied?
- 9 - DK/REF

Q23. If you had it to do over again, would you choose to participate in this program or not?

- 1 - YES
- 2 - NO
- 9 - DK/REF

Q24. What one suggestion would you offer to improve this program?  
**[PROBE AND RECORD ONE MAIN RESPONSE]**

\_\_\_\_\_  
99 - DK/REF



**DEMOGRAPHICS SECTION:**

SEX. In closing, the following questions are for comparison purposes only.  
**[RECORD GENDER OF RESPONDENT:]**

- 1 - MALE
- 2 - FEMALE

EDU. What is the highest grade or year of school that you have completed and received credit for...

- 1 - high school or less;
- 2 - at least one year of college, trade or vocational school;
- 3 - graduated college with a bachelor's degree;
- 4 - at least one year of graduate work beyond a bachelor's; or
- 5 - a graduate degree?
- 9 - DK/REF

YRS. How long have you been employed in your current position?

\_\_\_\_\_ YEARS  
99 - DK/REF

**CLOSING SECTION:**

PHN. Those are all the questions I have. I'd like to confirm that I reached you at...

**[VERIFY AND INSERT TELEPHONE NUMBER:]** \_\_\_\_\_

NAM. And that I'm speaking with...

**[VERIFY AND INSERT RESPONDENT'S NAME:]** \_\_\_\_\_

Your name and phone number will be separated from your responses to these questions and destroyed after the data has been processed.

**[THANK RESPONDENT; RECORD REMAINING INFORMATION BELOW]**

TIN. **[INTERVIEWER NUMBER:]** \_\_\_\_\_

LEN. **[LENGTH OF INTERVIEW IN MINUTES:]** \_\_\_\_\_

DAT. **[DATE OF INTERVIEW:]** \_\_\_\_\_