To calculate the necessary sub-population sample size to achieve 80 percent confidence at 20 percent precision, Nexant first calculated the sample size for a hypothetical infinite population of projects using the following equation:

$$n^i = \frac{\left\lfloor C_v^{\,2} \times z^2 \right\rfloor}{p^2}$$

Where:

n^i	=	sample size for an infinite population
C_v	=	Coefficient of variation (depends on expected variation of key parameters)
z	=	z-statistic (equal to 1.2817 for an 80 percent confidence level)
p	=	precision level (set at 20 percent for 80/20 reliability)

Then Nexant determined the sample size for a finite population of projects using the following equation:

$$SampleSize = \frac{n^i \times N}{\left(N + n^i\right)}$$

Where:

N	=	size of the actual population to be measured

The coefficient of variance (C_v) is defined as the standard deviation of a group of measurements divided by the mean of that group of measurements. For the sampling plan, an assumed C_v had to be selected, since the actual C_v value cannot be determined until after the project data is gathered and analyzed. The generally accepted value for projects in which no previous measurements exist is 0.5, and this is the value Nexant used for the majority of the calculations in the sampling methodology. Two exceptions exist—first, an assumed C_v of 0.35 was used for the generation sub-populations of each of the three program segments. This is because the kW augmentations are easier to estimate from generation projects, and they are expected to be close to their projected kW augmentations. The second exception, associated with choosing a sample of sites within a single project, was assumed to also have a C_v of 0.35. This is because it is expected that sites within the same project will achieve similar realization rates.

Tables 5-4 and 5-5 show the subpopulation sample sizes for both SB 5X (28 projects) and AB 970 (8 projects). The sample population size is 36 projects.

Table 5-4: SB 5X Subpopulation Sample Sizes

	Program segment			
Technology	**Large grant**	**Small grant**	**Third-party**	**Total**
Lighting	2	4	1	7
Generation	3	0	1	4
Curtailment	3	4	3	10
Other	1	1	5	7
Totals	**9**	**9**	**10**	**28**

Table 5-5: AB 970 Subpopulation Sample Sizes

Technology	Large grant
Lighting	3
Generation	3
Curtailment	2
Other	0
Total	**8**

Reported savings for projects in the AB 970 sample represent 99 percent of total reported savings for the population of AB 970 projects (35.2 MW of 35.6 MW). Reported savings for projects in the SB 5X sample represent 68 percent of total reported savings for the population of SB 5X projects (77.6 MW of 114.3 MW). A high degree of confidence in the evaluation results is directly attributable to the large shares of reported savings that were represented in sampled projects.

5.4 PROGRAM ELEMENT MONITORING AND VERIFICATION

For all sample projects, Nexant performed pre-installation inspections to verify the presence or absence of proposed equipment. Where construction was started or was substantially completed before the inspection, inspectors made an effort to determine which equipment was in place before the retrofit. For each sample project, Nexant also performed post-installation inspections to verify the actual and proper implementation of the project.

For all sampled projects, Nexant calculated the difference between peak demand *before* a project was installed (baseline demand) and *after* the project was installed (post-installation demand). Demand savings were calculated using the following equation:

$$kW_{saved} = \frac{\sum_{2p.m.}^{6p.m.} kWh_{baseline} - \sum_{2p.m.}^{6p.m.} kWh_{post-retrofit}}{4}$$

Where:

kWh = the average energy consumption per day of the affected building(s) or system(s), June through September, between 2 pm and 6 pm on a non-holiday, weekday.

Nexant collected necessary data in several ways, depending on the type and complexity of the project. Overviews of the various data collection approaches are summarized below; the exact procedures used for each project in the sample populations can be found in the appendices to this program element.

In cases where direct-metering data was necessary, Nexant used metering equipment that included portable data loggers, which recorded measurements such as electrical current (amps), light levels, and equipment on/off status, (usually at 15-minute intervals). Additional equipment, such as true-power meters, was sometimes needed to calibrate the data loggers and measure various performance aspects of affected equipment.

5.4.1 Lighting Efficiency and Lighting Controls

Lighting inspections were performed on a sample of the sites to verify the installation of new equipment. The procedure was to use data loggers to determine operating hours and equipment time of use. Standard lighting table information was then used to supply pre- and post-retrofit fixture wattages. These results were then extrapolated and applied to the balance of the sites based on how much old equipment was removed and new equipment installed. For any project, sufficient loggers were installed to achieve an 80 percent precision at 20 percent confidence level, assuming the C_v of the measurement was 0.5.

5.4.2 Deemed Savings Projects

This method was used only for simple measures where savings did not warrant methods that are more rigorous. For a sample of sites, inspections were performed to verify installation of equipment. Where appropriate, data loggers were installed to determine equipment-operating times. Pre-established values (such as watts/square foot) were used to determine baseline and post-retrofit savings. Results from sampled sites were extrapolated to the balance of the sites based on an inventory of installed equipment.

5.4.3 Nameplate Information/Engineering Equations/Spot Measurements

This method was used for simple measures (i.e., equipment with constant load) or when enough onsite energy management system (EMS) data was available to accurately estimate demand from engineering equations. It was also used if equipment had been modified or replaced before alternative M&V strategies could be implemented.

Equipment performance was established using inventories of equipment affected by the measure. For many pieces of equipment, the demand was determined from nameplate information, manufacturer's specification sheets, or similar sources. Operating hours were taken from EMS or time clock schedules. At a sample of locations, operating hours were measured to verify schedule accuracy and time-of-use allocations.

5.4.4 Performance, System, or Equipment Curves

In this calculation method, standard performance curves were used to determine the demand savings associated with a retrofit or installation project. These performance curves establish a relationship between demand use and equipment operating conditions (CFM, temperature, etc.) affecting equipment load. Spot measurements or short-term monitoring were performed to verify the accuracy of the curves.

For equipment subject to variable-load applications, published performance curves were used to establish equipment demand. Field measurements at multiple operating loads were used to verify the accuracy of the curves. After verifying the accuracy of the curves, the equipment load parameter (temperature, CFM, etc.) was measured directly and the demand was calculated from the performance curve. The post-retrofit demand was either measured directly or estimated through a performance curve or regression analysis. Equipment nameplate information and engineering equations were used to supplement available information.

5.4.5 Regression Analysis

When information was available, regression analysis was used to track equipment electric demand (kW) as a function of one or more independent parameters. To estimate equipment demand, a relationship between the demand use and the independent parameter was established.

For equipment subject to a variable load, regression models of demand as a function of independent variables were used to estimate pre-retrofit demand. The post-retrofit demand was either measured directly or estimated through a performance curve or regression analysis. Equipment nameplate information and engineering equations were used to supplement the available information.

5.4.6 Continuous Direct Monitoring

Where possible, continuous direct metering, using logging equipment, was used to measure the pre- and post-retrofit performance of projects. Many of the projects that involve generation equipment had dedicated utility-grade revenue meters installed on them. From these meters, power and energy, either consumed or produced by equipment, was determined.

5.4.7 Simulation Analysis

Simulation analysis uses computer software (e.g., DOE-2 or similar) to create a model that simulates the energy impact of measure(s) or curtailment strategy. Nexant used this strategy when the energy efficiency measures were too complex or costly to analyze with the traditional M&V methods, such as projects with multiple measures that contain interactive effects.

5.5 PROGRAM ELEMENT EVALUATION

Nexant's findings on the demand impacts of the 36 projects in the sample are presented in Table 5-6. The table lists: a) the sample project, b) the contracted demand impacts, c) Nexant's verified demand impact, and d) a description of the project.

Table 5-6: Measurement and Verification Findings for the Sample Population

Segment	Technology	Name	Reported savings (MW)	Realization rate (Percentage)	Verified savings (MW)	Project description	Status
Funding SB 5X							
Third party	Other	Novatia	2.361	175.7	4.148	Solar-shade window screens	M&V complete
Third party	Generation	SCS Engineers	1.000	71.7	0.717	Landfill-gas-fueled generators	M&V complete
Third party	Curtailment	ECS Energy, Inc.	4.098	100.0	4.097	Lighting and HVAC controls	M&V complete
Third party	Other	ConSol	4.891	57.9	2.830	Comfortwise efficient-home design	M&V complete
Third party	Curtailment	Quantum Consulting	1.345	26.1	0.352	Waste-water treatment plant pump controls	M&V complete
Third party	Other	BOMA of Los Angeles	14.200	117.9	16.739	Lighting and HVAC retrofit	M&V complete
Third party	Other	Proctor Engineering - Commercial	22.319	81.1	18.094	Air-conditioner tune-ups	M&V complete
Third party	Other	Proctor Engineering - Residential	7.789	81.1	6.315	Air-conditioner tune-ups	M&V complete
Third party	Curtailment	SCE Electrodrive	9.260	29.7	2.746	Electric forklift and golf cart battery charger controls	M&V complete
Third party	Lighting	Solatube	0.618	51.0	0.315	Daylighting with skylights	M&V complete
Large	Lighting	Tenet Health Systems	1.816	72.5	1.316	Lighting retrofit	M&V complete
Large	Generation	Los Angeles Valley College	0.433	100.0	0.433	Chiller replacement	M&V complete
Large	Curtailment	East Bay MUD - WWTP	0.090	100.0	0.090	Storage expansion	M&V complete
Large	Curtailment	East Bay MUD - Aqueduct	2.163	88.6	1.917	Process modifications	M&V complete
Large	Lighting	State Center Community College District	0.480	121.2	0.582	Lighting retrofit	M&V complete
Large	Curtailment	Smart & Final	2.188	265.8	5.815	Lighting, HVAC, and refrigeration controls	M&V complete
Large	Other	Johns Manville International Inc	0.923	100.0	0.923	Air-compressor controls	M&V complete
Large	Generation	USA Waste of California	2.500	100.0	2.500	Landfill-gas-fueled generators	M&V complete
Large	Generation	Pure Power	3.600	96.1	3.460	Ethanol microturbines	M&V complete

Segment	Technology	Name	Reported savings (MW)	Realization rate (Percentage)	Verified savings (MW)	Project description	Status
Funding AB 970							
Large	Generation	County of Alameda	0.222	100.0	0.222	Photovoltaic panels on county jail	M&V complete
Large	Curtailment	Lost Hills Water District	1.500	101.5	1.523	Reservoir expansion	M&V complete
Large	Lighting	Mt. San Antonio College	0.500	67.0	0.335	Lighting retrofit	M&V complete
Large	Generation	County of San Diego Public Works	0.225	55.6	0.125	Landfill-gas-fueled generators	M&V complete
Large	Curtailment	Berrenda Mesa Water District	2.600	99.0	2.575	Reservoir expansion	M&V complete
Large	Lighting	County of San Diego	0.414	100.0	0.414	De-lamping	M&V complete
Large	Lighting	Kmart Corporation	7.546	84.5	6.380	Lighting retrofit	M&V complete
Large	Generation	San Joaquin Valley Energy Partners	22.230	90.0	20.000	Biomass-gas-fueled generators	M&V complete
Funding SB 5X							
Small	Lighting	Pilgrim Towers East (L.P.)	0.019	158.4	0.030	Lighting retrofit	M&V complete
Small	Other	City of Lakewood	0.048	100.0	0.048	Thermal energy storage system	M&V complete
Small	Lighting	St. Jude Medical Center	0.101	61.6	0.063	Lighting retrofit	M&V complete
Small	Curtailment	Southern California Water Company	0.216	100.0	0.216	Well rehabilitation and pump retrofit	M&V complete
Small	Curtailment	City of Burbank	0.135	113.3	0.153	Waste-water treatment plant aeration diffusers	M&V complete
Small	Curtailment	City of Fairfield	0.096	162.3	0.155	Lighting retrofit	M&V complete
Small	Curtailment	City of Fremont	0.125	56.9	0.071	Lighting and HVAC retrofit	M&V complete
Small	Curtailment	Ecogate	0.053	49.9	0.026	Dust collection system controls	M&V complete
Small	Lighting	Greater Fresno Area Chamber of Commerce (Phase 2)	0.249	87.3	0.218	Lighting retrofit	M&V complete

Nexant extrapolated the results of the analysis from the sample projects to the entire program population to determine the program-wide demand impacts. The extrapolation methodology involved calculating a realization rate for each sample project. The realization rate is the ratio of verified savings to reported savings. To calculate the realization rate for each project, Nexant used the following equation:

$$RR = \frac{\sum_{j=1}^{n} kW\_verified_j}{\sum_{j=1}^{n} kW\_reported_j}$$

Where:

RR	=	project realization rate
$kW\_verified_j$	=	verified demand savings of site j as determined by Nexant
$kW\_reported_j$	=	demand savings reported for site j by participant
n	=	total number of monitored sites in the project

Nexant then calculated an average realization rate for all sampled projects within a sub-population to determine the subpopulation's realization rate. To do this, the sum of the subpopulation's contracted demand was multiplied by the subpopulation's realization rate to determine the verified demand for that subpopulation. The verified demand for the entire Innovative program element was determined by summing the verified demand for each subpopulation. Nexant used the following equation to calculate the total verified demand for the program element:

$$kW\_reduction = \sum_k \left(RR_k \times kW\_reported_k \right)$$

Where:

kW_reduction	=	total verified demand impact for the Innovative program element
RR_k	=	realization rate associated with sub-population k
$kW\_reported_k$	=	total demand reduction reported for sub-population k

Nexant was able to determine the realization rate for each of the 12 subpopulations, with the following exception: Nexant did not include any projects from the small-grant-generation subpopulation, due to the fact that the generation projects were identified and recruited after Nexant had begun its M&V sampling plan. The realization rate for this category is therefore assumed equal to the average of the realization rates from the remaining subpopulations.

Table 5-7 shows the realization rates for each subpopulation, and Table 5-8 shows the verified demand impacts of each subpopulation.

Table 5-7: Subpopulation Realization Rates

	Program segment		
Technology	Large grant	Small grant	Third-party
Lighting	83.9%	100.0%	51.0%
Generation	91.5%	88.0%	71.7%
Curtailment	139.6%	88.3%	48.9%
Other	100.0%	100.0%	93.3%

Table 5-8: Verified Demand Impacts by Subpopulation (MW)

	Program segment			
Technology	Large grant (MW)	Small grant (MW)	Third-party (MW)	Total (MW)
Lighting	10.8	18.3	0.3	29.4
Generation	27.0	1.9	0.7	29.6
Curtailment	12.4	0.5	7.2	20.0
Other	3.2	6.7	48.1	58.0
Totals	**53.3**	**27.3**	**56.4**	**137.0**

Tables 5-9 through 5-11 show the application of realization rates to each program segment, broken out by funding source.

Table 5-9: Application of Realization Rates to Large-Grant Segment

	SB 5X		AB 970		Total		
Technology	Reported (MW)	Verified (MW)	Reported (MW)	Verified (MW)	Reported (MW)	Verified (MW)	Realization rate
Lighting	4.4	3.6	8.5	7.1	12.8	10.8	83.9%
Generation	6.5	6.4	23.0	20.6	29.5	27.0	91.5%
Curtailment	4.8	8.3	4.1	4.1	8.9	12.4	139.6%
Other	3.1	3.1	0.1	0.1	3.2	3.2	100.0%
Totals	**18.8**	**21.4**	**35.6**	**32.0**	**54.4**	**53.3**	**98.1%**

Table 5-10: Application of Realization Rates to Small-Grant Segment (SB 5X Only)

	SB 5X		
Technology	**Reported (MW)**	**Realization rate**	**Verified (MW)**
Lighting	18.3	100.0%	18.3
Generation	2.1	88.0%	1.9
Curtailment	0.5	88.3%	0.5
Other	6.7	100.0%	6.7
Totals	**27.6**		**27.3**

Table 5-11: Application of Realization Rates to Third-Party Segment (SB 5X Only)

	SB 5X		
Technology	**Reported (MW)**	**Realization rate**	**Verified (MW)**
Lighting	0.6	51.0%	0.3
Generation	1.0	71.7%	0.7
Curtailment	14.7	48.9%	7.2
Other	51.6	93.3%	48.1
Totals	**67.9**		**56.4**

5.5.1 Measurement and Verification Error Analysis

To quantify the level of uncertainty in the program results, Nexant performed an error analysis, using IPMVP guidelines, on the verified demand savings.[2] Nexant determined that the 137.0 MW of overall program verified demand savings had a 5.6 percent precision at the 80 percent confidence level. This level is well within the Energy Commission's goal of 80/20 statistical precision. In other words, Nexant is 80 percent confident that the verified demand savings for the Innovative program are 137.0 ± 7.7 MW.

Nexant first calculated the standard error of individual projects, and then compiled the results to determine the amount of error for the Innovative program as a whole. The sources of uncertainty found in Nexant's analysis come from instrument or measurement error, modeling or calculation error, sampling error, and errors in assumptions and stipulated factors. Nexant's field engineers used professional judgment to establish the magnitude of effects attributable to each potential source of uncertainty, which may vary from project to project. Instrumentation and measurement

[2] Department of Energy, *International Performance Measurement and Verification Protocol, Section 5.10 Calculating Uncertainty*, December 1997.

errors, for example, though typically small in magnitude, can range from as little as 1% to above 5% depending on what type of measurement is required and the precision of the instrument. Other sources of uncertainty (e.g., modeling errors or stipulated values) may have wider ranges, though the process of combining components of uncertainty to derive an expected standard error for an individual project tends to reduce the level of uncertainty around the point estimate of central tendency. Similarly, combining standard error terms for the sampled projects to derive an expected level of precision at the level of the aggregate sample, and so we can reasonably state that program level estimates of precision have a low degree of sensitivity to subjective estimates of error terms at the project level. For this reason, our field engineers typically estimate *larger than expected* ranges of potential error in the project level components of uncertainty. Even with these conservatively large estimates of error terms, the composite level of precision at the 80% confidence interval is comfortably within the Energy Commission's goal.

5.6 COST EFFECTIVENESS

In addition to calculating the demand impacts of each project in the sample population, Nexant also calculated the cost effectiveness of each project in the sample population in order to determine the overall cost effectiveness of the various subpopulations and of the program as a whole.

Program cost effectiveness was calculated in terms of simple costs and levelized costs. The simple cost was calculated by dividing the incentive amount by the verified demand reduction. The levelized cost is expressed as dollars per kilowatt year. The general equation for calculating levelized costs of demand reductions is from the Energy Commission's *Standard Practice Manual: Economic Analysis of Demand-Side Management Programs, (1987).* The formula for levelized cost at the project level is:

$$LC_{project} = IC_{project}/DR_{project}$$

Where:
$LC_{project}$ = levelized cost for individual project ($/kW-yr)
$IC_{project}$ = incentive paid by the Energy Commission for the project ($)
$DR_{project}$ = total discounted demand reduction of the project (kW-yr)

Nexant assumed that because project incentives were distributed as single payments, no discounting of the cash flow was necessary. The demand discount rate was 4.1 percent. Nexant expects project demand reductions to persist from 1 to 25 years, depending on the technology type and the expected operation of the equipment involved. Discounted demand reduction was calculated using the following equation:

$$kW_{disc} = kW_1 + \sum_{i=2}^{t} \frac{kW_i}{(1+dr)^i}$$

Where

kW_1 = demand reduction for year 1 (kW)
kW_i = demand reduction for year *i* (kW)
dr = discount rate, 4.1%
t = project lifetime in years

The project lifetime of an individual project was based on two factors: (1) the type of technology/equipment installed, and (2) the assumed operational patterns of the equipment. Nexant based a project's lifetime on the effective useful life (EUL) listed in the *California Advisory Council's Master Table of Measure Life Estimates*. This table contains acceptable listings for equipment EULs, given in years, for many different technologies and equipment. EULs from the table were used in the calculation of discounted demand reduction for the majority of projects in this analysis. Where appropriate, Nexant adjusted the EUL up or down based on known or assumed operational patterns of the equipment. For example, an energy-management system used to curtail pump motors may have a listed EUL of fifteen years. If, however, Nexant has reason to believe that the system will be disconnected or disabled within five years, then five years was assumed as the lifetime for that project.

For projects involving more than one measure type, the measure-life for the measure with the most significant demand savings contribution was used.

To determine levelized costs for each subpopulation, Nexant used the following equation:

$$LC_{subpop} = \frac{\sum_{i=1}^{n} IC_{project \cdot i}}{\sum_{i=1}^{n} DR_{project \cdot i}}$$

Where:
LC_{subpop} = levelized cost of subpopulation (\$/kW-yr)
$IC_{project\ I}$ = amount of incentive paid by the Energy Commission for project *i* (\$)
$DR_{project\ I}$ = total discounted demand reduction of project *i* (kW-yr)
n = number of projects in subpopulation

Tables 5-12 through 5-14 show both the simple cost and levelized cost of the subpopulations of each of the three program segments. Tables 5-15 and 5-16 show the total simple and levelized cost effectiveness.

Table 5-12: Cost Effectiveness for the Large-Grant Segment

Technology	Invoice amount	Verified savings (MW)	Simple cost ($/kW)	Levelized cost ($/kW-yr)
Lighting	$2,857,265	10.8	$265	$24
Generation	$3,640,160	27.0	$135	$36

Technology	Invoice amount	Verified savings (MW)	Simple cost ($/kW)	Levelized cost ($/kW-yr)
Curtailment	$1,779,675	12.4	$144	$19
Other	$702,872	3.2	$220	$21
Totals	**$8,979,972**	**53.3**	**$168**	**$26**

Table 5-13: Cost Effectiveness for the Small-Grant Segment

Technology	Invoice amount	Verified savings (MW)	Simple cost ($/kW)	Levelized cost ($/kW-yr)
Lighting	$4,159,196	18.3	$227	$20
Generation	$526,750	1.9	$284	NA
Curtailment	$89,438	0.5	$192	$19
Other	$1,356,851	6.7	$203	$18
Totals	**$6,132,235**	**27.3**	**$224**	**$20**

Table 5-14: Cost Effectiveness for the Third-Party Segment

Technology	Invoice amount	Verified savings (MW)	Simple cost ($/kW)	Levelized cost ($/kW-yr)
Lighting	$50,000	0.3	$159	$19
Generation	$180,000	0.7	$251	$33
Curtailment	$3,600,661	7.2	$500	$56
Other	$11,834,906	48.1	$246	$34
Totals	**$15,665,567**	**56.4**	**$278**	**$37**

Table 5-15: Cost Effectiveness by Program Segment

Technology	Invoice amount	Verified savings (MW)	Simple cost ($/kW)	Levelized cost ($/kW-yr)
Large-Grant	$8,979,972	53.3	$168	$26
Small-Grant	$6,132,235	27.3	$224	$20
Third Party	$15,665,567	56.4	$278	$37
Totals	**$30,777,773**	**137.0**	**$225**	**$32**

Table 5-16: Cost Effectiveness by Technology

Technology	Invoice amount	Verified savings (MW)	Simple cost ($/kW)	Levelized cost ($/kW-yr)
Lighting	$7,066,461	29.4	$240	$23
Generation	$4,346,910	29.6	$147	$36

Curtailment	$5,469,773	20.0	$273	$34
Other	$13,894,629	58.0	$240	$33
Totals	**$30,777,773**	**137.0**	**$225**	**$32**

5.7 PERSISTENCE VERIFICATION

5.7.1 Introduction

To verify that the AB 970 projects monitored in 2001 were still delivering the same level of demand reductions in 2002, Nexant performed persistence verification activities in the fall of 2002. Persistence verification activities included site visits and phone calls to the original sampled participants inspected as part of the M&V process for the AB 970 projects. Nexant approached persistence verification by trying to find out if: (1) the measure was still in place and operating, (2) there had been any business or operational changes to the project or the site which affected energy savings, (3) the project had performed as planned, and (4) the savings achieved in 2002 were the same as those verified in 2001.

5.7.2 Overview of Activity

Nexant performed persistence verification for the eight projects in the AB 970 M&V sample population. These projects are:

- San Joaquin Valley Energy Partners
- Berrenda Mesa Water District
- County of San Diego
- County of San Diego Public Works
- K-Mart
- Lost Hills Water District
- Mt. San Antonio College
- County of Alameda

To verify persistence, Nexant either did a site visit or performed a phone survey. Nexant determined which projects would be verified via phone or site visit by reviewing project files. If there appeared to be any doubts about a project's implementation, it was added to the site visit list. Participants whose files and reports appeared to be in order received phone calls. Of the eight projects, site visits were used to verify three—San Joaquin Valley Energy Partners, Berrenda Mesa Water District, and County of San Diego. Phone surveys were used to verify the remaining eight.

5.7.3 Summary of Results

All projects were found to still be in place and operating to some extent. Table 5-17 shows the breakdown of responses.

Table 5-17: Persistence Verification Survey Results

	Sampled participant	Project	Project in place and operating?	Changes in operations?	Comments
	Site Visits				
1	San Joaquin Valley Energy Partners	Biomass power plant	Y	Reduced down time	
2	Berrenda Mesa Water District	Reservoir expansion	Y	Yes	
3	County of San Diego	Lighting	Y	N/A	Problems w/ dimming ballasts
	Phone Surveys				
4	County of San Diego Public Works	Landfill gas generation	Y	N/A	
5	K-Mart	Lighting	Y	Decreased store population	
6	Lost Hills Water District	Reservoir expansion	Y	N/A	
7	Mt. San Antonio College	Lighting and HVAC	Y	N/A	
8	County of Alameda	Photovoltaic installation	Y	No	Expanding installation of equipment

During the summer of 2001, the San Joaquin Valley Energy Partners project was able to achieve only 11.0 MW of peak demand impacts, despite having an installed generation capacity of over 24.0 MW. This was primarily due to a high level of facility down time in 2001. For the summer of 2002, San Joaquin Valley Energy Partners, now known as Madera Valley Energy Partners, was able to reduce down time and achieve approximately 20.0 MW of peak demand impacts.

Nexant determined that of the original 134 participating K-Mart stores, 14 had been closed due to bankruptcy, resulting in the persistence of only 90 percent of the verified peak period demand savings. To adjust the peak period demand savings for 2002, Nexant multiplied the verified savings for the K-Mart project from 2001 (7.124 MW) by 90 percent. Nexant originally reported in the 2002 Q4 Innovative Chapter and Appendix that 29 stores had been closed due to bankruptcy. However, only 14 of those stores 29 closed stores participated in original lighting retrofit. Verified peak period demand savings for 2002 were precisely equal to 6.380 MW:

$$(7.124 \text{ MW}) \text{ X } (1 - (14/134)) = 6.380 \text{ MW}$$

The San Diego County lighting project reported that more than 100 dimming ballasts have had to be replaced since their installation about a year ago. Of the rooms that Nexant visited, approximately 5-10 percent of the ballasts were not functioning. Our team confirmed that the facility staff replaced ballasts with the same models that were originally installed. Ballast failure should result in lower total demand at the facility; however, in reality equipment failure results in lower savings claims for the project. Because any adjustment to the savings would be small, Nexant did not reduce the verified savings for this project.

For all other projects in our study, the verified savings appear to have persisted at the 2001 level. Table 5-18 compares the 2001 verified savings level with verified savings adjusted for 2002 based on Nexant's persistence verification activities. Only one project, K-Mart, was found to have a drop in savings (0.7 MW) as discussed above.

Table 5-18: Persistence Adjustment to AB 970 Savings

Project	2001 Demand reduction (MW)	2002 Demand reduction (MW)
K-Mart	7.1	6.4
San Joaquin Valley Energy Partners	11.0	20.0
County of San Diego Public Works	0.1	0.1
Berrenda Mesa Water District	2.6	2.6
Lost Hills Water District	1.5	1.5
County of San Diego	0.4	0.4
Mt. San Antonio College	0.3	0.3
County of Alameda	0.2	0.2
Totals (sample)	**23.2**	**31.6**
Totals (AB 970 population)	**23.6**	**31.9**

5.7.4 Persistence Verification Conclusions

The findings of Nexant’s AB 970 persistence verification efforts show that the 2001 verified demand savings persisted through 2002 for the sample population. Additionally, several of the projects for which savings have persisted have been expanded, based on the success of the original project. For example, at Mt. San Antonio College the lighting and HVAC project went so well that another phase will be started. Alameda County expanded its photovoltaic solar rooftop system in 2002. Berrenda Mesa Water District notified Nexant that it had increased its water storage capacity. K-Mart had installed more lighting projects, reportedly yielding an additional 1 MW of demand savings. These anecdotal savings are considered as free-drivers that are not direct effects resulting from the program, so they are not included in either reported or verified savings attributable to the program.

5.8 ADMINISTRATOR AND PARTICIPANT AUDITS

5.8.1 Administrator Performance Audits

The purpose of the program administrator audit is to determine the effectiveness of third-party program administration for the Energy Commission’s PLRP. In the Innovative program element, there are nine administrators in the third-party administrator sub-element. These administrators are contractors who developed their own plan to recruit participants who implemented a single type (or one of just a few types) of peak load reduction measure. These administrators each have different requirements and different methods of dispersing incentive funds.

The tenth contract is with Xenergy, who is responsible for administering the small-grant sub-element. Xenergy's projects have demand impacts between 20-400 kW. Their administration of this part of the Innovative program is similar to the Energy Commission's administration of grants for those projects with demand reductions greater than 400 kW.

For the Innovative program, Nexant audited Xenergy and their nine third-party administrators:

1. Building Owners and Managers Association of Los Angeles (BOMA)
2. SCS Engineers
3. Southern California Edison Electrodrive
4. ECS Energy, Inc.
5. Solatube
6. Quantum Consulting
7. Proctor Engineering
8. ConSol
9. Novatia

Nexant's administrative audits took place between December 2002 and March 2003 at the administrator's office. All of the administrators allowed Nexant to review a sample of their program files to verify that a proper tracking system was in place, which justified project payments.

Methodology for Audits

Nexant developed a checklist to use for administrator audits. This checklist was based on the administrator requirements defined by Energy Commission contracts, and on key performance indicators such as participant recruitment, customer service, M&V, and delivery of demand savings. Each of the ten administrators, all of the third-party administrators and Xenergy, was evaluated based upon the criteria outlined in this audit checklist. Information for the completion of the checklist was gathered through administrator interviews and onsite audits of administrators' records.

The questionnaire elicited feedback from participants on such criteria as advertisements, the application process, administrator customer service, and administrator M&V. The audit checklist form and participant questionnaire can be found in the appendices to this report.

Administrator Audit Checklist

The administrative audit consisted of six categories, each with its own focus. These categories were:

1. *Participant Recruitment*—determined what methods and materials administrators used to market the program and how successful they were. Criteria considered included use of sales force, communication with vendors, use of flyers and websites, and number of participants and dropouts.
2. *Customer Service*—determined what offerings administrators made to participants to assist them in project implementation. Criteria considered included incentives, equipment, services, and training.
3. *Project Eligibility*—determined whether projects were eligible as defined by the administrator's program guidelines. Criteria considered included demand reduction or supply augmentation, prior project operability, duration of project, measurability of savings, and size of the participants' facilities.
4. *Verification Requirements*—determined the breadth and depth of the administrators' verification process. Criteria included cooperation with third-party verification contractor M&V efforts, method of verification (site visit, data monitoring), and verification sampling plans.
5. *Reporting*—determined the administrators' compliance with program reporting requirements, including participation and savings updates and general communication with contract manager.
6. *Documentation*—determined whether the administrator kept proper records for participating projects. Criteria considered include hardcopy and electronic filing systems, invoices, and incentive payment tracking.

5.8.2 Summary of Results

Below are the 15 questions Nexant used for the administrative audits. The first seven questions cover each area of the administrators' responsibilities throughout the program process. The last six questions investigate administrators' record-keeping practices to discern their level of organization and to check that the procedures and responsibilities required by the Energy Commission have been followed. For questions 1, 2, and 7 the respondents could give more than one answer.

Question 1: How were participants recruited?

The most common answers were through vendors or industry associations and by use of an internal sales force. Specific recruitment efforts include the following:

- ECS Energy worked through the California Hotel and Lodging Association.
- Xenergy had an elaborate marketing plan, which clearly laid out its strategy. Xenergy listed over 30 associations to contact in their plan. Xenergy also held eight statewide informational seminars for potential vendors of the program.

- SCS got in touch with its internal field services group, which already maintained 50 landfill sites that were targets for this program.
- For Electrodrive, SCE account representatives brought in about 50 percent of the business.
- Consol had three sales people placed regionally around the state.
- Solatube exhibited at Edison Electric Institute conferences, and cold-called attendees from the conferences and companies mentioned in *Chain Store Age* magazine.
- Quantum targeted geographic regions and looked at city websites to determine potential customers.

Table 5-19 is a matrix of the administrators and the methods they used to recruit program participants.

Table 5-19: Administrator Recruitment Methods

Administrator	Internal sales force	Existing customers	Vendors/ associations	Tradeshows
Xenergy	X		X	
BOMA			X	
SCS	X	X		
Electrodrive	X	X	X	
ECS			X	X
Solatube	X			X
Quantum	X			
Proctor		X	X	
ConSol	X	X		
Novatia			X	

Question 2: What marketing material did you use to attract participants?

Marketing material to reach prospective customers included: (1) program fliers (2) ads in targeted publications, (3) websites, and (4) direct mailings. Specific responses included the following:

- BOMA used its own newsletter and local newspaper coverage to reach participants.
- A contractor in Proctor's program placed a television spot in Los Angeles; others used print ads.

- Novatia contractors used radio, TV, newspaper, and magazines to advertise the program.
- ConSol assisted at new houses grand openings that used its program.
- Xenergy conducted 13 seminars around the state.

Table 5-20 shows the breakdown of answers to Question 2.

Table 5-20: Administrator Marketing Materials

Administrator	Flyers	Advertisements	Website	Other
Xenergy	X			Direct mail, seminars, telemarketing
BOMA		X	X	E-mail and fax alerts
SCS	X		X	Publish papers
Electrodrive	X		X	
ECS	X	X		
Solatube	X	X		
Quantum	X			
Proctor	X	X	X	Direct mail
ConSol	X	X		At grand openings
Novatia		X	X	
Totals	**8**	**6**	**5**	

Question 3: A two-part question: a) How many participants are participating as of December 31, 2002, and b) How many participants dropped out since September 2000?

Administrators reported the numbers of participants who have completed projects, who committed to projects, and those that dropped out of the program since September 2000 (see Table 5-21). Dropouts are defined as participants who ended their participation prior to project completion. This definition does not include potential participants whose applications were rejected.

- Approximately 50 of Xenergy's participants dropped out. Most of these cited the effects of the weakening economy on their businesses as reasons for leaving the program. According to Xenergy's records, 196 participants either dropped out or were rejected by the administrator. Some of the reasons Xenergy rejected participants were: free riders, non-responsiveness or non-compliance with program guidelines.
- ECS cited post-September 11, 2001 financial struggles for many of their program dropouts. The hospitality industry was hit hard by this event.

Table 5-21: Number of Participants and Dropouts

Administrator	Participant sites	Dropped out
Xenergy	129	50
BOMA	300	0
SCS	2	1
Electrodrive	74	0
ECS	60 hotels; 12,683 rooms	45 hotels
Solatube	3	0
Quantum	6	0
Proctor	35,647	0
ConSol	1,624	N/A
Novatia	15,138	0

Question 4: How has your reported MW changed with the level of participants?

Quantum Consulting noted that based on their research and experience, each of their projects could achieve a 150 kW reduction. As the participant level increased, the baseline savings level was raised to 50-100 kW.

ConSol mentioned that the program was growing, but it takes a while to get participants online.

Xenergy stated that after the initial deadline of July 30, 2001, the program was opened to projects above 400 kW; therefore, savings increased.

Question 5: What equipment and services did you offer to participants?

Program participants received a range of equipment, services, and financial incentives depending on the administrator and the type of proposed project. Table 5-22 shows what each one offered.

Table 5-22: Equipment and Services Offered to Participants

Administrator	Equipment	Services	Incentives
Xenergy	N/A	N/A	$250/kW
BOMA	N/A	N/A	$213/kW
SCS	Turbine and equipment skid	Design, turnkey, O&M contract	$250/kW
Electrodrive	Energy management system; Signage to remind operators of program compliance requirements; Signage to warn operators not to leave batteries connected for long intervals	Training and programming services; Upon request, information on battery charging impacts and battery life; Upon request, electric rate analysis	
ECS	Guest room control systems (motion sensor and door lock switch); Monitors which	Monthly reports and recommendations; Online access to reporting and analysis on ECS website	$62.50/room

Administrator	Equipment	Services	Incentives
	download to ECS database (included in the program)		
Solatube	Skylights; Required to use photo-controllers	Installation partners; assistance with lighting audits, CAD layouts, and payback calculations	$56/unit
Quantum	Process optimization-monitoring and control equipment ranging from timers to EMS (SCADA)	24 hr, 15 minute interval readings	Custom grants
Proctor	N/A	Testing of air conditioner refrigerant charge and airflow; if repairs needed, perform them; then test again after repairs; and finally send a certificate one week after test with educational info about results and maintenance as a 3rd party verification, which includes feedback/satisfaction/problem form and phone number	To contractors: $20 / initial residential run; $30 / residential run after repair; $35 / initial commercial (<5 tons); $75/ commercial (<5 tons) after repair; $35 / initial commercial (>5 tons), $125/ commercial (>5 tons) after repair
ConSol	Plaque for house once certified	Specify highly efficient windows, and mechanical systems; downsize mechanical systems; provide installation specifications-scopes of work for insulation, air conditioning, and windows	N/A
Novatia	Solar Screen	N/A	$1/sq ft

Question 6: Were participants offered training or any other instructional help during any time of their participation?

All the third-party administrators, with the exception of BOMA, offered training to participants. Half of the third party administrators gave participants technical manuals to help them run their projects. Below are some additional offerings:

- Working through its installation contractors, Electrodrive offered their customers systems training.
- SCE provided contractors installation training, program compliance and procedure orientation in late 2001 through early 2002.
- Honeywell provided installation training, program compliance and procedure orientation for contractors in late 2001 and early 2002, and provided data monitoring training for customers.
- Quantum trained operators on how to read data and use it for reducing aeration.
- Proctor had a one-day training for contractors.
- ConSol trained site supervisors and sales people at housing developments.
- Novatia gave contractors marketing training.
- SCS signed operating and maintenance contracts with participants for their projects.

- ECS performed monthly analysis for participants and gave recommendations on how they could further enhance savings

Question 7: How did you evaluate your projects?

Five of the administrators listed eligibility criteria other than size that applicants had to meet. For example, Xenergy had a specific list of eligible project types; Solatube looked at expected lighting levels; and Novatia checked for north-facing windows. Four of the administrators listed feasibility studies and engineering calculations to estimate savings. Three administrators specifically noted size restrictions, usually a minimum standard of building size or energy use. SCS required projects to be at least 60 kW, and ECS had a 75-room minimum for hotel size. This breakdown is displayed graphically in Table 5-23.

Table 5-23: Evaluation Criteria

Administrator	Feasibility study	Size of demand impact	Project type	Calculations
Xenergy			X	X
BOMA				X
SCS	X	X		
Electrodrive			X	
ECS	X	X	X	
Solatube		X	X	
Quantum	X			
Proctor	X			X
ConSol				X
Novatia			X	

In addition to technical criteria, Quantum looked for the presence of any recent code violations and a willingness of the facility staff to make the project a success. Novatia required installers to know the eligibility criteria when visiting a customer. This sometimes led to customers being rejected, after a product was installed, due to the installer's evaluation error. According to Novatia’s program guidelines, the installers were also responsible to rectify any problems that developed.

Question 8: A) How did you verify installations?

B) How many participants or sites were verified?

C) Did you use a sampling plan for this?

Fifty percent of the administrators verified every one of their project installations by either site visits, photographs of completed projects, or data collection. The remaining administrators used sampling plans for on-site verification and performed calculations for the rest of the projects. Table 5-24 offers more detailed findings:

Table 5-24: Verification Procedures

Administrator	Verification approach practiced	Number of participants or sites verified	Sampling plan used
Xenergy	Project completion form, invoices, and random and flagged inspections	45 sites were pre-inspected; 13 out of 129 were post-fielded	20% of grant agreement sites pre-inspected; 10% of completed projects post-inspected; all “red flagged” projects inspected
BOMA	Baseline sites, post-installation performance of vendors, and equipment were verified; Contracts and invoices for equipment were reviewed.	300	All
SCS	Turnkey for 2 participants, periodic checks of others; computer system in SCS office gathered all data	2	All
Electrodrive	Count chargers, record nameplate data and verifying the EMS load shift schedules were within program compliance limits; Remote dial-up or internet operational verification performed at completion of installation, 100% monthly by Honeywell DMC Services during summer 2002	11 out of 74 were inspected between Feb and July 2002	SCE verified a sample of Honeywell dial-up data retrievals
ECS	Checked all monitoring systems; cross-checked utility bills with monitored data for commissioning and monitoring; looked at pre- and post-data; if any negative savings occurred then checked with the vendor	60 hotels and 12,683 rooms	All
Solatube	Verify light fixtures ahead; either request photos or physically walk the building after completion	3	All
Quantum	Visited every facility	6	All
Proctor	Tested units before and after service, checked 6 temperature points and 2 pressure points, used digital thermometer; performed statistical tests on data to look for patterns, which might precipitate site visits	Several out of 35,647	Did a random sample of follow-up visits in addition to site visits
ConSol	Inspect and test during building for downsizing; 9 raters in CA	67 out of 1,624	Looked at minimum of 1 in 7 homes; looked at every plan type
Novatia	Nexant onsite inspections; performed some installer audits to confirm that calculations were correct; phone interviews were done with some installers	N/A	Spot-checked applications for rebates over $300; 1 out of every 20 applications spot-checked

Question 9: What method was used to track and report project progress to the Energy Commission and/or the M&V contractor?

All administrators had an electronic list of projects either in Microsoft Access®, Microsoft Excel®, or Microsoft Word®. Proctor Engineering had numerous databases, which were used to analyze data, track charges to the Energy Commission, or generate checks for participants—which was outsourced. Proctor also had a built-in feedback loop with contractors and customers, as well as incidence reports for customers to report problem projects.

ConSol uses a database that mirrors the California Home Energy Efficiency Rating System (CHEERS) registry on the Internet, capturing all the relevant program data. ECS retrieved monitoring data from its sites and stored it on its Los Angeles server. For Quantum, the vendor, BacGen, could dial into the data system; however, all of the data is stored at their facilities.

All administrators prepared a monthly status report for the Energy Commission. For Electrodrive, Honeywell produced weekly tracking and compliance reports. For the ConSol program, the Energy Commission received copies of the CHEERS certificates for homes that complete installation. Regular reports were given to the M&V contractor only when requested.

Record Keeping

Questions 10-15 rate the administrators' record keeping abilities. A 1- to 5-point evaluation scale was developed for each question, 5 being the highest score for any question, while 1 signifies the lowest achievable score. Below each question is a description of how the scale was applied.

The Administrators being evaluated did not have advance notice of the questions that were asked them. Nexant's evaluation procedure was to sample 10 files from each administrator. If there were fewer than 10 completed project files, Nexant reviewed all of the available files. Files were selected randomly from a project list or from filing cabinets at the administrator's site. Files selected were both electronic and hardcopy. When both were available, Nexant staff tried to reconcile between the two forms of information.

Question 10: Are documents available for the sampled projects in question?

On the 5-point scale, 5 = All requested documents were available; 3 = Half of requested documents were available; 1 = No documents were available.

Question 11: Were invoices valid—as shown by proper documentation and consistent with the initial agreements between parties involved and the program requirements?

Where 5 = All invoices were consistent; 3 = Half of the invoices were consistent; 1 = Invoices were completely inconsistent or not available.

Question 12: Was the verification process noted above followed?

Where 5 = Thorough verification process with full documentation; 3 = Nexant observed two or more significant deviations from the verification process, but these were explained; 1 = No verification process or the process was not at all according to plan.

Question 13: Did the installed equipment agree with the invoice?

Where 5 = A complete consistency between invoices and equipment; 3 = Staff observed two or more discrepancies between invoices and equipment; 1 = Invoices were completely inconsistent with equipment or not available.

Question 14: Were participants paid according to the customer agreement?

Where 5 = All payments were made according to customer agreements; 3 = Most payments, with few discrepancies, were made according to customer agreements; 1 = Payments were not made at all, or were not made according to agreements, or all payments were made and were in dispute.

Question 15: Was the tracking/reporting method noted above maintained?

Where 5 = Actual tracking/reported method is consistent with planned method, with data available for all requested participant sites; 3 = A few deviations from the planned method, or half of the records were inadequate or missing; 1 = No effective tracking method observed, or the data was found to be completely inaccurate.

Table 5-25 shows the actual ratings for each administrator for each file component.

Table 5-25: Questions 10-15 Administrator Record-Keeping

Administrator	Question 10	Question 11	Question 12	Question 13	Question 14	Question 15
	Files	Invoices	Verification	Equipment	Payment	Tracking
Xenergy	5	4	4	4	5	5
BOMA	4	3.5	5	3.5	3.5	5
SCS	5	5	5	4	4	5
Electrodrive	5	5	5	5	5	5
ECS	5	5	4	5	5	5
Solatube	5	5	5	4	5	5
Quantum	3	2	2	1	1	3
Proctor	5	5	4	5	5	5
ConSol	4	5	5	4	5	4
Novatia	5	5	4	5	5	5
Averages	**4.6**	**4.5**	**4.3**	**4.1**	**4.4**	**4.7**

Administrator records were in order and administrative processes succeeded except in one case. The lowest average scoring performance attributes (agreement of invoicing and equipment documentation, and documentation of the verification process) was above 4 for the program as a whole, leading Nexant to conclude that the third-party administrators effectively administered the program.

Only one third-party administrator, Quantum, received a rating of three or less for Questions 12-14. No documentation of verification visits was kept; those visits were considered visual inspections. Similarly, because there was neither verification documentation nor other notice of installed equipment, it was difficult to confirm that equipment installed agreed with invoices. The administrator stated that the Energy Commission was conducting an inquiry into the payment process. Nexant contacted the Innovative program manager at the Energy Commission and will defer to the Energy Commission's findings on this matter.

Question 14b: Out of the overall budget, what was the percent allowed for incentives, administration activities, other (specify)?

Five of the administrators took an administrative fee, either based on actual labor and expenses or a flat percent of the overall budget. Four administrators took a commission on each unit or project they completed. SCS and Solatube took no fees from the Energy Commission. They viewed the program as a marketing tool for their product or services. The results are illustrated in Table 5-26.

Table 5-26: Administrator Payment Methods

Administrator	Administrative fee (percent of contract)	Commission	No fee
Xenergy	15.0		
BOMA	15.0		
SCS			X
Electrodrive	20.0		
ECS	Labor costs	X	
Solatube			X
Quantum	6.5		
Proctor		X	
ConSol		X	
Novatia	31.0		

The equipment, services, and rebates administrators offered to participants cover the necessary aspects of project implementation and financing, and are well focused for each of the program's audiences. The administrative processes that have been set up and executed succeeded in: choosing viable candidates while weeding out unsuitable applications; verifying project completion; tracking and reporting project progress; and getting payments out to participants.

5.8.3 Participant Audits

Participant audits were conducted on large and small grant participants as a check on the accuracy of the administrators' records and as a means to determine the degree of participant satisfaction with the administrator's performance. In the Innovative program element, there are three separate types of participants (corresponding with the three program segments):

- Large-grant participants conducted projects at their own facilities. Their grant managers are Energy Commission staff members, and their incentive payments come directly from them.
- Small-grant participants conducted projects at their own facilities; however, their grant managers are staff of Xenergy, Inc. Xenergy forecasts the grant payments they expect to make over six-months or so, and then requests an advance from the Energy Commission to cover the payments. They have been delegated the authority to make grant payments as they determine a project has been successfully completed. No additional signal from the Energy Commission is required.
- Third-party administrator participants have projects whose demand savings vary greatly, as each of the administrators is distributing incentives for different demand reduction measures. Depending on the administrator's program structure, these projects may or may not be managed by the administrator, but in most cases the incentive payment comes from the administrator.

Nexant developed a participant audit survey based on the Innovative program's guidelines and participant contracts and/or grant agreements. The audit survey was administered to a sample of program participants from the large and small grant program segments. Nexant performed program participant surveys over the phone.

The participant audit encompassed five categories, each with its own focus. These categories were:

1. *Application Process*–the participant's compliance with program application guidelines and timeline, and their level of cooperation with application reviewers.
2. *Reporting*–the participant's compliance with program reporting requirements, including timeline, content, and general communication with contract manager.
3. *Project Timeline and Completion*–whether or not the participant upheld the timeline outlined in its agreement. Criteria considered included timeliness and correctness of installation, obstacles to project completion, and communication of delays to the Energy Commission manager.

4. *M&V Requirements*–the level of cooperation with M&V requirements adhered to by the participant. Criteria included cooperation with both administrator and third-party verification contractor M&V efforts, and provision of access to facilities and records.
5. *Miscellaneous*–this category was reserved for unique programmatic requirements, such as insurance requirements and special requirements of the individual participant contract.

Nexant attempted to contact 20 participants—all of whose projects had been included in the M&V sample population—and was successful in completing 15 audits (five participants were never reached despite repeated attempts). Table 5-27 shows the breakdown of audited projects by program segment.

Table 5-27: Participant Surveys and Inspected Projects by Program Segment

	Small grant	Responded	Large grant	Responded
1	St. Jude Medical Center	X	Smart & Final	X
2	City of Lakewood	X	East Bay Municipal Utility District – Waste Water Treatment Plant	X
3	Pilgrim Towers East	X	East Bay MUD - Aqueduct	X
4	City of Burbank	X	USA Waste of California	
5	Fleetwood Travel Trailer	X	Pure Power	X
6	Southern California Water Company	X	City of Fremont	X
7	EcoGate	X	Johns Manville International, Inc.	
8	Fresno Veterans Administration Medical Center		Tenet Health Systems	X
9	Fresno Area Chamber of Commerce		Los Angeles Valley College	X
10	City of Fairfield	X	State Center Community College District	
Totals		**8**		**7**

5.8.4 Summary of Results

Below is a series of charts and discussion categorizing the responses of 15 program participants to each of 17 questions. Seventeen questions were determined to be an appropriate number to cover all categories of interest, while not keeping respondents on the phone longer than was thought reasonable. The first eight questions ask participants about each aspect of the program's process, such as marketing, communication, reporting, and verification. Questions 9-11 inquire about how the process went and what effect the program had on the participants' willingness to undertake an efficiency upgrade. Questions 12-17 ask for ratings of the participants' level of satisfaction with each aspect of the program, such as the administrator, the application, and the program timeline. Not every respondent gave an answer to every question, so total tallies may not always add up to 15 responses.

Question 1: How did you find out about the Energy Commission Innovative Program?

The Energy Commission was the most cited source of information about the program. Four respondents specifically mentioned the Energy Commission's website; one respondent found out through an energy service company (ESCO); one other respondent, Southern California Water Company, said that its consultant monitored the legislative process wherein the Energy Commission was awarded the funds. The breakdown of responses is shown in Table 5-28.

Table 5-28: Source of Program Information

Source	No. of Responses
Energy Commission	8
Utility	2
ESCO	1
Other	1
Total	**12**

Question 2: Why did you participate in the program?

Participants could give more than one answer to this question. As a result, the total number of responses is greater than the number of survey participants. The financial incentive was the most given answer. Two specific responses were (1) funding reduced bottom line costs and subsequent customer costs, and (2) funding saved capital expenditures of a project. Other answers include (1) the fact that the participant wanted to perform a retrofit anyway and decided to get the grant to make it more economical; (2) to demonstrate a new technology; (3) pressure from a city council; and (4) because the program is statewide, different utilities didn't have to be coordinated. The breakdown of answers is shown in Table 5-29.

Table 5-29: Participants' Motives

Source	Number of responses
Rebate/Cost Savings	10
Retrofit	3
Demonstration	1
Statewide	1
Political Pressure	1
Total	**16**

Question 3: Did you participate in any other similar peak load reduction programs?

Eleven respondents answered yes, and four answered no. Programs cited include other state peak load reduction programs being offered by PG&E, SCE, and SDG&E, as well as by the Los Angeles Department of Water and Power and Sacramento Municipal Utility District.

Questions 4, 6, and 13-18 below, ask participants to rate administrators' communication. Each question has a 5-point scale developed by Nexant. A 5 rating is the highest, a 1 the lowest. The exact meaning of the scale is described along with each question.

Question 4: Rate the overall quality of the communication process with your administrator (5=complete; 3=sufficient; 1=absent or inadequate)

All respondents answered and the average rating was 4.6. All Large Grant respondents gave a 5 rating, while the Small Grant average rating was 4.3. Respondents said that communication was generally on a monthly basis, coinciding with status reports.

Question 5: By what means did you most often communicate?

All respondents answered that communication primarily took place either by telephone or email. In addition, one respondent each noted fax, regular mail, and their Energy Service Company as secondary communication methods.

Question 6: Rate the reasonableness of the reporting requirements you were required to fulfill (5=Very reasonable and easy; 3=Somewhat reasonable, with some challenges; 1=Very challenging)

There were 14 responses to this question. The average rating was 4.8. Large Grant respondents gave an average rating of 4.9, while the Small Grant average rating was 4.7. Most respondents listed monthly progress reports as the only requirement. One respondent mentioned pre- and post-installation measurements and efficiency analysis.

Question 7: How long did it take for you to be notified about your application status after you submitted it?

The majority of the respondents said it took from one week to a month to find out about their application status. Three did not recall the length of time. See Table 5-30 for full details.

Table 5-30: Administrator Application Response Time

Metric	No. of responses
Days	3
Weeks	5
Months	3
Not sure	4
Total	**15**

Question 8: Did your program administrator visit your project to verify project completion?

All 15 respondents answered: 11 answered yes, three answered no, and one did not answer because they were still processing the paperwork.

Question 9: Rate the obstacles you encountered and whether you would implement the project again (5 = No significant obstacles; 3 = Obstacles were significant, but would conduct project again; 1 = Obstacles were prohibitive)

Answers were received from all of the respondents. The average rating was 4.1. Large Grant respondents gave an average rating of 4.0, while the Small Grant average rating was 4.3. The following are some specific comments that Nexant recorded:

- Installation was difficult when the HVAC units had to be changed out when the building was occupied, rather than unoccupied as originally planned.
- Sites were sold, closed, and reorganized. Problems were not related to the program.
- Limited time often reduced savings potential.
- Sites with the least savings potential were eliminated due to limited project costs funding.
- Pure Power could not find a customer to contract to purchase the power to be produced. SCE would not purchase under the existing Wind Power contracts.

Question 10: What is the likelihood that you would have taken peak load-reducing actions without the assistance of the Innovative program element?

The responses to Question 10 are in Table 5-31.

Table 5-31: Participants Who Would Have Reduced Load Without Program Assistance

Metric	No. of responses
Never	3
Probably not	3
Maybe	5
Probably	1
Definitely	3
Total	**15**

Question 11: From your experience with this program, would you participate again in a similar program? (5 = without question; 3 = yes, though under different circumstances; 1 = under no circumstances)

For this question, 14 respondents answered. All answers were favorable for participating again, a four, to "yes" without a question they would participate again, a five rating. Two respondents questioned added the following qualifications to their answers:

- They would participate as long as the level of funding ($/kW) was at this program's level or above.
- Maybe if the forms could be made easier to fill out – they were very technical.

Questions 12-17 ask for ratings of the participants' level of satisfaction with each aspect of the program, such as the administrator, the application, and the program timeline. All respondents answered Questions 12, 13, and 17; one skipped 14 and 16, and two skipped 15. The administrator got the highest average rating, followed by the overall program and the verification process. The timeline was the only category to receive an average below four. A number of comments were given regarding the timeline, both negative and positive:

- Working in a hospital and dealing with OSHA drags out the timeline beyond ones control.
- Regulatory requirements complicate the deadline.
- More time would have been helpful.
- Energy Commission deadline was fair, but third-parties made it difficult to achieve.
- Willingness to extend timeline to make program work was appreciated.
- Very accommodating when there were project delays.

Table 5-32 shows each rating for Questions 12-17.

Table 5-32: Program Component Ratings Count

Question	How would you rate	Low	Ranking scale			High	Average	Large average	Small average
		1	2	3	4	5			
12	The program overall	0	0	1	6	8	4.5	4.9	4.1
13	The administrator	0	0	1	1	13	4.8	5.0	4.6
14	The application process	0	0	2	9	3	4.1	4.3	3.9
15	The invoicing, billing, payment process	0	1	0	6	6	4.3	4.8	3.9
16	The verification process	0	0	2	5	7	4.4	4.7	4.1
17	The implementation timeline	2	0	1	6	6	3.9	4.6	3.3

The overall average for the Large Grant Administrator was 4.7, while it was 4.0 for the Small Grant Administrator, with the largest differences coming in rankings of the timeline and the payment process.

5.8.5 Non-Participants

Non-participant audits were also performed on participants that initially applied to the program but then, according to the program database, dropped out. The purpose of this audit was to try to find out when and why participants dropped out; if they went ahead with peak load reduction projects anyway; and how the program could be changed for them to consider participating in the future. Ten non-participants were contacted for feedback, but only one completed a survey. The Pasadena Police Department gave the following feedback:

- They did not remember how they found out about the program.
- They withdrew the application after receiving marketing materials and/or more in-depth program information.
- They withdrew because they felt the process was too much an administrative burden owing to the fact that the application form required the city council approval.
- The police department did complete peak load-reducing actions without the program.
- The police department would participate in a similar program if it met its needs, such as less of a paperwork burden.

5.8.6 Process Evaluation Conclusions

The Energy Commission, and specifically its website, was the best source of information for participants. Rebates appear to be driving participation for the most part. Most participants also are active in other energy efficiency programs. People seemed satisfied with the communication process. Most participants received responses to their applications within a matter of weeks, which seems acceptable to them. Most participants achieved their peak load reduction goals. Participants listed a variety of obstacles to project installation. They seemed unsure as to whether they would have implemented the project without the program. Almost everyone would certainly participate again in a similar program. Participants seemed very pleased with their administrators, and showed the most displeasure with the timeline for project completion.

5.9 CONCLUSIONS

The Innovative Peak Load Reduction Program element has achieved considerable success in reducing summer peak demand for electricity. The program's successes support the following general conclusions, discussed in more detail below:

- The program has substantially realized its goals for peak load reduction.
- Rapid deployment of innovative energy technologies has a demonstrable role in reducing summer peak demand.
- Third-party administrators can provide an effective option for program implementation.
- Cost-effective demand reductions, averaging $32/kW-year, are achievable even in an accelerated timeframe.

5.9.1 Achieving Program Goals

Through December 31, 2002, the program has contracted for 140 percent of its goal. Through its large grant, small grant, and third-party segments, the program has exceeded its 152.0 MW goal by successfully contracting for 212.9 MW. With many projects still pending completion, the program has already achieved documented savings of approximately 137 MW, or 90 percent of the 152 MW goal.

As impressive as the impacts are, the rate at which projects have been recruited and installed has not quite achieved the high expectations embodied in the program's original goals. It became clear as early as the spring of 2001 that expectations for project completion timelines were overly optimistic. Despite the need for demand reductions and the participants' sincere efforts to bring projects on-line by June 1, 2001, unexpected delays inherent in nearly all projects made the deadline impossible for some participants to meet. Nexant recommends that future demand reduction programs should either allow more time for participants to complete their projects, or focus on solicitation of a narrower selection of projects that are able to provide consistent demand savings within a short timeframe.

5.9.2 Role of Innovative Technologies

Equally important as the magnitude of savings is the emerging and plainly evident contribution that innovative energy technologies can play in reducing the State's peak demand for electricity. Successful examples include the following:

- The Berrenda Mesa Water District is able to nearly eliminate its peak demand during summer months by utilizing its Innovative Program-funded reservoir to store water pumped at night for distribution during the peak periods. For most days in the summer of 2001, the district lowered its demand from a summer 2000 baseline demand of 1.5-4.6 MW to just 20 kW (an average reduction of over 99 percent from normal).
- The Alameda County Jail's PV project, implemented in 2001 with a rated capacity of 458 kW, continues to be the largest roof-mounted photovoltaic array in the United States.
- The County of San Diego's and the City of Burbank's landfill-gas generation systems are among the first in the nation to use highly efficient microturbine technology to convert the otherwise wasted energy produced by the landfills' off-gasses into electricity. At the Madera Biomass Power Plant, agricultural and urban waste from no more than 60 miles away is burned to produce electricity. Each of these projects demonstrates the value of an innovative, clean renewable technology that uses local resources to serve local needs.

If promoting innovative, cutting-edge technology demonstrations, such as landfill gas-fired microturbines, is a high priority, the Energy Commission's approach to program implementation can easily be modified. Project completion timelines can be extended to accommodate the extended commissioning and more frequent maintenance required by innovative projects. The two goals of achieving consistent, reliable peak demand savings in the short-term and achieving peak demand savings with innovative (relatively untested) technologies are in potential conflict with one another. Sometimes these goals can be achieved simultaneously, but usually innovative technologies are less reliable in the short-term because they often require a more complex commissioning process.

5.9.3 Program Administration

Use of third-party administrators to implement the program has largely been successful, enabled by an energy industry comprised of capable professionals throughout California. The overall performance in realizing program goals has been exemplary. Participants report satisfaction with the administrative process, and independent examination of program documentation confirms good compliance with administrative procedures. Program impacts appear cost-effective, averaging about $32/kW-yr for the program as a whole, inclusive of retained administrative fees.

Although administrators and participants report that program procedures are effective, refinements in program guidelines could further improve administrative processes. To accommodate the diversity of eligible projects, the Energy Commission established relatively generic program guidelines. Such general guidelines are still needed, but specific guidelines could be developed for some of the more common project types, such as lighting efficiency. For example, guidelines could include (1) pre-approved, stipulated operating hours or coincidence factors for different occupancy types; (2) stipulated lighting fixture wattages; and (3) pre-approved demand savings calculation methodologies. Standardized guidelines could help to improve the accuracy of contracted savings, and would help participants to become more knowledgeable about their projects' potential demand savings.

5.9.4 Cost-Effectiveness of Peak Load Reductions

The Innovative Program has achieved significant peak load reduction impacts at an average cost to the State of about $225/kW (simple cost, or about $32/kW-year in annualized costs). The Berrenda Mesa and Lost Hills Water Districts' reservoir expansion projects are particularly notable for their impact, timeliness, and cost-effectiveness. In general, reservoir expansion projects seem to be a predictable source of demand savings. This type of project is not specific to rural water districts, such as those that participated in the Innovative program element, but can be emulated by any facility that can implement a pumped storage project for the shifting of their load from on-peak to off-peak periods. In the future, when timely and consistent demand savings are desired, an effort should be made to solicit this type of project, which can be brought on-line quickly and provide immediate and consistent demand savings. The market potential of reservoir expansion projects should be investigated for use in future demand conservation efforts.

Contributing to the attractive cost-effectiveness of the program impacts is the persistence of savings. Nexant's persistence verification of the AB 970-funded projects revealed that the level of verified demand savings in 2001 persisted through 2002, leading to the conclusion that the State can reliably depend on the program's peak load reductions now, and in the future.