Contrasting Approaches to Estimating Program Net Savings in NRNC

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ABSTRACT

The Building Efficiency Assessment Study's (BEA) key objectives are to develop gross whole-building energy and demand impact estimates, impact estimates of both incented and non-incented measure categories, estimates of both free-ridership and spillover at the measure and end-use level, and provide a process evaluation of the Savings By Design (SBD) program.

Savings By Design is the statewide non residential new construction (NRNC) energy efficiency program, administered by PG&E, SCE, and SDG&E.[1] The goal of SBD is to foster a team approach with the objective of designing comfortable, energy efficient buildings. Through a better understanding of the NRNC market and its players, the "Integrated Design" approach has evolved into a key component of the SBD Program. The Program recognizes the importance of the individual role each member of the project team plays, offering benefits to each for their part in energy efficient building design and construction.

The study utilizes on-site surveys and energy simulation modeling of both program participants and program non-participants to predict building energy efficiency and gross energy savings and to track building characteristics. The evaluation is based on DOE-2 engineering models that are informed by detailed onsite audits statistically projected to the program population. Program net savings are estimated using surveys with the building owners and design teams regarding the energy design choices made for these buildings. The decision maker survey results lead to re-simulation of the DOE-2 models to determine net energy and demand impacts. This paper explores findings from the net savings analysis conducted for this evaluation.

Introduction

This paper describes the net savings methodology and results of the BEA study for the NRNC program area, covering program years 1999-2001. The SBD program includes design assistance and financial incentives to improve the energy efficiency of commercial new construction. The incentive program has two compliance paths, the Systems Approach and the Whole Building approach. The incentive structure targets both the building owner and the building design team. The study includes an assessment of both program participants and an equal number of program non-participants that were carefully matched to the participants.

The discussion in this paper will focus on the three net savings methodologies used to estimate the program's net savings and the net impact findings associated with each methodology, using the survey data for the SBD program participants and non-participants. This paper will also discuss impacts of spillover and market transformation as a result of the SBD program.

[1] Southern California Gas (SCG) also runs the program, but the BEA study does not include SCG participants.

Background

In the 1994 and 1996 NRNC program evaluations, econometric techniques were used to model the efficiency choice of the sample sites in order to estimate the direct net impacts and spillover effects for demand and energy savings. Basically, the approach was to regress the observed energy efficiency of each site against decision-maker information about the degree of involvement and influence of the program. To the extent that a correlation was found between energy efficiency and program involvement or influence among participants or non-participants, the program was given credit for either net savings or spillover.

This approach depended on self-reported decision-maker information as well as large samples to ferret out a statistically significant association. As in most exercises in econometric modeling, the results were somewhat sensitive to the specification of the econometric model (choice of variables) as well as the weight given to each observation (influential observations). Moreover the results were not traceable to specific buildings, measures or respondents. Therefore they were difficult to defend.

In 1996 and 1998 the difference-of-differences was used in place of econometrics to estimate program net savings. The difference of difference approach is a fairly simple approach and is the approach that has been historically the approved methodology for calculating net savings results. One assumption of the difference-of-differences approach is that the participant free-ridership rate is equal to the non-participant spillover rate.

In the difference-of-differences approach the non-participants are considered to indicate the energy efficiency that would be expected in the absence of the program. The difference between the energy efficiency of the participants and non-participants is used to estimate the net impact of the program. Since the 1996 NRNC evaluation, CADMAC has accepted the difference of difference approach as the most accurate and defensible approach to evaluating program net impacts.

The difference-of-differences algorithm has strengths and weaknesses. Recognized strengths of the approach are the natural inclusion of free-ridership. By comparing a suitable sample of non-participant projects to participant projects it is thought that naturally occurring non-participant efficiency relative to the baseline accounts for program free-ridership. In other words, non-participants' efficiency choices are indicative of the efficiency choices participants would have made absent the program. Another strength to this approach is that this methodology has been the CALMAC/ORA accepted evaluation methodology for NRNC programs since 1996.

The first obvious weakness to this approach is that it cannot account for free-ridership at the measure level. Another recognizable weakness of the approach is that it does not account for any program induced non-participant spillover. Now that NRNC programs have been in place in California for nearly a decade it is not unthinkable that these programs have changed the way buildings are designed outside of the program.

Conducting this analysis is relatively straightforward. To calculate the difference-of-differences net savings, it is necessary to take the ratio of both participant and non-participant baseline whole building consumption over participant and non-participant as-built energy consumption. Next it is necessary to calculate the difference of these two ratios. Then the product of the difference and the participant baseline whole building consumption provides the net savings. Figure 1 illustrates the calculation.

Figure 1: Difference-of-Differences Equation

$$\left[\left(\frac{P_{ab}}{P_b}\right)-\left(\frac{NP_{ab}}{NP_b}\right)\right]\times P_b$$

Where :
NP = Non-participants
P = Participants
b = baseline whole building kWh
ab = as-built whole building kW

Because the difference of differences approach fails to provide measure/end-use specific information and non-participant spillover data, we calculated net savings results based on two alternative methodologies. The first approach, the decision-maker self report method, directly addresses the two primary shortcomings of the difference-of-differences approach. While the second attempt, difference-of-differences + spillover adjustment, only makes an adjustment for non-participant spillover.

In the following sections of this paper we discuss these new methodologies and compare and contrast the results as conducted for the evaluation of California's statewide Savings By Design program.

Methodology

In the 1999-2001 BEA study we identified three practical theories to measuring program net savings, they included: 1) difference-of-differences, 2) self-reported measure/end-use level decision-making, and 3) difference-of-differences, including self-reported spillover. The BEA study had a significant advantage over the prior impact evaluations in that the phone survey and on-site data collection took place much closer to the time that actual decisions were made about each project. Because of this proximity in the timeline of events between construction and evaluation we felt adding a self-reported methodology would provide valid responses to specific questions addressed by the participant questionnaire. In prior studies, we were often talking to decision-makers about projects that were completed several years prior to the survey. In the BEA study, we discussed projects that were typically completed in the prior quarter. Otherwise, the other two net savings methods employed were simply the difference-of-differences approach, and a deviation of the difference-of-differences approach.

We discuss the two added approaches in the following two sections.

Self-Reported Analysis Methodology

Self-report techniques were used to identify the efficiency choices of the participant sites traceable to the program, and DOE-2 modeling was used to estimate their direct net impacts for demand and energy. Similar non-participant self-report techniques were used to measure spillover effects for demand and energy savings.

The self-reported methodology is based on participant and non-participant decision-maker survey responses. The self-report methodology is used to calculate the estimates of free-ridership and spillover by measure category or end use. A decision maker survey asked measure specific questions of program participants, and end-use specific questions of non-participants (only for measures more efficient than Title-24). The survey questions elicited information describing why the efficiency choices were made and the various influences on these decisions.

The purpose of the measure/end-use questions was to reconstruct what might have happened absent program influences. Using a scoring methodology developed early in the study, the surveys were scored and then given to the surveyor responsible for the project. Using a "net savings report" furnished by the analyst, the surveyor adjusted the DOE-2 model to reflect program influences. The models were then re-simulated and compared to the as-built and baseline parametric models to develop end-use and measure level estimates of participant free-ridership and non-participant spillover.

The self-reported analysis estimates the portion of the savings that can be directly credited to the program. To accomplish this, it is necessary to understand the free-ridership rate associated with each participant. This analysis estimates free-ridership and adjusts the gross savings using responses to a decision-maker survey. This process is described below.

Free-ridership is calculated as the difference between the baseline and what would have been installed absent the program, divided by the difference between baseline and what actually was installed. For example, assume a project used a lighting baseline of 2.0 watts/sqft, and the participant received incentives for and installed lighting equipment resulting in 1.3 watts/sqft. If the participant would have installed lighting at 2.0 watts/sqft in the absence of the program, then the baseline is accurate and free-ridership would be zero. If lighting equipment equaling 1.3 watts/sqft had been installed in the absence of the program, then the free-ridership would be 100 percent. In reality, however, such a project may have had 1.8 watts/sqft equipment installed without the program, this would result in a free-ridership rate of 28.5%.

Quantifying free-ridership in this manner underscores the integral relationship between the measure baseline determination and what actually would have happened absent the program. Such a "partial free-ridership" is appropriate since measure savings vary directly and continuously with the efficiency level chosen for the equipment installed. We have found that this method is more robust than a dichotomous treatment of conservation and load management free-riders, i.e., the participant either would or would not undertake a given conservation action in its entirety absent the program. While a dichotomous treatment is appropriate for some measures and some conservation programs, we believe that in any performance-based program such as Savings By Design, probing the technical range of specifications and efficiencies provides a far more accurate picture of program-induced savings.

In the BEA study, participants generally were willing and able to provide a sufficient level of detail for the analysis. This method of analysis relies on the ability of the survey respondent to recall information about the incented measures. However, it may be difficult for the survey respondents to respond accurately to a hypothetical question about what their actions would have been in the absence of the incentive. In other words, some of the respondents may have had trouble 'backing out' knowledge about measures that they gained through the program. Therefore our estimates of free ridership may be biased upward in that respect.

Researchers conducted telephone and in-person interviews with the decision-makers directly involved with the project. The researchers used a series of questions designed to determine the important criteria to the owner in making the investment decision to install increasingly higher levels of energy efficiency. These questions are termed the financial aspect of free-ridership.

The specific energy conservation measure (ECM) or technology provided the analysis framework for the estimate of free-ridership. ECMs may be unique to each project. Some common ECMs are defined as follows:

- Lighting Controls (Occupancy Sensors, and Daylighting Controls),
- Lighting Systems w/reduced power density (LPD),
- High efficiency package units or heatpumps,
- Premium Efficiency Motors.

Gross savings were determined by examining the difference between the actual efficiency level and the "baseline" efficiency level. Therefore, the net savings can be developed by examining the difference between a "modified" efficiency run and the "baseline" efficiency run. This modified efficiency was created by applying adjustments to the "as surveyed" models to reflect free-ridership at the measure level. Customer responses to the decision-maker interview were used according to the free-rider assessment methodology to create analogous modified or "free-rider" models.

The spillover analysis estimates the amount of savings occurring in the NRNC market that is an indirect result of SBD or other NRNC programs. Similar to the direct net impact analysis, on-site and telephone survey data of non-participants were used to estimate the amount of spillover occurring in the NRNC market.

Spillover is the difference in the energy and demand between what the customer actually installed and what they would have installed in absence of any program influence. Spillover is calculated as the savings in the non-participant population associated with the baseline and what was actually installed (as-built) as a result of any SBD program influences, minus the savings associated with the baseline and what would have been installed. In other words, spillover is the amount of savings in the non-participant population that is attributable to the program.

Continuing from the previous example, assume that a project used a lighting baseline of 2.0 watts/sqft, and this non-participant installed lighting equipment resulting in 1.3 watts/sqft as a result of participating in the SBD program at an earlier time. Assuming the customer had not participated in the earlier program, they claim the lighting most likely would have been installed at the baseline of 2.0 watts/sqft, resulting in a spillover of 100% for the lighting power density. The key to the spillover analysis is whether the customer was previously influenced by the program (spillover) or influenced by other means not related to the program (not spillover).

Interviewing non-participant decision-makers is perhaps the most direct and effective way to obtain data required for a spillover analysis. Again, we generally found that non-participants were able to provide a sufficient level of detail for the analysis, provided that the interview was timely and relevant. Researchers attempted to conduct telephone interviews with the actual owners/developers of the project but often found that only the architect or engineer was the most knowledgeable, and willing or able to discuss the project.

Difference-of-Differences and Self-Reported Spillover

In the final approach, difference-of-differences and self-reported spillover, we use the results from each of the two aforementioned approaches. First a preliminary estimate of the net program percent savings is estimated using the difference-of-differences approach. Next, the results from the non-participant surveys are used to adjust the DOE-2 models in order to calculate end-use and whole building level spillover. The calculated spillover expressed as a percent energy savings is then added to the difference-of-differences results.

This is mathematically equivalent to the following, slightly different approach. First use the non-participant surveys to calculate the percent savings among the non-participants that is naturally occurring, i.e., not due to the program. Next reduce the gross percent savings of the participants by the naturally occurring savings among the non-participants.

Consider the following numerical example: Suppose the participants are found to be 25% more efficient than baseline and the non-participants are 10% more efficient than baseline. Then the difference of difference approach would conclude that the net savings of the participants is 15% (25% - 10%) of their baseline. Suppose, however, that the non-participants reported that 4% of their efficiency is spillover that is attributable to the program and 6% is naturally occurring. Then our suggestion would be to estimate the net program savings as 19% (15% + 4%). This can also be calculated as 25% - 6%.

The strength to this methodology is that we are able to use a defensible approach, namely difference-of-differences, while still accounting for program spillover that would otherwise bias the difference-of-differences estimate. The disadvantage of the approach compared to the self-reported approach is that the program is not credited for the actual energy savings of the non-participants that is due to the program.

Net Impact Findings

The annual energy net impact finding from each of the methodologies is presented below. Table 1 presents the difference-of-differences calculations for net annual energy savings. The calculations result in 16,637 MWh of net annual energy savings. These net savings correspond to a net-to-gross ratio of 17.3%. In other words, using the difference-of-differences methodology we conclude that 17% of the energy savings are a result of the SBD program. These findings suggest that the market is nearly transformed, relative to the measures offered through the SBD program, since advocates of the difference-of-differences approach believe that the net-to-gross ratio is a clear indicator of market transformation.

Table 1: Difference-of-Differences Net Savings – Annual Energy

	Participants	Non-Participants	Participant Net Savings
Baseline (MWh)	592,724	407,463	
As-Built (MWh)	496,480	352,738	
Savings (MWh)	96,244	54,725	16,637
Savings (% of Baseline)	16.2%	13.4%	2.8%
Net-to-Gross Ratio			17.3%

Because the difference-of-differences approach does not account for spillover, the BEA study also included a net savings assessment using the self-report methodology. As described above, decision-maker surveys were used to determine measure-level free-ridership and spillover occurring as a result of SBD. Free-ridership and spillover were quantified by asking the building owners and design teams a series of questions regarding the influence Savings By Design had on their energy efficiency decision making. Analysis of the survey results produced estimates of measure level free-ridership for the participant group and estimates of end-use level spillover for the non-participant groups.

Table 2 presents program net savings using the decision maker self-reported methodology, which produced two estimates of program net savings:

1. **Participant Net Savings** – total program induced savings removing participant free-ridership and including participant spillover.
2. **Comprehensive Net Savings** – total program induced savings for both participants and non-participants, which includes participant and non-participant spillover.

First lets focus on the participant net-to-gross ratio. The participant net-to-gross is an estimate of program-induced savings, less what the participants would have done absent the program (i.e., free-ridership). This ratio is most closely comparable to net-to-gross ratios calculated for past NRNC program evaluations conducted in California since it does not include non-participant spillover. Referring to Table 2, the participant net-to-gross is 59.3%, which means 59% of the energy savings are a direct result of the SBD program, while the difference (40.7% of the savings) is considered program free-ridership.

Table 2: Program Net Savings

	Self-Report Estimate (MWh)	Calculation
Program Tracking Savings	90,288	A
Gross Savings	96,244	B
Gross Realization Rate	106.6%	(B/A)
Net Participant Savings	57,092	C
Participant Net Realization Rate	63.2%	(C/A)
Participant Net -to Gross Ratio	59.3%	(C/B)
NP Spillover Savings	21,397	D
Total Net Savings	78,489	(C+D)
Comprehensive Net Realization Rate	86.9%	(C+D)/A
Comprehensive Net-to-Gross Ratio	81.6%	(C+D)/B

The self-reported methodology used to calculate participant net savings was used in a similar way to calculate non-participant net savings. Non-participant net savings are savings that occur for non-participants as a result of prior program influence or influence from the new construction rep or program material. Using the non-participant survey responses, the non-participant engineering models were adjusted to reflect what non-participant owners reported they would have done absent any prior program influence. The results for the non-participant sample were then weighted to the non-participant population to produce an independent estimate of program-induced savings in the non-participant population.[2] Including non-participant spillover in the net savings calculation results in a second estimate of net savings, referred to in Table 2 as the comprehensive net-to-gross ratio.

As seen above in Table 2, the comprehensive net-to-gross ratio adds 21,397 MWh of energy savings attributed to spillover to the 57,092 MWh or participant net savings. The sum of these two estimates is then divided by the program gross evaluated savings, which produces a comprehensive net-to-gross ratio of 82%.

The self-reported net savings approach not only provided a means for tracking non-participant spillover, it also provided the added benefit of evaluating specific areas the program has influenced the most. Non-participants attributed nearly 18,000 MWh of lighting energy savings to the NRNC program, or about 85% of all spillover.

We also point out that for the self-reported methodology, while 82% is the estimated comprehensive net-to-gross, it remains uncertain how high this estimate may climb in the future. It is very likely that as Savings By Design continues to deliver energy savings through owner and design team incentives and training that the program will change standard practice related to energy efficiency design practices. Moreover, so long as SBD program administrators strive to bring new customers to the program, while at the same time limiting service to those that have previously participated, the net-to-gross may exceed 100%. Such results would suggest an adoption of energy efficient technologies (specifically targeted by the program) that no longer require utility subsidy. It would also suggest that

[2] F.W. Dodge data was used to determine the non-participant population and was also used to select the non-participant sample.

new technologies should be incorporated into the program now, rather than later. Because as energy efficiency technologies change and become more efficient it will be the role of SBD to push the envelope by helping emerging technologies become more mainstream.

For the third approach, difference-of-differences and self-reported spillover, results for the two aforementioned methodologies were used. First a preliminary estimate of the net program percent savings is estimated using the difference-of-differences approach. Next, the results from the non-participant surveys are used to adjust the DOE-2 models in order to calculate end-use and whole building level spillover. The calculated spillover expressed as a percent energy savings is then added to the difference-of-differences results. The 5,669 MWh in non-participant spillover savings should not be compared to the non-participant spillover savings of 21,397 presented in Table 2 above. The two methodologies are fundamentally different in the manner in which the savings are projected to the population, resulting in different magnitudes of non-participant spillover savings.

Table 3 presents the difference-of-differences + spillover adjustment calculations for net annual energy savings. The calculations result in a program level net annual energy savings of 24,884 MWh. These net savings correspond to a net-to-gross ratio of 25.9%. The spillover adjustment resulted in an 8.6% increase in the program level net-to-gross ratio (25.9% versus 17.3% as shown in Table 1) when compared to the difference of differences approach.

Table 3: Difference-of-Differences + Spillover Adjustment Net Savings – Annual Energy

	Participants	Non-Participants	NP Spllover	Participant Net Savings
Baseline (MWh)	592,724	407,463	407,463	
As-Built (MWh)	496,480	352,738		
Savings (MWh)	96,244	54,725	5,669	24,884
Savings (% of Baseline)	16.2%	13.4%	1.4%	4.2%
Net-to-Gross Ratio				25.9%

Understanding the Results

It is remarkable how much information the results of the net savings analysis produces when we compare these three approaches. In previous reporting we found that the difference-of-differences approach resulted in a much better net-to-gross ratio (NTGR) than did the self-reported method. In this study we have found the opposite, the self-reported method is showing a plausible NTGR, while the difference-of-differences approach is giving very low results, which we have not seen in any past evaluation of NRRC programs. Of course the energy crisis likely complicated the interpretation of these results. Yet the results still beg the question, which method should we be using?

A key issue is non-participant spillover, which only begins to be addressed by the difference-of-differences approach with the spillover correction. In previous evaluations we found very little non-participant spillover occurring. However the utility programs appear to be transforming the market, at least in the lighting power density (LPD) measure category. This category traditionally was heavily targeted as a program area with high returns. From 4th quarter 2000 to 1st quarter 2001, we found significant spillover in the non-participant population, specifically in the LPD measure category.

If spillover is actually occurring, the difference-of-differences methodology will certainly provide a downwardly biased estimate of the savings that can be attributed to the program. The difference-of-differences approach is based on the assumption that the non-participants indicate the level of energy efficiency to be expected in the absence of the program. If the program is in fact generating substantial improvements in energy efficiency of the non-participants, then the non-participants are not a suitable comparison group for assessing the impact of the program. If, ignoring this, we do use the non-participants in this way, then we are penalizing the program for its impact on the non-participants rather than giving the program credit for this impact. In other words, by using the difference-of-differences methodology we are not crediting the utilities with market changes for which they are responsible.

From 4th quarter 1999 to 3rd quarter 2000, we found very little non-participant spillover, which is easily explained by the efficiency of the non-participants relative to baseline. In the last year of the study the non-participants have experienced a tremendous growth in efficiency when compared to the baseline, however as we have shown in this section a remarkable amount of the added non-participant efficiency has been reported as program induced savings, further evidence that the spillover is real.

Now we appear to be seeing that the program is beginning to transform the NRNC market. That is, we may be seeing measurable spillover. If so, we will have to accept the need to replace the difference-of-differences methodology that has served well in the past. Is the self-reporting approach a suitable tool for measuring spillover? It is probably too early to know for sure. Historically California program evaluations have stayed away from the use of self-reported information. But is there any feasible alternative?

Overall, we believe that the self-reported technique likely produces relatively conservative estimates of both free-ridership and spillover. This is predicated on the belief that decision makers will often take credit for decisions made, even though in truth they may not have been responsible for the decision they now take credit for. Since the program participant may be more likely to take credit for a good decision, than give credit to the program, we believe we are likely estimating free-ridership conservatively.

In order to draw conclusions on which methodology we should lend the most credence, we must understand the NRNC market conditions, attitudes, and behaviors. In doing so, we have already compared the varying free-ridership results from the three methodologies. However we must also point to other recent dynamic influences that most certainly contributed to free-ridership in the BEA study, as well as historic net-to-gross ratios that back the BEA findings.

Beginning with the latter issue, Table 4 shows net-to-gross ratios and free-ridership fractions from past NRNC evaluation studies, in addition to their simple averages. While various approaches were used to compute these results, including econometric approaches, difference of differences, and self-reported methodology (only used in the 99 PG&E evaluation), the average net-to-gross ratio of 60% is very similar to the 59.3% calculated by the self-report methodology for this study However the results are very different from the two other difference of difference based approaches.

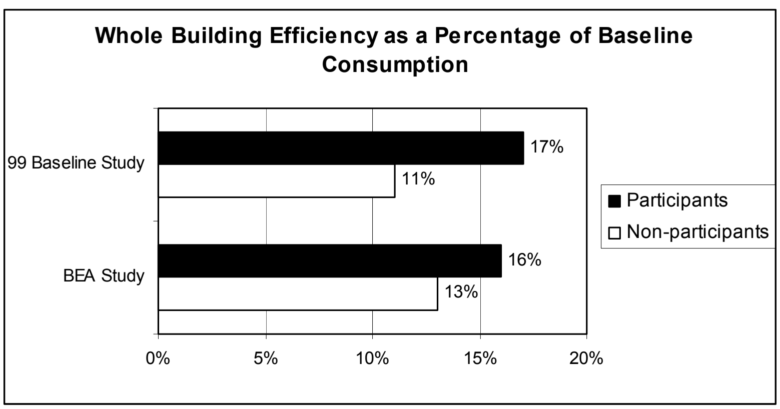
Table 4: Historic Net to Gross Ratios for NRNC Studies

NRNC Study	Net-to-Gross	% Free-Ridership	Method
94 SCE	50%	50%	Econometric
94 PG&E	80%	20%	Econometric
95 SDG&E	59%	41%	Difference of Differences
96 SCE	62%	38%	Difference of Differences
96 PG&E	47%	53%	Difference of Differences
98 SCE	62%	38%	Waiver to use 1996 Results
98 PG&E	41%	59%	Difference of Differences
99 PG&E	76%	24%	Self Reported

These differences may be a result of events that took place in the California energy industry in 1999-2001. The NRNC industry was first impacted beginning in 2000 with rolling blackouts and steep price increases in the SDG&E service territory, followed by planned SCE/PG&E rate increases and widespread speculation of price manipulation that was created by a planned deregulation of the energy industry. This uncertainty in the market likely increased interest in making buildings more efficient. This was further fueled by numerous and effective add campaigns such as "Flex Your Power" and the "20/20" program. Moreover, in the earlier stages of the "California energy crisis" the California economy was peaking, which may have led to greater investments in energy efficient products and services.

Figure 1 begins to substantiate these observations by comparing participant and non-participant efficiency as a percentage of baseline energy consumption. Figure 1 shows that non-participants are using 13% less energy than their baseline consumption. This is an improvement over RLW's 1999 NRNC Baseline Study[3] results, which at that time showed non-participants to be using 11% less energy than baseline consumption. While the participant efficiency has slightly decreased between the two studies (16% BEA and 17% Baseline), non-participant efficiency grew a few percentage points. This increased efficiency among the non-participants may be due to the market influences discussed above, or other factors. Other factors may include other NRNC programs offered by the IOUs, such as Energy Design Resources (EDR), and possible market transformation in the lighting power density measure grouping. The BEA study also collected process evaluation survey data from building owners and design teams. The responses analyzed from the process surveys provided further insight as to why program free-ridership is exceeding 40% of the gross savings.

Figure 1: Comparison of Participant and Non-participant Energy Savings as a Percentage of Baseline Consumption

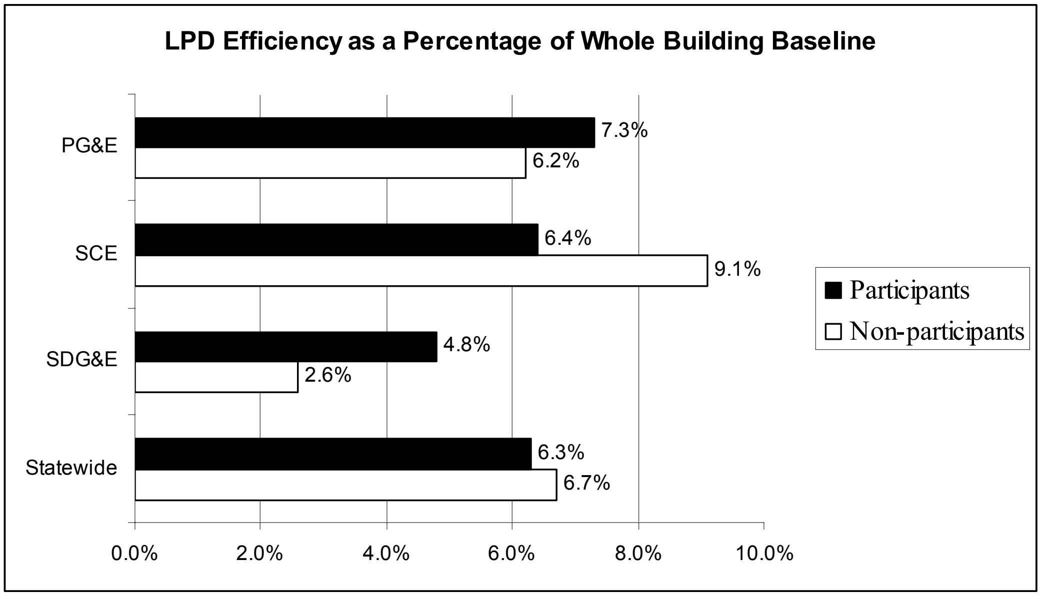


The statewide BEA findings show that non-participants are designing efficient lighting systems, as they are performing equally as well as the program participants. At least amongst the market segments studied for the BEA, it appears that market transformation has occurred for lighting power density measures. Figure 2 compares the LPD efficiency of participants and non-participants as a percentage of lighting baseline consumption. The results show that at the statewide level program participants and non-participants have similar end-use efficiency in LPD. Note that the statewide results

[3] The 1999 Baseline Study was conducted under the direction of the California Board for Energy Efficiency (CBEE) for buildings constructed between 1994 and 1998. It is important to note that the study included only four predominant market segments: schools, offices, retail, and public assembly. The study also evaluated the buildings against the applicable code at that time which was 1995 Title-24.

are heavily influenced by the SCE service territory results which shows non-participants outperforming participants by approximately 3%, while PG&E and SDG&E participants are both performing better than non-participants. As a result of these findings the utilities were strongly encouraged to let the measure level results this study produced guide them in future program design. Recommendations suggested that the utilities remove LPD or strengthen LPD measure requirements, in addition to updating the measure mix to further support adoption of emerging technologies.

Figure 2: LPD Efficiency as a Percentage of Baseline Energy Consumption



Readers are also reminded that a significant portion of the LPD savings in the non-participant category was reported to be utility influences. Which begs the questions, are we measuring spillover, or are we measuring market transformation – or both. Definitions of market transformation have at times included spillover as part of market transformation (Dennis Nelson, BC Hydro circa 1995/96). In California, "market transformation" lived a short life, as the California energy crisis quickly squashed the new paradigm of energy efficiency programs. Just as quickly as market transformation died, resource acquisition was back. Programs like Savings By Design, which were actually designed with market transformation ideals in mind, but fundamentally existed as resource acquisition programs are now quite common. Many of SBD's program aspects are information and training based, which are designed to overhaul many of the ways buildings are designed and built, and foster a lasting change in the industry. Of course the program continues to offer incentives that offset the cost of participation. Therefore, the SBD program is really a resource acquisition and a market transformation program, as we believe programs should be if they are to be well rounded.

The difficulty in evaluation arises when we attempt to differentiate between what is market transformation and what is spillover. Since in California shareholder earning claims are no longer at stake for the investor owned utilities, we believe our job is to provide a net-to-gross estimate that offers the greatest amount of information, without compromising the integrity of the results. Utility stakeholders agreed that each of the approaches offered insight into program effectiveness, but overall the self-reported method provided more detailed and possibly more reliable information. Ultimately it was agreed that the self-reported method should be the primary method by which the results for the study would stand, and that the other results would be used to further inform future program design when applicable.