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2010-12 WO033
Custom Net-to-Gross

Final Report

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Executive Summary

1.1 Background

The purpose of this report is to present findings specific to the Net-to-Gross (NTG) component of the Custom programs impact evaluation. The goal of the NTG analysis is to assess the influence of investor-owned utility (IOU) or third party (3P) energy efficiency programs on program participants' decisions to install energy efficiency projects through IOU/3P programs. The outcome of this analysis is a NTG ratio for each program or group of programs, which can be thought of as a "program influence index." In accordance with current CPUC policy, the NTG ratios in this report include the effects of free ridership[1] only, and exclude the effects of spillover.[2] However, spillover-related savings have been quantified and are referenced in this report.[3]

The body of work presented in this report was undertaken as a part of the impact evaluation of program year (PY) 2010-2012 California IOUs Custom energy efficiency projects. This effort was managed by the California Public Utilities Commission's (CPUC's) Energy Division (ED) and is referenced as Work Order Number 33 (WO033) on the CPUC ED public documents website. This report is a supplement to the overall WO033 Final Report.[4]

Through this work effort, NTG surveys representing 1,388 installed projects were completed between Q1 2011 and Q3 2013. A much larger NTG sample was drawn in this evaluation compared to previous evaluation cycles in order to support a more thorough reporting of results at the program or program grouping level. Due to the significant amount of overall content in the WO033 work effort, the WO033 Final Report could only accommodate an abbreviated

1 Energy saving projects that would have taken place in the absence of the program.

2 Actions leading to energy savings that take place outside of the program, which are directly attributed to prior participation in the program. These are considered savings that have "spilled over" from program-claimed activity.

3 A separate memo summarizing spillover savings will be posted publicly on the CPUC ED public documents website.

4 2010-12 WO033 Custom Impact Evaluation Report is available at: http://www.energydataweb.com/cpucFiles/pdaDocs/1129/2010-12_WO033_Custom_Impact_Eval_Report_Final.pdf; the Report Appendices are available at: http://www.energydataweb.com/cpucFiles/pdaDocs/1130/2010-12_WO033_Custom_Impact_Eval_Report_Final_Appendices_Only.pdf.

reporting of higher-level NTG results. This rich set of data, however, affords the possibility of a much more detailed reporting than the WO033 Final Report could support. Therefore, it was decided to prepare this stand-alone WO033 Net-to-Gross report in order to present these expansive findings.

In order to support the many uses of the findings from this work effort, this reporting goes beyond numerical results to include contextual information that can provide important insights into the "story" behind each energy efficiency project undertaken. This broader set of information is accompanied by a set of actionable recommendations aimed at improving the influence of the Custom programs going forward.

1.2 Methods and Data Sources

The NTG methodology used for this research was the standard Nonresidential Self-Report Approach (SRA) framework developed by the CPUC's Net-to-Gross Working Group for the PY2006-2008 and forward evaluation cycles. This standard framework relies on three sources of free-ridership and spillover information: (1) Program files; (2) Decision Maker (telephone) surveys; and (3) Utility and Program Staff Interviews[5]. In addition, targeted interviews with market actors (such as equipment suppliers) were conducted to determine standard practice for particular projects where warranted to establish project baselines. Additional data sources included IOU program tracking data and IOU-provided project specific documentation.

1.3 Completed Surveys

The Net impact evaluation results are based on surveys of a representative sample of 1,388 projects.[6] The sample was developed to be representative and statistically reliable for a number of sampling domains, where a domain represents a particular segment of interest, such as a utility or program group. The NTG sample is much larger than the gross impact sample, the results of which are a primary focus of the overall WO33 Final Report, since it also includes a number of 'net-only' sites. In addition to reporting at the sampling domain level, the body of completed NTG surveys supports reporting at the program or program grouping level.

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5 Available at: http://www.energydataweb.com/cpucFiles/pdaDocs/910/Nonresidential%20NTGR%20Methods%202010-12%20101612.docx

6 Note that 9 sample points were subsequently removed for the limited purpose of calculating an NTGR Adjustment Factor. This was due to the potential overlap of these with assumed Gross ISP or Dual Baseline projects.

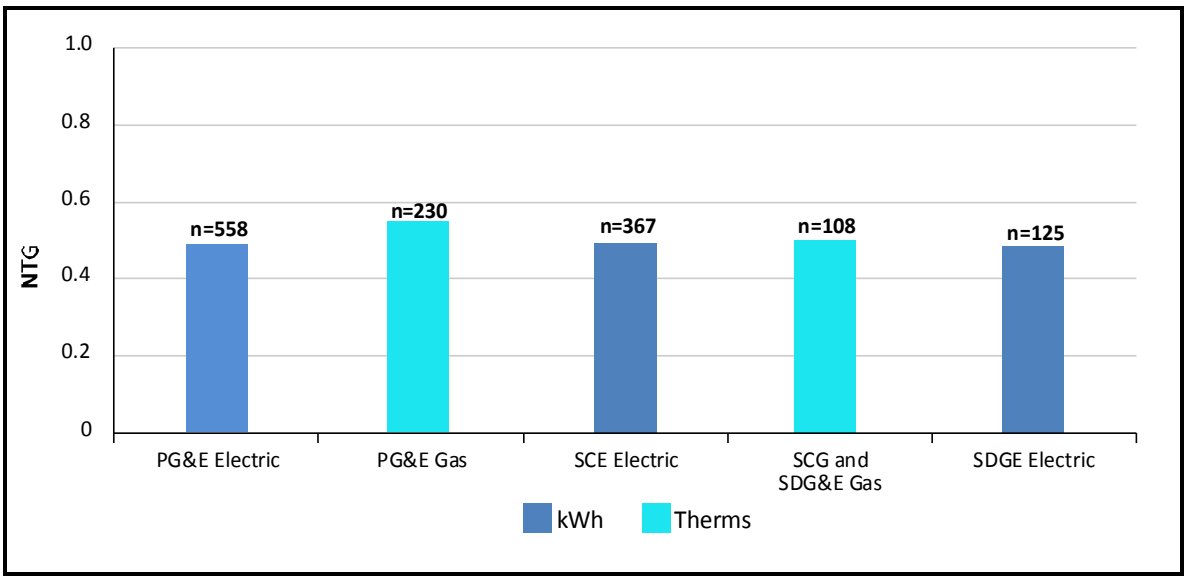
The large number of NTG surveys represent more than 25 percent of ex ante savings at the IOU-Fuel domain level and provide statistically robust results for a number of important sampling domains.

1.4 Key NTG Findings

1.4.1 High Level NTG Findings

NTG results at the level of sampling domain (IOU and fuel) are presented in Figure 1-1 below and in Table 1-1 below. Domain-level NTGR values range from a low of 0.45 (SDG&E Electric) to a high of 0.56 (PG&E Gas). On a statewide basis, the NTGR across all program categories averaged 0.48 for electric programs and 0.53 for gas programs. These values indicate a medium high level of free ridership, and a resulting medium low level of program influence, and are similar in magnitude to NTGRs from the past several evaluation cycles, as shown in Figure 1-2 below.

Figure 1-1: Weighted Net-to-Gross Ratios by IOU Fuel Domain[7]

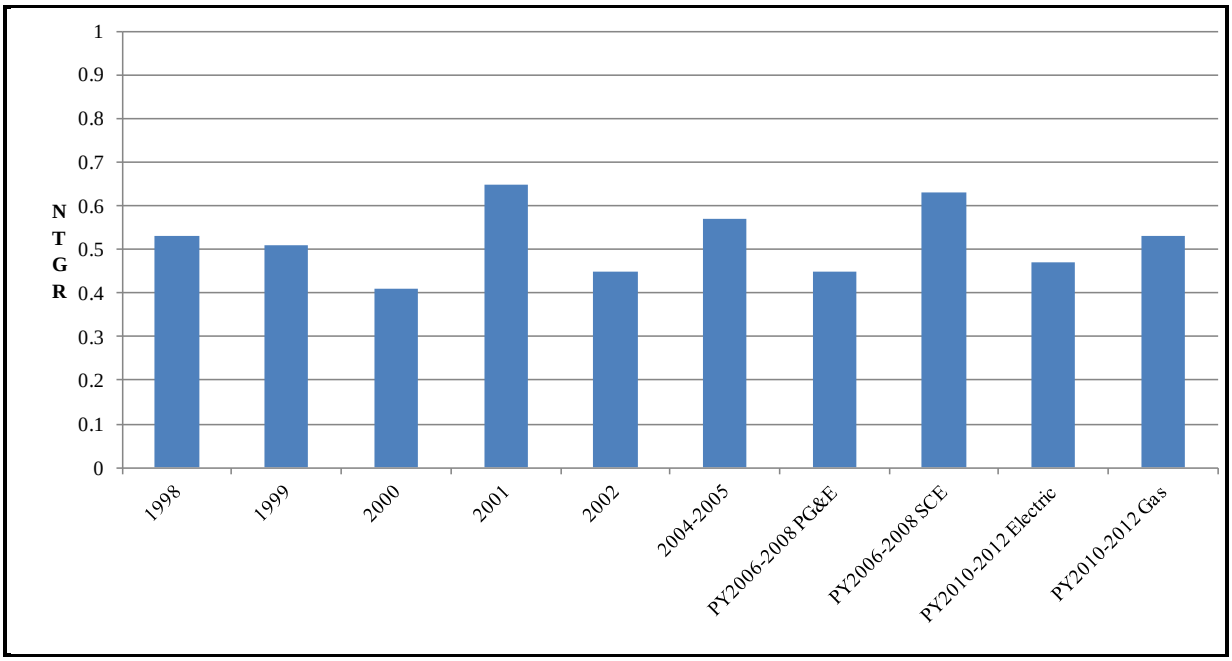


[7] Note that these values do not include the effects of the 9 sample points that were subsequently removed for the limited purpose of calculating an NTGR Adjustment Factor. This was due to the potential overlap of these with assumed Gross ISP or Dual Baseline projects. For all IOU-fuel domains except PG&E and SDG&E/SCG Gas, the improvement in IOU-fuel domain level NTGRs from these removals was very slight, on the order of 1 to 2 percent. The PG&E Gas value had no projects removed and therefore, remains unchanged. The change in the SDG&E/SCG Gas NTGR value was extremely low, resulting in a 1.00 multiplier.

Table 1-1: Weighted Net-to-Gross Ratios by IOU Fuel Domain[8]

Results	Electric NTGRs				Gas NTGRs		
	Statewide	PGE	SCE	SDG&E	Statewide	PGE	SDG&E/SCG
Weighted NTGR	**0.47**	**0.46**	**0.49**	**0.45**	**0.53**	**0.56**	**0.50**
90 Percent Confidence Interval	0.46 - 0.48	0.45 - 0.48	0.47 - 0.50	0.43 - 0.48	0.50 - 0.57	0.53 - 0.58	0.42 - 0.57
Relative Precision	0.03	0.04	0.04	0.06	0.07	0.05	0.15
n NTGR Completes	1,050	558	367	125	338	230	108
N Sampling Units	11,515	6,994	3,052	1,469	2,347	1,270	1,077
Error ratio (ER)	0.52	0.59	0.44	0.43	0.79	0.46	0.99
NTGR Adjustment Factor	1.02	1.01	1.02	1.02	1.00	1.00	1.00
Final NTGR	**0.48**	**0.47**	**0.50**	**0.46**	**0.53**	**0.56**	**0.50**

Figure 1-2: NTGR Trends Since 1998 for Custom-Type Programs[9]



Significant levels of free ridership have continued into this program cycle, as demonstrated by the PY2010-2012 evaluation net-to-gross ratio (NTGR) results. Evaluated NTGRs are similar in magnitude to those from the results of evaluations dating back to program year 1998.

8 Note that the Final NTGR values are based on the removal of nine projects for the limited purpose of calculating an NTGR Adjustment Factor. This was due to the potential overlap of these with assumed Gross ISP or Dual Baseline projects.

9 Note that the pre-2006 NTGRs are for the Statewide Standard Performance Contracting programs, while the 2006-2008 NTGRs are for the Industrial contract groups for PG&E and SCE, respectively.

While there are many potential reasons for high free ridership in this market segment,[10] we found *little evidence of any changes to either the Custom program designs or implementation procedures and requirements* in order to try to reduce free ridership. Recommendations for reducing free ridership in custom programs have been provided in a number of previous evaluation reports dating back to the late 1990s, as well as in the IOU and CPUC sponsored *National Energy Efficiency Best Practices Study*.[11] We observed limited evidence of significant free ridership-related changes in custom program design and implementation procedures for the 10-12 program cycle; however, we note that PG&E reported in its comments on the draft of this report that they have made important changes.[12] Evidence for these changes, both qualitative and quantitative should be a focus of subsequent program year evaluations.

1.4.2 Detailed NTG Findings

NTGRs by Variables of Interest

Detailed analyses of NTGRs by the following variables of interest were completed: program category or group, measure type, baseline disposition, size of incentive, and market segment. More detailed results of this analysis are presented in Chapters 6 and 7 of this report. The following is a brief summary of the most important findings:

- At the program category/program group level of analysis:
  - In general, the weighted NTGRs for the electric fuel domain have not improved compared to evaluated values from the PY2006-2008 evaluation of industrial programs for either PG&E or Southern California Edison. At the level of IOU-fuel sampling domain, the Final NTGRs range from 0.46 to 0.50 over the complete cycle. However, certain niche programs experienced much lower NTGRs, while others had above average NTGRs.

[10] In practice, the large industrial market can be very difficult to influence. This is due principally to the highly technical, industry- and site-specific process equipment requirements of these firms and the high fraction of energy use as a cost of production for some segments. As compared with many other market segments, this results in a relatively strong internal incentive, as well as greater availability of internal expertise and resources, to maximize production efficiency and minimize energy related costs. In addition, prior research on the large industrial market in California showed a high level of total market efficiency-related activity. http://www.calmac.org/publications/SPC_04-05_Report_Final-100908.pdf. *2004-2005 Statewide Nonresidential Standard Performance Contract Program Measurement and Evaluation Study*, prepared by Itron Inc., September, 2008.

[11] http://www.eebestpractices.com/pdf/BP_NR5.PDF. *Volume NR5 - Non-Residential Large Comprehensive Incentive Programs Best Practices Report*, prepared by Quantum Consulting (now Itron Inc.), December, 2004.

[12] The changes cited by PG&E include: 1) PG&E has increased outreach efforts to hard-to-reach small and medium businesses; 2) PG&E has improved its program influence project documentation and trained Customer Relationship Managers on the importance of capturing such data; 3) PG&E is carrying out Industry Standard Practice (ISP) studies to identify measures for sun-setting from our portfolio including pump-off controllers in 2009.

- There has been a significant improvement in the weighted NTGRs for PG&E industrial gas programs over those seen in the PY2006-2008 industrial evaluation. In that evaluation, the gas NTGR was particularly low (0.31) but has more than doubled for both the PG&E Core Calculated – Industrial and the All PG&E Core programs groupings in PY2010-2012. This is a positive change. Certain programs such as PGE2225 (Nexant's Refinery Energy Efficiency program), PGE21042 (New Construction), and the Local Government Partnership (the PG&E Energy Watch program group) continue to experience high free ridership.
- For Retrocommissioning programs, the current NTGR findings for SCE of 0.61 (15 projects) and for PG&E of 0.58 (47 projects) are substantially less than the PY2006-2008 evaluation values of 0.75 and higher for all IOU RCx programs results.

- Results by measure type reveal that:
  - Water/Wastewater measures have very high free-ridership levels. While none of the measures performed very well, both Aerators and Controls had particularly low NTGRs. VFD NTGR results, especially for PG&E, also demonstrated a low level of program influence. *These results suggest that the set of Water/Wastewater measures eligible for incentives needs to be revisited, and those measures with medium-low or low NTGRs may need to be eliminated from program eligibility. Further, the last Water/Wastewater Baseline study[13] was completed by PG&E in 2006, therefore, the IOUs or CPUC should seriously consider conducting a new baseline study in the near future.*
  - Within the HVAC measures category, NTGRs for rooftop or split system units[14] and pump VFDs were somewhat lower, around 0.40 to 0.45. *The medium-low NTGRs for these two measure categories suggest an industry standard practice (ISP) study may be warranted to assess whether these measures are becoming standard practice.*
  - Results for the Energy Management System (EMS)/Controls category were more promising, with NTGRs ranging from 0.59 (SDG&E, 26 cases) to 0.70 (SCE, 17 cases). The PG&E value of 0.69 (42 cases) was very close to SCE's NTGR of 0.70. *Given these favorable results, it may be worthwhile to bundle EMS with standard measures, or emphasize an EMS focus in the RCx offering.*
  - NTGRs for Agricultural Pump Overhaul projects were approximately 0.45 suggesting medium-low program influence. Values were very similar for PG&E (3 cases) and SCE (98 cases). *However the SCE NTGR has dropped significantly from the finding in the PY2006-2008 evaluation, which had an NTGR of 0.63.*

[13] Energy Baseline Study For Municipal Wastewater Treatment Plants, Base Energy, Inc. September 2006.

[14] Note that the SDG&E result is based on 6 cases only.

- By baseline disposition, the findings indicate:
  - Projects in the Major Renovation and Add-On Measure categories had the highest levels of program influenced adoptions, with NTGRs approximating 0.70.
  - The Early Replacement NTGR results (between 0.43 and 0.56) did not present a convincing case for program induced early installments.
  - The level of program influence for Capacity Expansion projects was very low, with NTGRs ranging from 0.15 to 0.30. Such projects are largely motivated by non-program reasons (i.e., the desire to produce more product and increase revenues).
- By size of incentive:
  - The electric project NTGRs are relatively insensitive to the total amount of incentive provided, as values in all cases ranged from 0.40 to 0.51. At best, this indicates a weak relationship between NTGR and the total electric incentive level. Gas project results lead to a similar conclusion.

The main conclusions for the analysis of NTGRs by business type are:

- The analysis by program category reported in Chapter 6 revealed low NTGRs for programs serving water and sewage treatment and agriculture facilities. The NTGR results for these two business categories are also consistent with these earlier findings (i.e., with very low NTGRs).
- In general, the business sector classification with the most favorable NTGR results was colleges and universities. This is consistent with the program-specific NTGR results for the UC/CSU Statewide Partnership.
- For PG&E and SCE, the lowest NTGRs were achieved by water and sewage treatment facilities and agriculture/Water Supply/Irrigation facilities. For SCG and SDG&E, the Research and Development category also fared poorly, with an NTGR of 0.32, reflecting a number of different projects with largely non-program motivations for completion.

Key Factors Influencing NTGRs

Behind the NTGR calculated for each project are a host of contextual factors that may have influenced the project, directly or indirectly. The key contextual factors were first examined within each project, and then summarized across all evaluated projects within a given program or program grouping. The intent was to look more deeply, beyond the numerical responses used in the NTGR algorithm, into the qualitative factors that influenced the project decision making. Key findings from this analysis are:

- Across all programs and program groupings analyzed, corporate policy was a major driver for most projects. Related to this was the presence of corporate policy associated with environmental protection. Corporate policies that favor energy efficiency investment are a positive market characteristic and align well with the state's overall, long-term goals for energy efficiency adoption and climate change mitigation. However, correlation of this with program free ridership, for specific projects, presents a challenge to program implementers seeking to maximize net savings in the face of aggressive energy efficiency goals. An interesting question is whether there is a greater level of energy efficiency orientation for custom-type projects among end users in the California IOU territories, as compared with regions with significantly lower levels of efficiency program support, and, if so, whether the long-term effects of these programs is responsible for the difference.
- For programs and program groups with the lowest NTGRs, there were one or more other strong drivers present that contributed to reduced program influence. For SCE, a common theme was replacement of failing equipment. For SDG&E, environmental compliance featured prominently. For some PG&E projects, additional non-energy benefits like automation were cited as the project driver, and low program influence was evident when projects were already in advanced stages of design and implementation prior to extensive program interaction (and therefore not influenced substantially by the program). Finally, for new construction projects, a significant percentage of projects were implemented by firms already using advanced energy efficiency in designs, including national chains and big box stores.

1.5 Key NTG Recommendations

Without a doubt, the large non-residential market is perhaps the most challenging to address in terms of the size and sophistication of end-use customers and suppliers, and the complexity of end-user projects. The flexible structure of the Custom program design is another source of challenge to reducing free ridership. As a result, a certain amount of free ridership is to be expected in this market. Despite these challenges, there are a number of different strategies available to the IOUs, to adjust program design elements and implementation procedures in order to reduce free ridership. These recommendations are as follows:

- ***Adopt procedures to screen for and increase efficiency levels for high likelihood free ridership projects.*** The IOUs should consider developing processes to assess the likelihood of high free ridership on a project-by-project basis. In cases where it is found to be highly likely, the program implementer should take actions to increase the likelihood or extent of program influence. Such actions might include encouraging such customers to move to a higher level of efficiency or undertake additional projects to obtain deeper savings. The goal of these actions is to fund projects that are more likely to

have not been implemented absent the program. Note that these options do not equate to rejecting an otherwise qualified project for energy efficiency funding. Instead, the concept is to try to "upsell" the customer to an energy efficiency project, or efficiency level, that they were not already planning to do on their own.

Adjust the set of technologies that are eligible for incentives. Program implementers need to *carefully review the list of qualifying measures for each program and consider eliminating eligibility, or narrowing eligible segments, for those that are standard practice*. Measures that are already likely or very likely to be installed by a significant fraction of the market should, in most cases, not qualify for incentives. In addition, program implementers should *actively highlight and promote technologies that are less well-adopted, cutting edge, or emerging technologies*. Such measures are much less likely to be prone to high free ridership. Related, the *designation of the proper baseline* for a given measure type is critical. Program implementers should take great care in establishing program baselines and in developing a firm understanding of the underlying economics that most customers face when a given technology is acquired. For technologies that are already well established, another strategy is to *incent based on bundling of mandatory requirements or optional features* that enhance performance of the base technology. For example, this can be accomplished by bundling control technologies with base energy efficient equipment. Another option is to *use a comprehensive rather than a prescriptive approach* to discourage free ridership.

- ***Make changes to the incentive design.*** *Tier incentives by technology class*, such as end-use or type of equipment, to enhance promotion of technologies that are less well accepted versus those that are already established. Under this approach, the incentive level for less widely adopted and emerging technologies would be higher, while the incentive level for more widely-adopted measures would be lower. *Consider Incorporating a Payback Floor*. The use of a payback floor (a minimum payback level based on energy savings alone) can help to reduce free ridership by eliminating projects that have extremely quick paybacks and thus little need for ratepayer-funded incentives. Another path is for the program to *set the standard for incentive eligibility higher across-the-board* so that all such projects will need to meet a higher efficiency standard to qualify.
- ***Provide early up-front intervention, where possible, through expanded use of technical studies and other forms of technical assistance.*** Programs that lead with technical studies or assessments[15] have early up-front involvement and broader influence than those with involvement after measures have been identified and decisions have largely been made.

[15] Particularly in circumstances where such assessments are needed and are not typically being done by end-use customers.

- ***Recommendations by Measure Type.***
  - For Server Virtualization, the medium level NTGRs and the empirical data demonstrating that this measure is becoming standard practice across much of the industry reinforce the need to consider phasing out incentive eligibility for this measure.
  - The set of Water/Wastewater measures eligible for incentives needs to be revisited, and those measures with medium-low or low NTGRs should be considered for elimination from program eligibility.

2

Background

The work presented in this report was completed as a part of the impact evaluation of 2010-2012 California investor-owned utilities' (IOUs) Custom energy efficiency projects. This effort is managed by the California Public Utilities Commission's (CPUC's) Energy Division (ED) and is referenced as Work Order Number 33 (WO033) on the CPUC ED public documents website. The Custom Impact WO033 Evaluation Plan was finalized on December 27, 2011 and, along with the five companion evaluation plan addenda, provides additional detail on the evaluation effort conducted. The 2010-12 WO033 project population consists of over 50 measure groups and over 100 programs. Through this work effort, Net-to-Gross surveys representing 1,388 completed projects were done. A much larger sample was drawn in order to support reporting at the program or program grouping level. Despite this large body of work, the WO033 Final Report could only accommodate an abbreviated reporting of higher-level results. This rich set of data, however, affords the possibility of a much more detailed reporting than the WO033 Final Report could support. Therefore, it was decided to prepare this stand-alone WO033 Net-to-Gross report in order to present these expansive findings.

The net-to-gross component of the impact evaluation traditionally serves many purposes such as providing input to independent estimation of program and measure impacts, supporting recommendations to improve programs, developing data and findings to facilitate future program planning, and providing support for strategic planning. In addition to providing numerical results that can be used to estimate quantitative program impacts, the findings also include contextual information for each energy efficiency project in the sample. This narrative includes all factors surrounding the project, including both program-related elements and non-program factors. Therefore, beyond the numerical results, a key objective of this report is to convey this broader set of information, the specific role being played by the Custom programs vis-à-vis these other non-program elements and, importantly, a set of actionable recommendations to improve the influence of the Custom programs going forward.

3

Methods

This chapter provides a summary of this evaluation's approach to estimating the net-to-gross ratios for the analysis domains. A more extensive discussion of the methods used is provided in Appendix D-1 to the full WO033 Custom Final Report.

3.1 Large Nonresidential NTG Approach

The methodology described in this chapter was developed to address the unique needs of Large Nonresidential customer projects developed through energy efficiency programs offered by the four California investor-owned utilities and third-party implementers. This method relies exclusively on the Self-Report Approach (SRA) to estimate project and domain-level Net-to-Gross Ratios (NTGRs), since other available methods and research designs are not feasible for the types of Large Nonresidential Custom programs that were the subject of this evaluation. For example, in the industrial sector, three obstacles to use of non-SRA methods are immediately apparent. First, there is an expected very small signal to noise ratio (low statistical power) in a participant/nonparticipant billing analysis i.e., the expected difference in monthly energy use between participants and nonparticipants is too small to detect reliably compared to other sources of variation in kWh across individual industrial sites. Second, some large industrial customers targeted by the program may have been influenced by participation in energy efficiency programs in prior years, making it very difficult to find true nonparticipants. Finally, even if the first two problems were absent, the large industrial customers targeted by the program are each unique, making it unlikely that one could find a group of nonparticipants that could be matched with participants on critical variables. The SRA in this evaluation was implemented in accordance with the relevant EM&V guidelines (see Appendix C) including the California Energy Efficiency Evaluation Protocols (April 2006).

This SRA methodology provides a standard framework, including decision rules, for integrating findings from both quantitative and qualitative information in the calculation of the net-to-gross ratio in a systematic and consistent manner. This approach was designed to fully comply with the *California Energy Efficiency Evaluation: Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals* (Protocols) and the *Guidelines for Estimating Net-To-Gross Ratios Using the Self-Report Approaches* (Guidelines), as

demonstrated in the Nonresidential NTGR Methods (Appendix D-1 to the full WO033 Custom Final Report).[1]

The method uses a zero to ten scoring system for key questions used to estimate the NTGR rather than using fixed categories that were assigned weights. Respondents were asked to jointly consider and rate the importance of the many likely events or factors that may have influenced their energy efficiency decision making, rather than focusing narrowly on only their rating of the program's importance. This question structure more accurately reflects the complex nature of the real-world decision making and helped to ensure that all non-program influences were taken into account in assessing the unique contribution of the program as reflected in the NTGR.

There are three levels of free ridership analysis. The most detailed level of analysis, the Standard – Very Large Project NTGR, was applied to the largest and most complex projects (representing 10 to 20 percent of the total) with the greatest expected levels of gross savings.[2] The Standard NTGR, involving a somewhat less detailed level of analysis, was applied to projects with moderately high levels of gross savings. The least detailed analysis, the Basic NTGR, was applied to all remaining projects.

3.1.1 NTGR Questions and Scoring Algorithm

The NTGR was calculated as an average of three scores. Each of these scores represents the highest response or the average of several responses given to one or more questions about the decision to install a program measure.

1. **Score 1** that reflects the influence of the **most important** of various program and non-program elements in the customer's decision to select the specific program measure at this time. Program influence through vendor recommendations was also incorporated in this score.

2. S**core 2** that captures the perceived importance of the program (whether rebate, recommendation, training, or other program intervention) relative to non-program factors in the decision to implement the specific measure that was eventually adopted or installed. This score was determined by asking respondents to assign importance values to both the program and most important non-program influences so that the two total 10. The program influence score was adjusted (divided by two) if respondents said they had

[1] Appendix D-1 contains the detailed *Methodological Framework for Using the Self-Report Approach to Estimating Net-to-Gross Ratios for Nonresidential Customers*, which includes a demonstration of how this methodology complies with the *California Energy Efficiency Evaluation: Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals* (Protocols) and the *Guidelines for Estimating Net-To-Gross Ratios Using the Self-Report Approaches* (Guidelines).

[2] Note that we do not refer to an Enhanced level of analysis, since this is defined by the Protocols to involve the application of two separate analysis approaches, such as billing analysis or discrete choice modeling.

already made their decision to install the specific program qualifying measure before they learned about the program.

3. S**core 3** that captures the likelihood of various actions the customer might have taken at this time and in the future if the program had not been available (the counterfactual). This score also accounts for deferred free ridership by incorporating the likelihood that the customer would have installed program-qualifying measures at a later date if the program had not been available.

When there were multiple questions that fed into the scoring algorithm, as was the case for both **Score 1** and **Score 3**, the maximum score was always used. The rationale for using the maximum value was to capture the most important program element in the participant's decision making. Thus, each score was always based on the strongest influence indicated by the respondent. However, high scores that were inconsistent with other previous responses triggered consistency checks and led to follow-up questions to clarify and resolve the discrepancy.

When there were missing data or 'don't knows' to critical elements of each score, one of two options was used. The missing element was sometimes backfilled with a value that represented the average of the lowest and highest extreme values. Alternatively, if it was one of several other elements that were considered in the algorithm, the missing element may simply have been excluded from consideration.

The resulting self-reported NTGR in most cases was simply the average of the **Score 1, Score 2,** and **Score 3** values, divided by 10. The one exception to this was when the respondent indicated a 10 in 10 probability of installing the same equipment at the same time in the absence of the program, in which case the NTGR was based on the average of the **Score 2,** and **Score 3** values only.

Table 3-1 provides examples of how the NTG ratio is calculated using the NTG algorithm as described above.

Table 3-1: NTG Ratio Calculations

Decision Maker NTG Algorithm Calculator	1	2	3	4	5
Itron RecordID					
	Company A	Company B	Company C	Company D	Company E
Score 1:					
Highest Program Influence Score	**8.00**	**8.00**	**8.00**	**8.00**	**6.00**
Highest Non-program Influence Score	**8.00**	**9.00**	**9.00**	**5.00**	**10.00**
New Score 1 w/Meas exp, Eng rec, Std pr, Corp pol, regs,normal mnt, other	**5.00**	**5.00**	**4.71**	**6.15**	**3.75**
Please rate the importance of each of the following in your decision to implement this specific [MEASURE] at this time.					
Availability of the program rebate	8	8	5	7	0
Information provided through study, audit or other technical assistance provided through the PROGRAM	7	8	-	6	2
Information from UTILITY or program training course	-	-	-	-	-
Information from UTILITY or program marketing materials	2	5	7	7	6
Recommendation from PROGRAM staff	6	-	5	-	-
Suggestion by UTILITY Account Rep	4	8	-	6	0
Payback on the investment P (score if rebate moved into range, 0 else)	-	-	8	8	-
Payback on the investment NP (score if rebate did not affect PB, 0 else)	2	8	-	-	0
Vendor Program Influence: VENDOR VMAX Score times Vendor Recommendation score if Vendor Recommendation>5	0	0	0	0	0
Recommendation from a vendor	2	9	2	0	0
Vendor Non-Program Influence = Vendor Rec. score * (1-VENDOR VMAX Score)	2	9	2	0	0
Age or condition of the old equipment	-	6	-	4	-
Previous experience with MEASURE	5	8	8	5	10
Previous experience with PROGRAM	7	6	8	5	5
A recommendation from a design or consulting engineer	-	-	-	-	-
Standard practice in your industry	5	5	8	4	8
Corporate policy or guidelines	8	-	9	-	-
Improved product quality	-	-	-	-	-
Compliance with rules or codes set by regulatory agencies	-	-	-	-	-
Compliance with your organization's normal maintenance or equipment replacement policies	4	-	8	4	-
Other, such as non-energy benefits	No	No	No	No	No
Importance of other factor	-	-	-	-	-
Score 2 -- Program Influence (Relative Importance) Score	**5**	**7**	**5**	**5**	**6**
Score 2 -- Relative importance score reduced by half if learned after decision	**5**	**7**	**2.5**	**5**	**6**
Did you make the decision to install MEASURE before or after you began discussions with UTILITY regarding the availability of rebates for this measure?	After	After	Don't know	After	After
How significant was PROGRAM versus other factors in your decision to implement MEASURE?					
Please rate the overall importance of PROGRAM in your decision to implement MEASURE?	5	7	5	5	6
Please rate the overall importance of OTHER FACTORS in your decision to implement MEASURE?	5	3	5	5	4
Score 3 -- No-Program Score	**10.00**	**8.00**	**8.00**	**4.00**	**0.00**
If the PROGRAM had not been available, what is the likelihood that you would have installed exactly the same program qualifying efficient equipment	0	2	2	6	10
If the PROGRAM had not been available, what is the likelihood that you would have installed EXACTLY the same item/equipment at the SAME TIME as you did?	0	-	0	-	9
If the program had not been available, what is the likelihood that you would have done this project at the same time as you did?	0	1	4	4	9
If the program had not been available, which of the following alternatives would you have been MOST likely to do?	Done nothing (keep the existing	Installed standard efficiency equipment	Do Something else (specify)	Repaired/re wound or overhaul the existin	Installed EXACTLY what we did through th
NTGR	**0.67**	**0.67**	**0.51**	**0.51**	**0.33**

3.1.2 Data Analysis and Integration

The calculation of the Core NTGR (involving Core IOU programs and less complex projects covered by the CATI interviews) was generally mechanical and was based on the answers to the closed-ended questions. However, the reliance of the Standard NTGR – Very Large professional interviews on more information from other sources required more of a case study level of effort in many cases. The SRA Guidelines point out that a case study is one method of assessing both quantitative and qualitative data in estimating a NTGR. A case study is an organized presentation of available data about a particular customer project with respect to all relevant aspects of the decision to install the efficient equipment. In such cases where multiple interviews were conducted, eliciting both quantitative and qualitative data and a variety of program documentation, all of this information was integrated into an internally consistent and coherent

story that supported a specific NTGR. This process, in which multiple data sources are used to develop the NTGR, is referred to as "triangulation" and was used for a small number of Standard-Very Large projects.

Sometimes, *all* the quantitative and qualitative data clearly pointed in the same direction while, in others, the *preponderance* of the data pointed in the same direction. Other cases were more ambiguous. In all questionable cases, in order to maximize reliability, it was essential that more than one person be involved in analyzing the data. Each person analyzed the data separately and then compared and discussed the results. Important insights can emerge from the different ways in which two analysts look at the same set of data. Ultimately, differences were resolved and a case made for a particular NTGR. Careful training of analysts in the systematic use of rules was carried out to insure inter-rater reliability.[3]

Once the individual analysts completed their review, they discussed their respective findings and presented their respective rationales for any recommended changes to the equation-derived NTGR. The outcome of this discussion was the final NTGR for a specific project.

3.1.3 Adjustment to Net sample to account for Overlapping ISP and Dual Baseline Sites

For that portion of the Net-to-Gross (NTG) sample that overlapped with the Gross sample, several projects were eliminated to avoid possible double-counting between the Gross and Net results (the situation where project realization rates are reduced on both Gross and Net for the same reason). This was done for the limited purpose of calculating an NTGR Adjustment Factor. This was due to the potential overlap of these with the assigned baseline or ISP or Dual Baseline consideration. Prior to the draft report submittal, two projects had been removed from the Net sample. These two projects had zero Gross savings, and very low NTGRs, and were presumed to be cases of double counting.

Following the completion of the draft report, a second review was completed to discern additional projects with potential double counting. This review consisted of projects that had non-zero ex-post Gross savings results. In all cases, the evidence behind each site was carefully examined, including an in-depth review of each site report. The following process was then used to eliminate these overlapping projects:

- **ISP Baseline projects.** Sites were identified for removal that met the following criteria: (1) the ex-post baseline disposition was Industry Standard Practice (ISP), (2) the primary reason for the discrepancy was due to the assumption of an ISP baseline as standard, (3) the Gross Realization Rate (GRR) was low (0.35 and below) and the NTGR was low

3 Inter-rater reliability is the extent to which two or more individuals (coders or raters) agree. Inter-rater reliability addresses the consistency of the implementation of a rating system.

(0.30 and below). Most of these sites also claimed they would have installed the same measure in the program's absence suggesting a high likelihood of double counting. One site was a duplicate of another claimed project; it was also dropped as an ineligible measure. A total of five projects were dropped for these reasons.

- **Dual baseline projects.** Sites were identified for removal that met the following criteria: (1) the Remaining Useful Lives (RUL) was short, (2) the GRR in the ex-post RUL-EUL period was low or zero, and (3) the NTGR was low (0.30 and below). A total of four projects were dropped for these reasons. There were also a few projects that met the RUL, and post-RUL GRR thresholds, but had high NTGRs (0.60 and above) and those remain in-sample. This is to give the benefit of the doubt to the program in such cases.
- These nine overlapping projects were then removed from the NTGR sample frame. A total of 266 projects overlapped between the Gross and Net samples prior to this removal, and 257 projects overlapped after this removal.
- Following this, the NTGRs were re-run for the overlapping project population only. First, NTGRs were calculated for the overlapping points with the nine projects included (to establish base values). Next, NTGRs were calculated for the overlapping points with the nine projects removed. The resulting NTGRs were then compared, and the percentage consideration between the base and non-overlap cases was computed.
- A multiplier of 1 plus this percentage change was then developed for each IOU-fuel sampling domain. This multiplier was applied to the NTGR values from the draft report to obtain revised NTGRs for the final reporting of results. Note that only the IOU-fuel domain NTGRs were adjusted; results were not re-run at the stratum or program level because in some cases the sample sizes were not sufficient. *In all cases, the improvement in IOU-fuel domain level NTGRs was very slight, on the order of 1 to 2% for all IOU-fuel domains except PG&E Gas (which had zero projects removed and therefore didn't change).*

3.2 Additional NTGR Analysis

In addition to the standard analysis of NTGRs by sampling domains (IOU, fuel) and where feasible, IOU-program and program groupings, additional analyses were conducted. The goal of these analyses was to examine how NTGRs vary as a function of other variables of interest, in order to determine whether there were specific patterns in the NTGR levels that could be found in the underlying data. Where this was the case, further analysis was done to assess the underlying causes of these patterns (particularly for extreme value NTGR categories – low and high). The results of this analysis are presented in Chapter 7 of this report. The categories examined were:

- Measure Type
- Baseline Disposition
- Size of Incentive
- Business Type (NAICS code)

Further analysis was done to examine the specific contextual reasons driving project decision making, including both program-related influences and non-program factors. This analysis is reported fully in Chapter 8.

3.3 Spillover

The NTG analysis also included the quantification of spillover-related savings for selected sites. Spillover was quantified for projects that met the following two conditions:

1. The participant indicated they had undertaken additional energy efficiency actions on their own and had not received an incentive from any utility or third party incentive programs.
2. In the decision to take these actions on their own, the participant specifically attributed high importance[4] to their experiences participating in the utility or third party incentive program.

The standard battery of NTG questions included a separate sequence of Spillover questions. Each participant was asked initial questions regarding whether they had taken any actions outside the IOU/3P programs that had been highly motivated by their experiences participating in the utility or third party incentive program. For those that had, a series of follow-up questions were asked regarding the specific measures installed, including the measure counts, efficiency levels, locations and timing of those installations.

Following completion of the standard NTG survey, the names and contact information, and spillover measure information for those that met the thresholds for spillover were then passed to the Engineering team for quantification of the spillover savings. Each engineer conducted an in-depth follow-up telephone interview to obtain detailed information regarding these spillover installations, sufficient to support a savings calculation. The spillover savings associated with each site were then quantified.

[4] Based on scores of 8, 9 or 10 on a 0-to-10 importance scale.

4

Data Sources

There are five sources of free-ridership and spillover information in this study. Each level of analysis relies on information from one or more of these sources. These sources are described below.

1. **Program Files**. Custom programs maintain a paper file for each paid application. These can contain various pieces of information which are relevant to the analysis of free-ridership, such as letters written by the utility's customer representatives that document what the customer had planned to do in the absence of the rebate and explain the customer's motivation for implementing the efficiency measure. Information on the measure payback with and without the rebate is generally available for the larger projects and can be found in the project documentation.

2. **Decision-Maker Surveys**. When a site is recruited, one must also determine who was involved in the decision-making process which led to the implementation of measures under the program. They are asked to complete a Decision Maker (telephone) survey. As discussed in Chapter 3, this survey obtains highly structured responses used to estimate the probability that the customer would have implemented the same measure in the absence of the program. First, participants are asked about the timing of their program awareness relative to their decision to purchase or implement the energy efficiency measure. Next, they are asked to rate the importance of the program versus non-program influences in their decision making. Third, they are asked to rate the significance of various factors and events that may have led to their decision to implement the energy efficiency measure at the time that they did. These include:

    - the age or condition of the equipment,
    - information from a feasibility study or facility audit
    - the availability of an incentive or endorsement through the program
    - a recommendation from an equipment supplier, auditor or consulting engineer
    - their previous experience with the program or measure,
    - information from a program-sponsored training course or marketing materials provided by the program

- a suggestion from program staff, a program vendor, or a utility representative
- compliance with regulatory requirements
- a standard business practice
- an internal business procedure or policy
- improved product quality
- compliance with rules or codes set by regulatory agencies
- improved plant safety
- compliance with normal maintenance or equipment replacement practices

In addition, the survey obtains a description of what the customer would have done in the absence of the program, beginning with whether the implementation was an early replacement action. If it was not, the decision maker is asked to provide a description of what equipment would have been implemented in the absence of the program, including both the efficiency level and quantities of these alternative measures. This is used to adjust the gross engineering savings estimate for partial free ridership.

The survey contains a core set of questions for **Basic** NTGR sites, and several supplemental questions for both **Standard and Standard – Very Large** NTGR sites For example, if a Standard or Standard-Very Large respondent indicates that a financial calculation entered highly into their decision, they are asked additional questions about their *financial criteria* for investments and their rationale for the current project in light of them. Similarly, if they respond that a *corporate policy* was a primary consideration in their decision, they are asked a series of questions about the specific policy that led to their adoption of the installed measure. If they indicate the installation was a *standard practice*, there are supplemental questions to understand the origin and evolution of that standard practice within their organization. These questions are intended to provide a deeper understanding of the decision making process and the likely level of program influence versus these internal policies and procedures. Responses to these questions also serve as a basis for consistency checks to investigate conflicting answers regarding the relative importance of the program and other elements in influencing the decision. In addition, **Standard – Very Large** sites may receive additional detailed probing on various aspects of their installation decision based on industry- or technology-specific issues, as determined by review of other information sources. For Standard-Very Large sites all these data are used to construct an internally consistent "story" that supports the NTGR calculated based on the overall information given.

3. **Vendor Surveys**. Vendor interviews are triggered in cases where participants indicate a high level of vendor influence in the decision to implement the energy efficient measure,

and that vendor influence is the single highest decision influence. For those few projects where such interviews were completed, the vendor survey results enter directly into the NTGR scoring. The vendor survey findings are also be used to corroborate Decision Maker findings, particularly with respect to the vendor's specific role and degree of influence on the decision to implement the energy efficient measure. Vendors are queried on the program's significance in their decision to recommend the energy efficient measures, and on their likelihood to have recommended the same measure in the absence of the program. Generally, the vendors contacted as part of this study are contractors, design engineers, distributors, and installers.

4. **Utility and Program Staff Interviews**. For the Standard and Standard-Very Large NTGR analyses, interviews with utility staff and program staff are also conducted. These interviews are designed to gather information on the historical background of the customer's decision to install the efficient equipment, the role of the utility and program staff in this decision, and the name and contact information of vendors who were involved in the specification and installation of the equipment.

5. **Other information**. For **Standard – Very Large Project** NTGR sites, secondary research of other pertinent data sources is performed. For example, this could include a review of standard and best practices through industry associations, industry experts, and information from secondary sources (such as the U.S. Department of Energy's Industrial Technologies Program, Best Practices website URL, http://www1.eere.energy.gov/industry/bestpractices/). In addition, the Standard- Very Large NTGR analysis calls for interviews with other employees at the participant's firm, sometimes in other states, and equipment vendor experts from other states where the rebated equipment is being installed (some without rebates), to provide further input on standard practice within each company.

Table 4-1 below shows the data sources used in each of the three levels of free-ridership analysis. Although more than one level of analysis may share the same source, the amount of information that is utilized in the analysis may vary. For example, all three levels of analysis obtain core question data from the Decision Maker survey.

Table 4-1: Information Sources for Three Levels of NTGR Analysis

	Program File	Decision Maker Survey Core Question	Vendor Surveys	Decision Maker Survey Supplemental Questions	Utility & Program Staff Interviews	Other Research Findings
Basic NTGR	√	√	√[1]		√[2]	
Standard NTGR	√	√	√[1]	√	√	
Standard – Very Large NTGR -	√	√	√[3]	√	√	√

[1] Only performed for sites that indicate a vendor influence score (N3d) greater than maximum of the other program element scores (N3b, N3c, N3g, N3h, N3l).

[2] Only performed for sites that have a utility account representative.

[3] Only performed if significant vendor influence reported or if secondary research indicates the installed measure may be becoming standard practice.

Copies of the complete survey forms (with lead-in text and skip patterns) are provided in Appendix D-2 of the WO033 Custom Final Report.

5

Completed Survey and Sampling Information

This chapter presents a summary of the approach used and considerations for the design of the net-to-gross sample along with comparisons of the distribution of the sample and population with respect to energy and number of projects.

5.1 Sample Design

An important goal of this evaluation was to look for areas to provide results at the program level. Given the relatively high cost of measurement and verification associated with the gross impact part of WO033 work effort, it was not possible to have a large enough gross impact sample to provide statistically robust results at the program level, except for a small number of program groups. As a result of the relatively low cost of NTG telephone surveys; however, it was possible to include hundreds of additional NTG sample points beyond the gross impact points.[1] These supplemental NTG sample points were directed to individual programs or groupings of programs. The resulting larger NTG sample – almost 1,400 sample points - enabled reporting of NTG results for a larger number of programs/program groups than not have been possible if the NTG sample simple mirrored the gross impact sample size.

As discussed in Chapter 8 of the *Custom Impact WO033 Evaluation Plan,*[2] in order for the evaluation to provide meaningful NTG results for selected programs, a minimum of roughly 25 to 50 points per program would be needed to achieve targeted precision levels of 90/10 to 90/20 for individual programs and program groups (depending on characteristics include the finite population of a program and the statistical variation associated with the results). As expected, actual allocations by program domain differed somewhat from these general targets. First, core and other larger programs sometimes met these targets based upon the random gross impact allocation alone. Moreover, certain programs with a relatively small number of participants were

[1] The gross impact sample design is summarized in the WO033 Custom Impact Evaluation Final Report.

[2] http://www.energydataweb.com/cpucFiles/pdaDocs/814/WO33%20Research%20Plan%20Final%2012%2029.pdf

allocated a lower number of points due to the benefits of small populations on targeted precision levels.[3]

Within each program included in the NTG sample, the population was sorted by project size, largest to smallest, and then grouped into five stratum relatively proportional to the amount of energy in each stratum, that is, into quintiles. Consequently, the largest stratum (Stratum 1 and 2) often have relatively few population and sample points, while the smallest stratum (Stratum 4 and 5) have moderate sample sizes but sometimes large population counts. Results by stratum are provided in Chapter 6 of this report and provide an indicator of result by relative project size.

To produce an estimate of the net-to-gross (NTG) ratio, the individual net-to-gross ratios for each of the applications in the sample were weighted by the size of the impacts associated with the application and the proportion of the total sampling domain impacts represented by each sampling stratum.

5.2 Survey Disposition

One of the ways to characterize survey non-response is through the provision of a Sample Disposition table which indicates the full disposition of the survey sample frame. Table 5-1 and Table 5-2 show the final dispositions for the 2,043 program participants we attempted to contact for this evaluation.

[3] When estimating sample sizes from small populations, or when sampling a large portion of the population, a finite population correction (FPC) factor is multiplied by the standard error, which reduces the estimated confidence interval. Where applicable using FPC, targeted precision levels are achieved using a smaller sample size. The FPC is calculated as the square root of the ratio of (the population minus the sample size) and (the population minus one).

Table 5-1: Net-to-Gross Survey Sample Disposition – CATI Surveys

CATI Custom Survey Status	Contact Count			
	Pretest	**BD**	**AD1, AD2, AD3**	**Total**
Completes	79	260	351	690
Designated Respondent Not Available		24	96	120
Disability			1	1
Disconnected		3	29	32
Duplicate		18	6	24
Fax / Cell		1	11	12
Language Barrier		1	4	5
Max Attempts		23	254	277
Refused		36	33	69
*Unknown Disposition**	*494*	*92*	*33*	*619*
Grand Total	**573**	**458**	**818**	**1,849**

* Due to discontinued use of Bellview CATI system and transition to a new system, sample disposition data is no longer available

Table 5-2: Net-to-Gross Survey Sample Disposition – Professional Surveys

Professional Custom Survey Status	Contact Count		
	BD Period	**AD1, AD2, AD3**	**All Periods**
Completes	67	85	**152**
Refusal	2	0	**2**
Not Qualified/Decisionmaker has left	4	0	**4**
Unable to reach	13	11	**24**
Project cancelled	1	0	**1**
Active Sample		11	**11**
Grand Total	**87**	**107**	**194**
Number of projects (completes)	*259*		*626*

As these tables show, we completed interviews with 842 participants, or 41.2 percent of the sample frame. The completion rate for Professional surveys (78.4 percent) was significantly higher than that for CATI surveys (37.3 percent). We were unable to reach 58.5 percent for a variety of reasons. The most common reason was that the designated respondent was not available and/or did not respond despite repeated attempts to contact them. Additionally 3.4 percent of participants who answered refused to participate in the survey. There were problems with the phone number for 2 percent of those in the CATI sample. A small number of Professional interviews could not be completed because the decisionmaker had left the company.

Note that the sample disposition data is no longer available for about one-third of the CATI sample. This is because Itron has recently discontinued use of its Bellview CATI system and has transitioned to a new system. The majority of points with missing dispositions were in the survey pre-test, which was conducted in 2011.

5.3 Net-to-Gross Sampling Weight Information

Table 5-3 through Table 5-7 present statistics for the sample frame and net-to-gross sample completes used to develop the final weighted results for the PG&E, SCE and SCG/SDG&E electric and gas sampling domains. Note that the net-to-gross sample is larger than the gross sample; in addition to gross sampled sites, it also includes a number of 'net-only' sites. For both sampling domains, a large number of surveys were completed, representing high percentages of the sample frame and providing for robust results across nearly all sample strata.

Table 5-3: PY2010-2012 Net-to-Gross Evaluation Sample – Tracking System Savings by Gross Impact Weighting Stratum: PG&E Electric Projects

Utility/Fuel Sampling Domain	Total Projects		Completed Surveys		
	Electric Energy Savings (kWh)	% of Total	Electric Energy Savings (kWh)	% of Total Surveys	% of Total Savings
Core - Comm Ind Ag	436,835,184	43.1%	138,223,925	43.0%	32%
Pump Efficiency PGE21035	52,562,880	5.2%	8,746,421	2.7%	17%
New Construction PGE20142	94,007,995	9.3%	16,442,601	5.1%	17%
EE Oil Gas PGE2222	117,628,771	11.6%	45,563,857	14.2%	39%
Heavy Industry EE PGE2223	64,153,340	6.3%	26,133,578	8.1%	41%
EE Refinery PGE 2225	17,077,027	1.7%	14,815,471	4.6%	87%
Retrocommissioning Gp	18,401,577	1.8%	6,353,443	2.0%	35%
Statewide Government and Institutional Partnerships	69,303,758	6.8%	24,189,341	7.5%	35%
Energy Watch and Local Government	28,157,594	2.8%	6,569,464	2.0%	23%
Other Third Party Programs	115,495,749	11.4%	34,193,851	10.6%	30%
Total	**1,013,623,875**	**100.0%**	**321,231,953**	**100.0%**	**32%**

Table 5-4: PY2010-2012 Net-to-Gross Evaluation Sample – Tracking System Savings by Gross Impact Weighting Stratum: PG&E Gas Projects

Utility/Fuel Sampling Domain	Total Projects		Completed Surveys		
	Therm Savings (Btu)	% of Total	Therm Savings (Btu)	% of Total Surveys	% of Total Savings
Core - Comm Ind Ag	49,095,058	58.4%	24,517,561	53.0%	50%
New Construction PGE20142	1,325,947	1.6%	435,699	0.9%	33%
Heavy Industry EE PGE2223	5,827,328	6.9%	2,358,309	5.1%	40%
EE Refinery PGE 2225	12,930,129	15.4%	12,360,404	26.7%	96%
Retrocommissioning Gp	1,890,092	2.2%	361,325	0.8%	19%
Statewide Government and Institutional Partnerships	6,377,423	7.6%	2,749,917	5.9%	43%
Energy Watch and Local Government	1,539,006	1.8%	632,698	1.4%	41%
Other Third Party Programs	5,085,223	6.0%	2,848,333	6.2%	56%
Total	**84,070,206**	**100.0%**	**46,264,245**	**100.0%**	**55%**

Table 5-5: PY2010-2012 Net-to-Gross Evaluation Sample – Tracking System Savings by Gross Impact Weighting Stratum: SCE Electric Projects

Utility/Fuel Sampling Domain	Total Projects		Completed Surveys		
	Electric Energy Savings (kWh)	% of Total	Electric Energy Savings (kWh)	% of Total Surveys	% of Total Savings
Core - Comm Ind Ag	357,208,068	48.4%	83,654,431	41.3%	23%
New Construction	132,664,485	18.0%	41,246,310	20.4%	31%
Statewide Government and Institutional Partnerships	52,623,094	7.1%	25,787,159	12.7%	49%
Local Government	27,166,882	3.7%	15,127,736	7.5%	56%
Other Third Party Programs	168,566,553	22.8%	36,682,230	18.1%	22%
Total	**738,229,082**	**100.0%**	**202,497,866**	**100.0%**	**27%**

Table 5-6: PY2010-2012 Net-to-Gross Evaluation Sample – Tracking System Savings by Gross Impact Weighting Stratum: SDG&E Electric Projects

Utility/Fuel Sampling Domain	Total Projects		Completed Surveys		
	Electric Energy Savings (kWh)	% of Total	Electric Energy Savings (kWh)	% of Total Surveys	% of Total Savings
Core - Comm Ind Ag	50,413,805	24.3%	15,261,812	28.4%	30%
New Construction	48,662,602	23.4%	6,520,292	12.1%	13%
RCx SDGE3170	11,217,834	5.4%	0	0.0%	0%
Local Nonresidential BID SDGE3117	97,513,585	46.9%	31,897,003	59.4%	33%
Total	**207,807,827**	**100.0%**	**53,679,106**	**100.0%**	**26%**

Table 5-7: PY2010-2012 Net-to-Gross Evaluation Sample – Tracking System Savings by Gross Impact Weighting Stratum: SCG and SDG&E Gas Projects

Utility/Fuel Sampling Domain	Total Projects		Completed Surveys		
	Therm Savings (Btu)	% of Total	Therm Savings (Btu)	% of Total Surveys	% of Total Savings
SCG Core	46,003,094	73.6%	18,674,049	74.7%	41%
SCG Third Party	89,129	0.1%	22,831	0.1%	26%
SCG Deemed	6,883,138	11.0%	1,367,728	5.5%	20%
All SDGE	5,979,620	9.6%	2,895,913	11.6%	48%
Local Nonresidential BID SDGE3117	3,587,222	5.7%	2,032,189	8.1%	57%
Total	**62,542,203**	**100.0%**	**24,992,710**	**100.0%**	**40%**

5.4 Number of Completed Surveys

A substantial number of NTG surveys were completed, 1,388 in total. For IOU Core and Third Party programs, the number of completed surveys was roughly proportional to the population of completed projects for each IOU as shown in Table 5-8 below.

Table 5-8: Completed Surveys as a Percentage of Total Projects for IOU Core and Third Party Programs

Utility/Fuel Sampling Domain	Total Number of Projects		Completed Surveys	
	Total Number of Projects	% of Total	Completed Surveys (N)	% of Total
PG&E Electric	6,994	50%	558	40%
PG&E Gas	1,270	9%	230	17%
SCE Electric	3,052	22%	367	26%
SDG&E Electric	1,469	11%	125	9%
SDG&E/SCG Gas	1,066	8%	108	8%
Total	13,851	100%	1,388	100%

Included in this total were 254 surveys completed for projects funded by Statewide Government/Institutional[4] and Local Government programs as summarized in Table 5-9. However, the number of completed surveys for the Statewide Government/Institutional[1] and Local Government programs was not proportional to the population.

Table 5-9: Completed Surveys as a Percentage of Total Projects for Statewide and Local Government Programs

Utility/Fuel Sampling Domain	Total Number of Projects		Completed Surveys	
	Total Number of Projects	% of Total	Completed Surveys (N)	% of Total
PG&E Statewide Govt/Institutional	308	18%	72	28%
PG&E Local Government	1,101	63%	69	27%
SCE Statewide Govt/Institutional	126	7%	56	22%
SCE Local Government	199	11%	57	22%
Total	1,734	100%	254	100%

5.4.1 Comparison of Program Population versus Completed Surveys

The large number of completed surveys was able to support a much broader level of analysis than ever before. For each utility, analysis was done for each of the Core utility programs (Calculated and Deemed) group as well as a number of utility and third party programs. Within

[4] Comprised of the following programs: UC/CSU, CCC, DOC

the Core category, the three market segment subcategories (Commercial, Industrial and Agricultural) were also analyzed. In addition, Statewide and Local Government program subgroups were also examined.

The tables below report, for each individual program and program grouping analyzed, the number of sampling units in the population and the number of completed surveys, along with the percentage contribution of each category to the total. Excepting the Statewide Government/Institutional[1] and Local Government category, the number of completed surveys was roughly proportional to the population of completed projects for each category shown. In addition, the percentage of total projects accounted for by the completed surveys is shown in the column at the far right, to demonstrate the degree of coverage of evaluation surveys.

PG&E Electric and PG&E Gas

For the PG&E Electric and PG&E Gas sampling domains, the body of NTG surveys completed was able to support analysis of the Core program category, the Pump Efficiency and New Construction utility programs, several third party programs, and the statewide and local government categories. These results are presented in Table 5-10 and Table 5-11 below.

Table 5-10: Sample Frame versus Completed Surveys – PG&E Electric

Utility/Fuel Sampling Domain	Total Number of Projects		Completed Surveys		
	Total Number of Projects	% of Total	Completed Surveys (N)	% of Total Surveys	% of Total Projects
Core - Comm Ind Ag	2,156	30.8%	195	34.9%	9%
Pump Efficiency PGE21035	772	11.0%	55	9.9%	7%
New Construction PGE20142	395	5.6%	19	3.4%	5%
EE Oil Gas PGE2222	142	2.0%	46	8.2%	32%
Heavy Industry EE PGE2223	101	1.4%	27	4.8%	27%
EE Refinery PGE 2225	15	0.2%	9	1.6%	60%
Retrocommissioning Gp	33	0.5%	12	2.2%	36%
Statewide Government and Institutional Partnerships	308	4.4%	72	12.9%	23%
Energy Watch and Local Government	1,101	15.7%	69	12.4%	6%
Other Third Party Programs	1,971	28.2%	54	9.7%	3%
Total	**6,994**	**100.0%**	**558**	**100.0%**	**8%**

Table 5-11: Sample Frame versus Completed Surveys – PG&E Gas

Utility/Fuel Sampling Domain	Total Number of Projects		Completed Surveys		
	Total Number of Projects	% of Total	Completed Surveys (N)	% of Total Surveys	% of Total Projects
Core - Comm Ind Ag	551	43.4%	97	42.2%	18%
New Construction PGE20142	241	19.0%	7	3.0%	3%
Heavy Industry EE PGE2223	54	4.3%	12	5.2%	22%
EE Refinery PGE 2225	10	0.8%	5	2.2%	50%
Retrocommissioning Gp	24	1.9%	8	3.5%	33%
Statewide Government and Institutional Partnerships	214	16.9%	58	25.2%	27%
Energy Watch and Local Government	67	5.3%	21	9.1%	31%
Other Third Party Programs	109	8.6%	22	9.6%	20%
Total	**1,270**	**100.0%**	**230**	**100.0%**	**18%**

SCE Electric

In addition to the Core program/submarket analysis, the New Construction utility programs, the statewide and local government categories, and a grouping of third party programs were able to be analyzed based on surveys completed for SCE customer projects (Table 5-12).

Table 5-12: Sample Frame versus Completed Surveys – SCE Electric

Utility/Fuel Sampling Domain	Total Number of Projects		Completed Surveys		
	Total Number of Projects	% of Total	Completed Surveys (N)	% of Total Surveys	% of Total Projects
Core - Comm Ind Ag	2,073	67.9%	162	44.1%	8%
New Construction	389	12.7%	38	10.4%	10%
Statewide Government and Institutional Partnerships	126	4.1%	56	15.3%	44%
Local Government	199	6.5%	57	15.5%	29%
Other Third Party Programs	265	8.7%	54	14.7%	20%
Total	**3,052**	**100.0%**	**367**	**100.0%**	**12%**

SDG&E Electric

Results for SDG&E Electric and SDG&E Gas are presented below in Table 5-13 and Table 5-14. The Core group of programs and the Nonresidential BID program were able to be analyzed for both the electric and gas domains. In addition, for the electric domain, analysis was completed for the New Construction and Retrocommissioning program groups. For the gas domain, additional results are available for the Third Party and Deemed program groups.

Table 5-13: Sample Frame versus Completed Surveys – SDGE Electric

Utility/Fuel Sampling Domain	Total Number of Projects		Completed Surveys		
	Total Number of Projects	% of Total	Completed Surveys (N)	% of Total Surveys	% of Total Projects
Core - Comm Ind Ag	791	53.1%	56	44.8%	7%
New Construction	214	14.4%	14	11.2%	7%
RCx SDGE3170	21	1.4%	0	0.0%	0%
Local Nonresidential BID SDGE3117	464	31.1%	55	44.0%	12%
Total	**1,490**	**100.0%**	**125**	**100.0%**	**8%**

SDG&E and SCG Gas

Table 5-14: Sample Frame versus Completed Surveys – SDG&E and SCG Gas

Utility/Fuel Sampling Domain	Total Number of Projects		Completed Surveys		
	Total Number of Projects	% of Total	Completed Surveys (N)	% of Total Surveys	% of Total Projects
SCG Core	577	50.5%	62	47.7%	11%
SCG Third Party	7	0.6%	2	1.5%	29%
SCG Deemed	122	10.7%	10	7.7%	8%
All SDGE	335	29.3%	34	26.2%	10%
Local Nonresidential BID SDGE3117	102	8.9%	22	16.9%	22%
Total	**1,143**	**100.0%**	**130**	**100.0%**	**11%**

6

Detailed NTG Findings by IOU, Sampling Domain and Program or Program Grouping

This chapter presents NTG findings by IOU, sampling domain and, where feasible, individual program or program grouping. Findings are presented in a series of tables with standardized reporting formats. Results are stratified by project size, into five strata, where Stratum 1 represents the largest projects and Stratum 5 depicts the smallest ones.[1]

6.1 Weighted NTG Results - Overall

The methodology used to develop the individual, site-specific net-to-gross estimates is summarized in the Evaluation Plan provided previously.[2] Here, we present the weighted results on a statewide basis, for each sampling domain, and for a large number of program groupings and programs where the findings are sufficiently robust.[3]

Weighted NTGRs were also calculated for each size stratum within each program, enabling closer examination of the factors driving program level NTGRs. In general, the large number of completed surveys enables reporting for a sizable number of programs and program groupings. In some cases, the number of completed surveys within a stratum was either zero or too small to support a weighted estimate, and such cases are noted.

Note that the Final NTGR values in tables 6-2, 6-3, 6-6, 6-8 and 6-9 below are based on the removal of 9 projects for the limited purpose of calculating an NTGR Adjustment Factor. This was due to the potential overlap of these with assumed Gross ISP or Dual Baseline projects. For all IOU-fuel domains except PG&E Gas,[4] the improvement in IOU-fuel domain level NTGRs from these removals was very slight, on the order of 1 to 2 percent. Only those results for the IOU-fuel domain have been adjusted for this overlap, program and program grouping results have not.

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1 Refer to Chapter 4, Sample Design in the full WO033 Final Report for more detailed information on the process used to design the NTG sample.

2 http://www.energydataweb.com/cpucFiles/pdaDocs/814/WO33%20Research%20Plan%20Final%2012%2029.pdf
http://www.energydataweb.com/cpucFiles/pdaDocs/814/WO33%20Research%20Plan%20Final%2012%2029.pdf

3 Defined as having a minimum of eight completed surveys, representing all relevant strata.

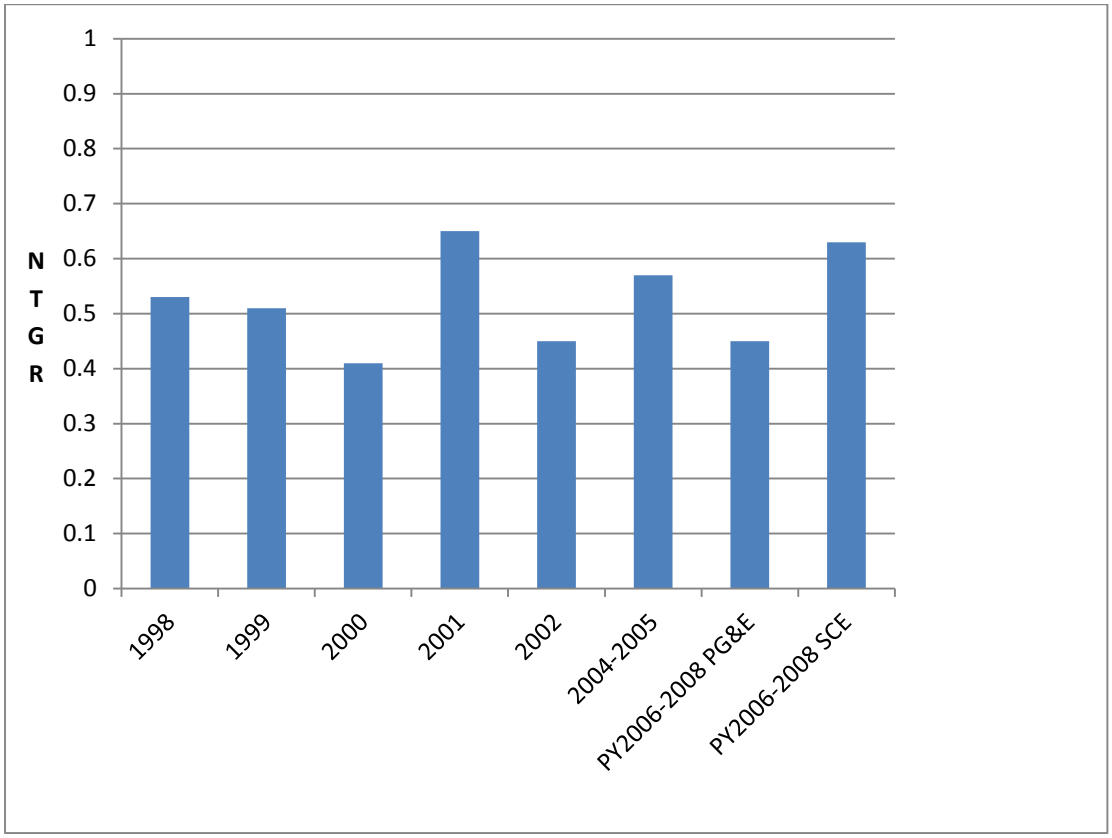
4 PG&E Gas had zero projects removed and therefore the results were unaffected.

6.1.1 Statewide Results

NTGRs for the Custom measure group were first examined on a statewide basis. These can be regarded as metrics of overall performance for the entire group of Custom programs.

On a Statewide basis, the NTGR across all program categories averaged 0.48 for electric programs and 0.53 for gas programs. These values indicate a medium high[5] level of free ridership, and a resulting medium low level of program influence, and are similar in magnitude to NTGRs from the past several evaluation cycles, as shown in Table 6-1. The conclusions are that overall program influence has not improved, and that too little effort has been expended to develop and implement approaches to improve the industrial free ridership situation. This issue will be discussed more fully in Chapter 9.

Table 6-1: NTGR Trends Since 1998 for Custom-Type Programs



Results at the Statewide level were also computed for the Core group of utility programs. These results are similar to the NTGRs across all Statewide programs with Core program NTGRs of 0.45 for Electric and 0.55 for Gas.

[5] Defined as the following: medium high free ridership is between 50 percent and 74 percent (NTGR of between 0.26 and 0.50).

6.1.2 Results By Sampling Domain – IOU and Third Party Programs

PG&E – Electric

In general, NTGRs for electric projects developed through PG&E programs are in line with those reported in the PY2006-2008 evaluations (kWh NTGR = 0.45, kW NTGR = 0.44). The weighted NTGR across all programs and projects is 0.47. For comparison purposes, this weighted result for the entire domain (labeled "All") is repeated to the left of program specific results in each detail table below.

Core Programs

Table 6-2 below reports verified NTGRs across the entire Core program group as well as each sector represented by the completed surveys. NTGRs are similar in magnitude with the exception of the Commercial sector result, which is somewhat higher (0.57), and the Industrial sector result which is significantly lower (0.28).

Table 6-2: Weighted Net-to-Gross Ratios for PG&E – Electric – Core Programs

Program Sampling Strata	All	PGE Core Comm Ind Ag	PGE Core Commercial PGE21011	PGE Core Industrial PGE21021	PGE Core Agricultural PGE21031
1	0.55	0.47	0.73	0.24	0.50
2	0.46	0.44	0.51	0.25	
3	0.46	0.54	0.62	0.37	0.58
4	0.44	0.42	0.50	0.27	0.44
5	0.44	0.45	0.52	0.40	0.40
Weighted NTGR	**0.46**	**0.47**	**0.57**	**0.28**	**0.47**
90 Percent CI	0.45 to 0.48	0.44 to 0.50	0.55 to 0.60	0.20 to 0.37	0.44 to 0.50
Relative Precision	0.04	0.06	0.05	0.28	0.07
n NTGR Completes	558	195	86	44	65
N Sampling Units	6,994	2,156	1,341	192	623
ER	0.59	0.55	0.29	1.30	0.36
NTGR Adjustment Factor	1.01				
Final NTGR	**0.47**				

- Calculated Incentives Commercial program (NTGR = 0.57)

  NTGRs for this program varied considerably across sample size strata. Data Center projects accounted for a large share of the results across strata 1, 2, 3 and 4. Results were mixed, with NTGRs ranging from 0.20 to 0.77. Stratum 1, consisting of the largest projects, had the highest NTGR, and was comprised of 4 large Data Center projects, of

which 3 had among the highest NTGRs in the 0.75 to 0.77 range. However, there were other Data Center projects in Strata 2, 3 and 4 where program influence was reported to be generally lower. For example, those in Stratum 2 had NTGRs of 0.20, 0.54 and 0.77, while the Stratum 3s consisted of 7 projects, nearly all of which were Data Centers with NTGRs ranging from 0.46 to 0.75. The Stratum 4 NTGRs range 0.33 to 0.71.

This program also included a large number of chain drug store HVAC projects (N=15) in Stratum 5, which had low program influence (NTGR=0.35). This was because the installed measures are being installed across all their stores nationally on a staggered basis.

- Calculated Incentives Industrial program (NTGR = 0.28)

  The NTGR for this program is much lower than the level of 0.46 for PY2006-2008 evaluations for PG&E programs' electric projects. The largest projects have among the lowest NTGRs, for example, the NTGR for stratum 1 projects is 0.24, while that for Stratum 3 projects is 0.37.

  A key cause of the low NTGRs is the inclusion in the sample of several large pump-off controller (POC) projects on new oil wells undertaken by a major oil producer where decisions were made and approvals received in PY2006-2008. In that evaluation, it was well-documented that POCs on new oil wells installed by major oil producing companies are essentially standard practice and are assigned very low NTGRs. The main cause of this is the low incremental cost of a POC (around $2,000) versus the cost of drilling a new oil well (about $250,000). At that time, it was recommended that all of the IOUs discontinue incentives on new POC installations because of the low or zero reported program influence. *We continue to strongly encourage PG&E to discontinue incenting POCs on new oil wells, which clearly are standard practice at this point.*

  Another root cause of the low NTGR for electric projects is low reported program influence for several sanitary district projects cutting across the 3 largest size Strata. These 4 projects have NTGRs of 0.30 (Stratum 1 project), 0.03 and 0.33 (Stratum 2 projects), and 0.26 (Stratum 3 project). During the NTG interviews, it was revealed that these projects were largely driven by the municipality's policy to go green and put in the latest and best technology. Further investigation into NTGR findings for Sanitary district projects is recommended to assess whether decisions have already been made before the program becomes involved, and/or whether other drivers of free ridership/standard practice are present (such as that some *of the installed measures are becoming standard practice).*

- Calculated Incentives Agricultural program (NTGR = 0.47)

  NTGRs were fairly consistent across all size Strata. The sample included several projects for large wineries which indicated relatively high program influence for installed measures. This was offset by smaller projects in Stratum 5 which were comprised of

small farm efficiency improvements, several of which were reported as standard practice, resulting in low NTGRs.

Non-Core Programs

Results for the electric domain were also developed for two PG&E Non-Core programs, Pump Efficiency (PGE21035) and New Construction (PGE21042). These results are reported in Table 6-3 below. In general, the New Construction program influence (NTGR = 0.46) is identical to the average for the electric domain, while the Pump Efficiency program result is much lower (NTGR = 0.36).

Table 6-3: Weighted Net-to-Gross Ratios for PG&E – Electric – Non Core Programs

Program Sampling Strata	All	PGE Pump Efficiency PGE21035	PGE New Construction PGE21042
1	0.55	N/A*	0.50
2	0.46	N/A*	
3	0.46	0.26	0.63
4	0.44	0.36	0.38
5	0.44	0.38	0.35
Weighted NTGR	**0.46**	**0.36**	**0.46**
90 Percent CI	0.45 to 0.48	0.33 to 0.40	0.40 to 0.52
Relative Precision	0.04	0.11	0.14
n NTGR Completes	558	55	19
N Sampling Units	6,994	772	395
ER	0.59	0.50	0.37
NTGR Adjustment Factor	1.01		
Final NTGR	**0.47**		

* No projects

- PGE21042: New Construction (NTGR = 0.46)

  Overall, the New Construction NTGR results depict a moderate level of program influence (NTGR = 0.46). However, the results vary considerably at both the strata and project level. For example, the largest size projects in strata 1/2 and 3 had generally higher NTGRs while those in strata 4 and 5 were generally lower.

  Data Center projects dominated the stratum 1 and 2 results. Among these projects, the results varied widely. For example within strata 2, the largest project, for a Data Center, had the highest NTGR of 0.75. However, another Data Center project, involving very similar measures, had the lowest NTGR of 0.10.

The stratum 3 result was comprised of two projects, for a food warehouse and food processing plant, respectively, with medium- high program influence 0.53 and 0.72. The smallest stratum 4 and 5 projects had medium-low NTGRs in general (0.20, 0.28, 0.34 and 0.49).

- PGE20135: Pump Efficiency Services program (NTGR = 0.36)

  The general picture is one of low program influence, with an overall NTGR of 0.36. Among the lowest NTGRs for this program were those for municipal water district projects, which account for the preponderance of results. Many are in the 0.20 to 0.30 range. The smallest stratum 4 and 5 projects are comprised of a mix of municipal (N = 8) and private sector (N = 8) projects. With one exception, all of the municipal projects have low NTGRs ranging from 0.22 to 0.37, with most clustered around a value of 0.25. The private sector projects have somewhat higher NTGRs, ranging from 0.22 to 0.61. *Again, further examination is needed into the municipal pumping market segment to assess program effectiveness given the dynamics and timing of decision making by customers in this subgroup.*

PG&E – Gas

In contrast to its electric projects within its programs, NTGRs for PG&E Industrial gas projects within its programs are significantly improved from the PY2006-2008 Industrial evaluation[6] where the NTGR for gas projects averaged 0.31. However, NTGRs for the largest stratum 1 and 2 projects are very low, and similar to levels found in the PY2006-2008 Industrial evaluation. In contrast, NTGRs for the medium and small projects that populate strata 3, 4 and 5 are much improved from the levels found in the PY2006-2008 Industrial evaluation. For comparison purposes, this weighted result for the entire domain (labeled "All Periods") is repeated in to the left of program specific results in each detail table below.

Core Programs

The NTGR for gas projects across all PG&E Core programs (0.63) is nearly twice as high as that in the PY2006-2008 Industrial evaluation (0.31). Table 6-4 below reports calculated NTGRs across all of the Core program groups represented by the completed surveys.

6 2006-2008 Evaluation Report for PG&E Fabrication, Process and Manufacturing Contract Group.

Table 6-4: Weighted Net-to-Gross Ratios for PG&E – Gas – Core Programs

Program Sampling Strata	All	PGE Core Comm Ind Ag	PGE Core Commercial PGE21011	PGE Core Industrial PGE21021	PGE Core Agricultural PGE21031
1	0.33	N/A*	N/A*	N/A*	N/A*
2		0.66	N/A*	0.66	N/A*
3	0.71		N/A*		N/A*
4	0.57	0.60	0.51	0.62	0.59
5	0.56	0.57	0.56	0.29	0.63
Weighted NTGR	**0.56**	**0.63**	**0.55**	**0.63**	**0.61**
90 Percent CI	0.53 to 0.58	0.58 to 0.67	0.48 to 0.62	0.58 to 0.68	0.55 to 0.67
Relative Precision	0.05	0.07	0.12	0.08	0.10
n NTGR Completes	230	97	40	27	30
N Sampling Units	1,270	551	379	87	85
ER	0.46	0.45	0.49	0.32	0.43

* No projects

Program-specific details are provided below.

- PGE21021: Calculated Incentives Commercial (NTGR = 0.55)

  The picture is one of medium program influence with an overall NTGR of 0.55. However, note that only smaller projects were evaluated, those in Stratum 4 and 5. Stratum 4 consisted of 3 projects, of which 2 were at a large university and reported medium-high program influence. The third, another Data Center project, had a low NTG ratio of 0.15, largely due to the fact that the project had already met their payback requirement even without the rebate. Stratum 5 consisted of a diverse mix of 11 projects for many types of end-users. All but one have NTGRs in the range of 0.43 – 0.79, reflecting medium and medium-high program influence.

- PGE21021: Calculated Incentives Industrial (NTGR = 0.63)

  The NTGR for the Calculated Incentives Industrial program is significantly higher than the PY2006-2008 Industrial evaluation result. The findings for this program were dominated by several large and medium-sized energy efficiency projects for refineries (in Strata 2, 3 and 4), which reported medium to high program influence in all cases. In addition all of these projects have a primary focus of energy efficiency improvement, and many consisted of making a process change in order to significantly reduce energy use. In contrast, the PY2006 – 2008 results were heavily influenced by large refinery and other industrial projects that were being done for reasons other than saving energy, thus resulting in high free ridership. Note that the Stratum 5 NTGR of 0.29 is much lower than those for Stratum 2/3 (0.66) and Stratum 4 (0.62). The Stratum 5 projects have low

NTGRs in general. Out of 11 projects evaluated, 7 had NTGRs of 0.33 and below, 0.287 across the stratum. These projects represented a wide range of technologies and market.

- PGE21031: Calculated Incentives Agricultural (NTGR = 0.61)

  The NTGR for the Agricultural sector Calculated Incentives program is a medium-high NTGR of 0.61. This result is similar to that in the PY2006-2008 Agriculture and Food evaluation where the NTGR was 0.63. However, note that only smaller projects were evaluated in this evaluation, made up of Stratum 4 and 5 projects exclusively.

  Within Stratum 4, the projects evaluated are for a diverse set of end-users, consisting of food processors, wineries and nurseries. Project-specific NTGRs ranged from 0.33 to 0.73, and most were above 0.50. Stratum 5 consists of 25 evaluated projects, for a mix of firms ranging from food processing companies to family farms. NTGRs for these projects ranged from 0.14 to 1.00. Roughly half of these projects had NTGRs of 0.50 and above, while the remaining half had NTGRs below 0.50.

Non-Core Programs

Results for the gas domain were also developed for a number of PG&E Non-Core programs, Pump Efficiency (PGE21035), New Construction (PGE21042), Heavy Industry Energy Efficiency (PGE2223), Refinery Energy Efficiency (PGE2225) and a grouping of two Retrocommissioning programs (RCx Group).[7] These results are shown in Table 6-5 below.

Table 6-5: Weighted Net-to-Gross Ratios for PG&E – Gas – Non Core Programs

Program Sampling Strata	All	PGE New Construction PGE21042	PGE Heavy Industry PGE2223	PGE EE Refinery PGE2225	PGE RCX Group
1	0.33	N/A*	N/A*	0.33	N/A*
2		N/A*	N/A*	N/A*	N/A*
3	0.71	N/A*	N/A*	0.33	N/A*
4	0.57	0.39	0.61	0.49	0.63
5	0.56		0.50		
Weighted NTGR	**0.56**	**0.39**	**0.57**	**0.35**	**0.63**
90 Percent CI	0.53 to 0.58	0.37 to 0.42	0.42 to 0.72	0.32 to 0.38	0.57 to 0.70
Relative Precision	0.05	0.07	0.26	0.08	0.10
n NTGR Completes	230	7	12	5	8
N Sampling Units	1,270	241	54	10	24
ER	0.46	0.12	0.61	0.15	0.20

* No projects

[7] Industrial Retrocommissioning program (PGE2228) and Monitoring-Based Commissioning program (PGE2203).

Below are observations for each program and each stratum represented by the completed surveys.

- PGE20142: New Construction program (NTGR = 0.39)

  In general, new construction projects have many non-energy efficiency drivers. For the PGE21042 New Construction program, a significant percentage of natural gas projects are being done by firms advanced in their adoptions of energy efficiency, including national chain and big box stores. The general picture is one of medium-low program influence given the NTGR of 0.39. However, only smaller projects were evaluated, those in Stratum 4 and 5.

  Within Stratum 4, one project undertaken by a large healthcare provider was evaluated, the program influence level was medium-low, with an NTGR of 0.41. Stratum 5 projects had low NTGRs in general. Of the seven projects evaluated, two were implemented by a fast food chain, where the proposed measure was found to be standard practice across the chain (NTGR = 0.00). The remaining five projects, implemented by healthcare providers, a nursery, and a local government office, had medium-low NTGRs in general, ranging from 0.34 to 0.47.

- PGE2223: Heavy Industry Energy Efficiency (NTGR = 0.57)

  Both this program and the RCx Group had the strongest performance, in terms of finding of medium high program influence. For PGE2223, the NTGR was 0.57. However, note that only smaller projects were evaluated, in Stratum 4 and 5.[8]

  With regard to the level of program influence, there was no discernible pattern based on either the participant or the project mix. Stratum 4 consisted of 3 diverse projects. Two of the three projects had medium-high program influence with NTGRs of 0.73 and 0.79, respectively. The remaining project was found to be a complete free rider with an NTGR of 0.00. The customer revealed that, "This was a project that cost millions of dollars and the rebate was in the hundreds of thousands. " The project involved replacement of older equipment and the respondent indicated they would have implemented it on their own in the absence of the program. Stratum 5 was made up of a very diverse mix of nine projects with widely-varying NTGRs.

- PGE2225: Refinery Energy Efficiency (NTGR = 0.35)

  Of the Third Party programs evaluated, this program had the lowest NTGR by far (0.35). The resulting level of program influence was medium-low. This contrasts sharply with results in the PG&E Calculated Incentives – Industrial program. That program also included a large number of refinery projects, but the level of program influence for those projects was much higher.

[8] Note the high level of Relative Precision for the projects evaluated through this program.

NTGRs in Strata 1 and 3 were particularly low (0.33), while Strata 4/5 projects had a somewhat higher NTGR (0.49).

A refinery with a flue gas scrubber projects accounts for project results in Strata 1 and 4. This was a very large project involving a measure that was largely standard practice for this firm, resulting in an NTGR of 0.28.

Another refinery had sampled projects in Strata 3, 4 and 5. Two of the 4 projects (in Strata 4 and 5) had a very low NTGR of 0.18 because the installed measure was primarily motivated by non-energy factors related to the building occupancy. Even with the incentive, the project had a very long payback, over 12 years. The remaining two projects had medium-high NTGRs of 0.70 and 0.72. The first project involved various boiler measures, where the rebate accounted for half the project cost; these were clearly program-driven. The second was a series of steam trap replacement projects which the program had accelerated by providing funding.

The experience of PG&E's Calculated Incentives – Industrial program clearly illustrates that the refinery sector has many good quality energy savings projects for which there can be a high level of program influence. *The key is to help end users find projects, early in the end user's decision making process that have a primary focus of energy efficiency improvement, and particularly, those involving making a process change in order to significantly reduce energy use. It is recommended that this program change its procedures for marketing and screening projects to prioritize those that have a primary focus of energy efficiency improvement.*

- (PGE2228 and PGE 2203): RCx Group - Industrial RCx and MBCx Programs

  The RCx program group had a medium-high NTGR of 0.63. These results, while favorable, are down from the NTGR levels of 0.75 and higher, from the evaluation of PY2006-2008 RCx programs.

  However, only smaller Strata 4 and 5 projects were involved in this evaluation. All of the nine projects evaluated had NTGRs ranging from 0.40 to 0.80; the three largest projects had NTGRs of 0.67, 0.67 and 0.80. Among these largest projects were two undertaken by a container company (in Strata 4 and 5) that scored the program importance highly in their decision making, and were highly unlikely to take the same actions on their own absent the program, resulting in a NTGR of 0.67.

SCE – Electric

Results for SCE's programs (all resulting in electric savings) were somewhat lower than those for SCE's Industrial Programs in PY2006 – 2008, which had an average NTGR of 0.63. In the current evaluation, the NTGR across all programs evaluated averaged 0.49. NTGRs for individual programs and program groupings ranged from 0.40 to 0.54.

Core Programs

Among SCE's Core programs are its Calculated Incentives Industrial program (NTGR = 0.54), its Calculated Incentives Commercial program (NTGR = 0.40) and its Calculated Incentives Agricultural program, (NTGR = 0.44). The average NTGR for all SCE Core programs at 0.47 was slightly lower than the average NTGR across all SCE programs of 0.50. These results are shown in Table 6-6 below.

Table 6-6: Weighted Net-to-Gross Ratios for SCE – Electric – Core Programs

Program Sampling Strata	All Programs	SCE Core Comm Ind Ag	SCE Core Commercial SCE-SW-002B	SCE Core Industrial SCE-SW-003B	SCE Core Agricultural SCE-SW-004B
1	0.48	0.47	0.33	0.58	NA*
2	0.52	0.53			NA*
3	0.52	0.49	0.45	0.56	0.41
4	0.47	0.45	0.47	0.47	
5	0.45	0.46	0.42	0.51	0.47
Weighted NTGR	**0.49**	**0.47**	**0.40**	**0.54**	**0.44**
90 Percent CI	0.47 to 0.50	0.45 to 0.50	0.35 to 0.45	0.50 to 0.58	0.41 to 0.47
Relative Precision	0.04	0.06	0.13	0.07	0.07
n NTGR Completes	367	162	59	39	64
N Sampling Units	3,052	2,073	1,169	355	549
ER	0.44	0.45	0.63	0.30	0.35
NTGR Adjustment Factor	1.02				
Final NTGR	**0.50**				

* No projects

Detailed results by Stratum within each of these SCE Core programs are somewhat more revealing as discussed below:

- SCE-SW-002B: Calculated Incentives Commercial (NTGR = 0.40)
  - The Calculated Incentives Commercial program had a medium-low NTGR of 0.40. The overall result was adversely affected by poor results for Stratum 1 and 2 projects
  - Within Stratum and 1 and 2, the NTGR averaged 0.33. There were two large data center projects in Strata 1 and 2 (NTGR = 0.37), that were largely motivated by the program rebate plus a number of non-program factors (including, a corporate policy to implement energy saving strategies and equipment into their facilities). The Stratum 2 projects also included a large sanitary treatment project (NTGR = 0.00) involving the replacement of old compressors at a wastewater treatment plant with larger compressors that have VFDs. The project scope also included a move to

electrically driven centrifugal pumps, as part of increasing the fine bubble aeration capacity of the plant. The rebated measure was part of a larger expansion due to the need for increased water treatment capacity and increased demand for reclaimed water. The need for increased aeration was driven by regulations regarding nitrogen content.

  - Within the smaller Stratum 5 projects were many grocery store lighting and refrigeration projects (NTGRs = 0.39 and 0.60) that were motivated by a mix of program and non-program factors.

- SCE-SW-003B: Calculated Incentives Industrial (NTGR = 0.54)
  - The evaluated projects in this program represented a wide range of business types and applications, therefore, it is not possible to draw conclusions about any particular type of measure or application.
  - Over two-thirds of the 39 projects evaluated had NTGRs of 0.50 and above. Six of these projects (15 percent) had NTGRs, of 0.75 and above, reflecting a high level of program influence.
  - The level of program influence for the 17 medium and large projects in Strata 1, 2 and 3 was generally high, most had NTGRs exceeding 0.60 and several were above 0.70. Only two projects had NTGRs below 0.50 in this group of medium and large projects. These projects had strong non-program influences present, but program influence was still significant.
  - For smaller projects in Strata 4 and 5, the level of program influence was somewhat less. Again, these consisted of a diverse mix of projects with unique customer specific circumstances governing the level of free ridership.
- SCE-SW-004B: Calculated Incentives Agricultural (NTGR = 0.44)
  - All projects evaluated were generally smaller in size, and were only associated with Strata 3, 4 or 5.
  - Most of the projects evaluated consisted of agricultural pump system overhauls. These had a wide range of NTGRs, ranging from 0.23 to 0.84, and averaging close to the program value of 0.44.
  - Other installed technologies included ventilation fans in barns, milk pump VFDs, and compressor VFDs.
  - Again, there was no systematic pattern to NTGRs by measure type.

Non-Core Programs

Only two Non-Core program categories were evaluated for SCE, New Construction (SCE-SW-005A) and a grouping of Third Party programs. Findings for each of these program categories are presented below in Table 6-7.

Table 6-7: Weighted Net-to-Gross Ratios for SCE – Electric – Non-Core Programs

Program Sampling Strata	All Programs	SCE Core New Construction SCE-SW-005A	SCE Other 3P
1	0.48	0.43	0.56
2	0.52	0.49	0.40
3	0.52	0.44	0.53
4	0.47	0.46	0.51
5	0.45	0.46	0.50
Weighted NTGR	**0.49**	**0.45**	**0.51**
90 Percent CI	0.47 to 0.50	0.42 to 0.49	0.45 to 0.56
Relative Precision	0.04	0.09	0.11
n NTGR Completes	367	38	54
N Sampling Units	3,052	389	265
ER	0.44	0.34	0.53
NTGR Adjustment Factor	1.02		
Final NTGR	**0.50**		

* No projects

- SCE-SW-005A: New Construction program

  The overall picture is one of moderate program influence, with a program-level NTGR of 0.45. Within each Stratum, NTGRs are quite similar. The diverse set of 38 projects evaluated addressed a myriad of different technologies implemented across a broad spectrum of end-users.

  As an example, the largest project evaluated, a wastewater treatment facility, had a medium NTGR of 0.55. Although the program incentive brought the simple payback down to 2.5 years, the project already had already had met the required payback level of 3 years even without the incentive. Strong non-program factors cited included a culture of being ahead of the curve on energy efficiency measures, and the organization's master plan for greenhouse gas reductions and energy efficiency.

  Another example is two data center projects for one firm in Strata 2 and 3 which reported a strong level of program influence overall (NTGRs = 0.63 and 0.73). These results were somewhat better than similar data center projects evaluated for other utility programs.

- Other Third Party Programs

  The Other Third Party category consisted of 54 projects from the following programs: Nonmetallic Minerals and Products (SCE-TP-016), Oil Production (SCE-TP-020), Food & Kindred Products (SCE-TP-013), Primary and Fabricated Metals (SCE-TP-014), Retail

Energy Action Program (SCE-TP-025), Comprehensive Petroleum Refining (SCE-TP-019), Healthcare EE Program (SCE-TP-006), Management Affiliates Program (SCE-TP-031), and Commercial Utility Building Efficiency (SCE-TP-026).

The Other Third Party category result is characterized by moderate program influence, with an. NTGR of 0.51 across the 54 projects evaluated. By Strata, the NTGR results are similar across all Strata except for Stratum 2 and range between 0.50 and 0.56. The Strata 2 result is somewhat lower, at 0.40, and is adversely affected by one large oil/gas project, with an NTGR of 0.13. That project involved installation of a high-efficiency transformer. During the interview, the decision maker revealed, "It was a given that we would have to do this because it was [to address] a safety issue." However, they also said they would have installed something less efficient in the program's absence.

SDG&E – Electric

Core and Non-Core Programs

Only three programs or program groups had sufficient sample to be able to report on, SDGE Core, SDGE3118 (New Construction) and SDGE3117 (Non Residential BID). Table 6-8 below reports the NTGR results for these three programs/program groups which address both Core and Non-Core program groups.

Table 6-8: Weighted Net-to-Gross Ratios for SDGE – Electric – Core and Non-Core Programs

Program Sampling Strata	All Programs	SDGE Core Comm Ind Ag	SDGE New Construction SDGE3118	SDGE Local NR SDGE3117
1	0.41	0.25	0.23	0.52
2	0.49	0.43		0.50
3	0.43	0.46	0.40	0.43
4	0.48	0.51	0.38	0.47
5	0.47	0.45	0.40	0.51
Weighted NTGR	**0.45**	**0.45**	**0.33**	**0.49**
90 Percent CI	0.43 to 0.48	0.41 to 0.48	0.18 to 0.48	0.46 to 0.53
Relative Precision	0.06	0.08	0.45	0.08
n NTGR Completes	125	56	14	55
N Sampling Units	1,469	791	214	464
ER	0.43	0.37	1.07	0.36
NTGR Adjustment Factor	1.02			
Final NTGR	**0.46**			

Across all programs and program groups evaluated, a medium-low program level of influence was found, with an NTGR of 0.46. The local Nonres BID program performed somewhat better with an NTGR of 0.49, while the New Construction program was notably worse (NTGR = 0.33). The Core program result (NTGR = 0.45) is identical to the average across all programs.

- Core Commercial-Industrial-Agricultural programs

  The weighted NTGR across all SDGE Core projects was 0.45, reflecting a medium-low level program influence. This result is based on findings from a large pool of 56 evaluated projects.

  The results across the strata are similar, with the exception of Stratum 1, which had a low NTGR of 0.25. This result was based on evaluation of two projects for a large institutional customer. The decision maker indicated their choice was based on the need to update their facility because the mechanical and electrical infrastructure had reached the end of its useful life, posing a potential loss of essential services. In addition, the program incentives represented only about one percent of the total cost of the project, therefore, the level influence they attributed to the program was very slight.

  Strata 2, 3 and 4, representing small and medium-sized projects, had similar NTGRs of 0.43, 0.46 and 0.51, respectively. Stratum 5, comprised of very small projects, had a comparable NTGR of 0.45. It was comprised of many municipal projects with medium NTGRs of 0.62, while other projects had much lower NTGRs of between 0.19 and 0.50.

- New Construction program

  The New Construction program (also referred to as Savings by Design) had a low overall NTGR of 0.33 based on 14 evaluated projects. This result was heavily influenced by poor performance of Stratum 1 and 2 projects, where 2 of the 3 projects evaluated had NTGRs of 0.05. The decision maker indicated that non-energy benefits related to improving work place quality were a prime motivation for doing the project. In addition, the program incentive was a very small fraction of the total project cost.

  Within Strata 3, 4 and 5, all evaluated projects had NTGRs in the range of 0.28 to 0.55. In all of these cases, the program had at most a moderate influence on project decision making.

- SDGE3117: Non Residential BID Program

  The weighted NTGR across all SDGE3117 (Non Residential BID) program projects was 0.49. There was some improvement over the BD period when the program NTGR was 0.43.

  The strongest results were seen in both the largest Stratum 1 and 2 projects (NTGR = 0.52 and 0.50, respectively) and the smallest Stratum 5 projects (NTGR = 0.51). Among the Stratum 1 and 2 projects were several for state universities with NTGRs of 0.60 and above. All of these projects were done for multiple reasons, including the desire to save

on energy costs, and program incentives also played an important role. One decision maker stated that energy efficiency is not a priority among university projects, and therefore, energy efficiency projects need to be self-funded in order to be approved. Program rebates help in this respect. A decision maker for another large project expressed a similar philosophy for his organization, that facilities projects are on a need basis and payback requirements must be met. If a project can pay for itself within the set threshold, it can be done. Utility rebates definitely help to fulfill payback period requirements.

Stratum 3 projects included multiple projects, 3 of the 5 evaluated, involving installation of CO sensors in parking ramps. These were reported as standard practice and received NTGRs of 0.00, thereby pulling down the NTGR for this size stratum.

SDG&E – Gas

Just one program had sufficient sample to be able to report on, SDGE3117 (Non Residential BID). Table 6-9 below reports the NTGR results for the group of all projects evaluated, and for this program.

Table 6-9: Weighted Net-to-Gross Ratios for SDGE – Gas – Core and Non-Core Programs

Program Sampling Strata	All SDGE	SDGE Local SDGE3117
1	N/A*	N/A*
2	0.57	0.72
3	0.65	
4		0.63
5	0.48	0.54
Weighted NTGR	**0.58**	**0.67**
90 Percent CI	0.55 to 0.61	0.65 to 0.69
Relative Precision	0.05	0.03
n NTGR Completes	34	22
N Sampling Units	335	102
ER	0.20	0.08
NTGR Adjustment Factor	1.00	
Final NTGR	**0.58**	

* Insufficient completes for SDGE Core, SDGE New Construction, SDGE Deemed

Non-Core Programs

The weighted NTGR across all SDGE Core and Non-Core Gas projects was 0.58, reflecting a medium level program influence. This result is based on findings from a total of 34 evaluated projects.

- SDGE3117: Non Residential BID Program

  The weighted NTGR across all SDGE3117 (Non Residential BID) program projects was a commendable medium-high level of 0.67. This is based on evaluation of 22 projects.

There was some variation in results by stratum. For example, Stratum 2/3 projects had the strongest level of program influence in this group, with an NTGR of 0.72 for Strata 2/3 and 0.63 for Stratum 4. All three of the projects in Strata 2 and 3 had NTGRs of either 0.70 (1 project) or 0.73 (2 projects). Three of the six Stratum 4 projects also had high NTGRs of 0.73. These projects were implemented by a large state university, and both of these measures were part of a portfolio of 30 similar projects. The most important factors cited in the project decision making were the program rebate, the resulting energy and cost savings and compliance with Assembly Bill 32 (the requirement to reduce greenhouse gases). The decision maker stated that program rebates are a primary source of funding and projects are not approved without a rebate. Stratum 5 projects (NTGR = 0.54) were more diverse and NTGRs more varied, with values ranging from 0.35 to 0.77.

SCG – Gas

For SCG's Gas programs, there were a sufficient number of completed surveys to allow for reporting for two sampling domains, SCG Calculated, and SCG Deemed programs. The NTGR results for the group of all projects evaluated, and for each of these program domains, are provided in Table 6-10 below. These results are based on findings from a total of 74 evaluated projects, out of which the SCG Calculated program domain accounts for the largest share (62 projects).

Table 6-10: Weighted Net-to-Gross Ratios for SCG – Gas – Core and Non-Core Programs

Program Sampling Strata	All SCG	SCG Core	SCG Deemed
1	0.44	0.44	N/A*
2			0.61
3	0.50	0.48	
4	0.54	0.53	0.62
5	0.54	0.54	0.43
Weighted NTGR	**0.49**	**0.48**	**0.55**
90 Percent CI	0.40 to 0.58	0.40 to 0.56	0.34 to 0.77
Relative Precision	0.19	0.17	0.39
n NTGR Completes	74	62	10
N Sampling Units	731	577	122
ER	1.04	0.85	0.79
NTGR Adjustment Factor	1.00		
Final NTGR	**0.49**		

* No completes for SCG New Construction

Core Programs

The weighted NTGR across all SCG Core and Non-Core Gas projects was 0.49, reflecting a medium level program influence. This result is based on findings from a total of 74 evaluated projects.

- Calculated Incentives Program

  The Calculated Incentives program achieved a medium-low NTGR of 0.48 across all projects evaluated. Projects in Strata 1 and 2 (combined) and 3 (NTGRs of 0.44 and 0.48, respectively) had relatively lower program influence than did those in Strata 4 and 5 (NTGRs of 0.53 and 0.54, respectively).

  Results in Strata 1/2 were heavily influenced by a number of different projects implemented by a large oil refinery. The very largest projects in Strata 1/ 2 had extremely low NTGRs of 0.13; according to the decision maker, while large in absolute terms, the incentive was very small relative to the total project cost (i.e., $1 million incentive versus $50-60 million total project cost). They also said they would have installed the same equipment with or without the program. However, program influence was much higher on other Stratum 2 projects undertaken by the same company, with NTGRs of between 0.70 and 0.75.

Strata 3, 4 and 5 consisted of a number of very diverse projects with NTGRs ranging from 0.28 to 0.95. There were no dominant types of projects or project sponsors in these Strata.

- Deemed Incentives Program

  The NTGR for the Deemed Incentives program was a medium value of 0.55 based on evaluation of 10 projects. Strata 2/ 3 and Stratum 4 had nearly equal NTGRs of 0.61 and 0.62, while Stratum 5 results were somewhat lower (NTGR = 0.43). There were no dominant types of projects or project sponsors in these Strata.

6.1.3 Results By Sampling Domain – Statewide and Local Government Programs

In addition to the IOU Core and Third party programs, NTG findings were developed for two categories of government programs: Statewide Government and Institutional programs, and Local Government programs. A total of 254 surveys were completed for this program domain and were evenly split between the Statewide and Local Government program categories. Below are findings specific to each program or program grouping studied.

Statewide Government and Institutional

Results are available for both PG&E and SCE programs. Findings are further subdivided into 2 major Statewide program categories: the UC/CSU Partnership program, and the California Community Colleges Partnership program.

Statewide

The NTGR for the Statewide Government and Institutional domain is a medium-high level of 0.56. NTGRs for PG&E (0.55) and SCE (0.57) Statewide Government and Institutional programs were very similar this statewide value, as shown in Table 6-11 below. Key drivers of each IOU result are at the program-level, as explained more fully below.

Table 6-11: Weighted Net-to-Gross Ratios for Statewide Government and Institutional Programs

Program Results	Statewide SW Govt & Institutional	PGE SW Govt & Institutional	SCE SW Govt & Institutional
Weighted NTGR	**0.56**	**0.55**	**0.57**
90 Percent CI	0.54 to 0.58	0.52 to 0.59	0.54 to 0.59
Relative Precision	0.04	0.07	0.05
n NTGR Completes	128	72	56
N Sampling Units	434	308	126
ER	0.35	0.39	0.29

Program-Specific

In general, the UC/CSU Partnership program achieved a somewhat higher NTGR than did the California Community Colleges Partnership program, demonstrating stronger program influence. Findings specific to each program are presented below, in Table 6-12 and Table 6-13, respectively.

Table 6-12: Weighted Net-to-Gross Ratios for UC/CSU Partnership Program

Program Results	Statewide UC/CSU	PGE SW UC/CSU PGE21262	SCE SW UC/CSU SCE-L-005G
Weighted NTGR	**0.56**	**0.56**	**0.57**
90 Percent CI	0.53 to 0.60	0.50 to 0.62	0.54 to 0.60
Relative Precision	0.07	0.11	0.05
n NTGR Completes	63	31	32
N Sampling Units	270	211	59
ER	0.38	0.42	0.28

Table 6-13: Weighted Net-to-Gross Ratios for California Community Colleges Partnership Program

Program Results	Statewide CCC	PGE SW CCC PGE21261	SCE SW CCC SCE-L-005A
Weighted NTGR	**0.47**	**0.41**	**0.52**
90 Percent CI	0.43 to 0.51	0.33 to 0.49	0.48 to 0.56
Relative Precision	0.09	0.20	0.08
n NTGR Completes	48	29	19
N Sampling Units	134	78	56
ER	0.46	0.82	0.25

The UC/CSU Partnership programs operated by each utility were able to develop a strong set of projects at participating universities that generally exhibited a high or medium-high level of program influence. A common set of themes from the completed NTG interviews is that participation in the UC/CSU partnership program is woven into how the university does its energy efficiency and facilities improvements planning. The incentive funds facilitate the approval of specific capital improvement projects from the deferred maintenance backlog, and they allow higher efficiency, improved equipment reliability, and improved operating budget in the process. Consequently, only 9 of the 63 projects evaluated had NTGRs below 0.50. In addition, a sizable number, 10 of the 63 projects (representing the very largest projects within each stratum) had NTGRs of 0.70 and over.

The California Community Colleges Partnership program fared less well with respect to the program's ability to influence project decision making. On a Statewide basis, the program NTGR of 0.47 falls into the medium-low category.

PG&E's program performed less well than SCE's, with an NTGR of 0.41 vs. 0.52 for SCE (note, however, that this difference is not statistically significant at the 90 percent confidence level as the confidence intervals slightly overlap). Results by Stratum are similar for the PG&E program with NTGRs of between 0.37 (Stratum 3) and 0.44 (Stratum 5). Only Strata 3, 4 and 5 had sufficient sample points to support NTGR analysis, there were no completed surveys in either Stratum 1 or 2. A key cause of the medium- low NTGR at the PG&E program level is low reported program influence for nearly two thirds of the sample. Of the 29 projects with completed surveys, 19 had NTGRs below 0.50. In contrast, for SCE's program, the majority (11 of the 19 projects with completed surveys) had NTGRs of 0.50 and higher. *This suggests that more effective program delivery can compensate somewhat for program design limitations.*

Local Government Partnership

Again, both PG&E and SCE programs had sufficient sample to support program-group level reporting. The program groups being reported have projects associated with the following Local Government Partnership (LGP) programs:

PG&E Local Government Partnerships	SCE Local Government Initiatives
PGE2130 - Association of Monterey Bay Area Governments Energy Watch	SCE-L-004B – City of Long Beach Energy Leader Partnership
PGE2132 - East Bay Energy Watch	SCE-L-004C - City of Redlands Energy Leader Partnership
PGE2133 - Fresno County Energy Watch	SCE-L-004E - City of Santa Ana Energy Leader Partnership
PGE2136 - Marin County Energy Watch	SCE-L-004F - City of Simi Valley Energy Leader Partnership
PGE2138 - Napa County Energy Watch	SCE-L-004H - Community Energy Leader Partnership
PGE2139 - Redwood Energy Watch	SCE-L-004I - Desert Cities Energy Leader Partnership
PGE2140 - San Joaquin County Energy Watch	SCE-L-004L - Kern County Energy Leader Partnership
PGE2141 - San Luis Obispo County Energy Watch	SCE-L-004M - Orange County Cities Energy Leader Partnership
PGE2142 - San Mateo County Energy Watch	SCE-L-004N - Palm Desert Demonstration Partnership
PGE2144 - Sierra Nevada Energy Watch	SCE-L-004O - San Gabriel Valley Energy Leader Partnership
PGE2145 - Sonoma County Energy Watch	SCE-L-004P - San Joaquin Valley Energy Leader Partnership

PG&E Local Government Partnerships	SCE Local Government Initiatives
PGE2146 - Silicon Valley Energy Watch (San Jose)	SCE-L-004Q - South Bay Energy Leader Partnership
PGE2147 - San Francisco Energy Watch	SCE-L-004R - South Santa Barbara County Energy Leader Partnership
PGE2196 – Rightlights	SCE-L-004S - Ventura County Energy Leader Partnership
	SCE-L-004U - Western Riverside Energy Leader Partnership
	SCE-L-005C - County of Los Angeles Energy Efficiency Partnership
	SCE-L-005E - County of San Bernardino Energy Efficiency Partnership

NTGRs for the LGP programs were very similar for all three domains studied, as shown in Table 6-14 below. On a Statewide basis, the LGP averaged 0.45, reflecting a medium-low level of program influence.

Table 6-14: Weighted Net-to-Gross Ratios for Local Government Partnership Programs

Program Results	Statewide Local Government	PGE Energy Watch & Local Govt	SCE Local Govt Initiatives
Weighted NTGR	**0.45**	**0.43**	**0.47**
90 Percent CI	0.42 to 0.48	0.39 to 0.48	0.45 to 0.49
Relative Precision	0.06	0.11	0.05
n NTGR Completes	126	69	57
N Sampling Units	1,300	1,101	199
ER	0.41	0.55	0.27

Within the PG&E LGP NTG result (0.43), evaluated projects fell into Strata 3, 4 and 5 only. Stratum 3 had a NTGR of 0.13. The largest project within this stratum had an NTGR of 0.10, and the decision maker described the program incentive funding as "icing on the cake". Highly-rated non-program factors included: standard practice within the organization, corporate policy, improved product quality, and compliance with normal maintenance practices. *As discussed in detail in Chapter 7 of this report, several of these factors are highly correlated with high free ridership on projects.* Remaining projects in Strata 4 and 5 had widely varying NTGRs and no clear story behind them.

With a weighted NTGR of 0.47, the SCE Local Government Initiatives performed slightly better than the PG&E LGP programs (the difference is not statistically significant). This result was

comprised of results from projects in Strata 2, 3, 4 and 5. Results by stratum were highly varied. The Stratum 3 NTGR of 0.73 was greatly influenced by a Retrocommissioning project at a large health care facility (NTGR = 0.83). The projects were completely funded by the rebate, since the health care facility didn't have its own source of money. They use a revolving fund supported by CPUC grant funding, and the cents/therm program incentive to cover the retrocommissioning cost. Similar projects by the end-user in Strata 4 and 5 also affected those results, however the much lower NTGRs from other projects in those Strata generally offset this favorable result. Strata 4 and 5 NTGRs were both 0.42.

7

NTG Findings by Variables of Interest

In addition to the standard NTGR analyses by sampling domains, programs and program groups, a number of additional analyses were conducted. The purpose of this analysis was to assess the degree to which NTGR levels varied as a function of specific variables of interest. The following variables were investigated:

- Measure type
- Baseline disposition
- Size of incentive
- Business type (NAICS code)

Approach Used. The analysis was straightforward, as all of the variables studied were included in the utility tracking databases. Data were sorted by IOU and major variable category into bins associated with each variable type and then a savings-weighted NTGR was calculated. Further analysis was completed for bins with sufficient sample for reporting; generally ten projects or greater. Results were then sorted by major end-use category for reporting.

In some cases, the variables investigated did not turn up any systematic variation in NTGRs. For example, the Business Type analysis did not reveal any significant pattern to program influence associated with a particular business category or NAICS code.

7.1 NTGR Analysis by Measure Type

The IOU tracking databases for PY2010-2012 included 124 individual IOU measure groups; however, many of these could be mapped to a higher level grouping for analysis. In addition, many measure groups had too few sample points for reporting.[1] Through the process of mapping related IOU measures groups to a common category, and eliminating measures with an insufficient number of completed sample points, the number of end-use and measure-type categories was reduced to 17 electric measures and four gas measures.

[1] Generally defined as fewer than 10 projects.

The following are the End-Use and Measure Type categories for which reporting was possible. Specific findings are discussed below.

- Electric End-Uses
  - Data Center Measures (Air flow management, Server Virtualization, UPS)
  - Water/Wastewater Measures (Process Wastewater Aerator, Process Wastewater Control, Process Wastewater Other, Process Wastewater VFD)
  - HVAC Measures (Chiller Water-Cooled, Controls EMS, Fan VFD, VAV Conversion, Rooftop or Split System)
  - Pump Off Controllers (PG&E only)
  - Agricultural Pump Overhaul
  - Retrocommissioning
- Gas End-Uses/Measures
  - Process Boiler
  - Steam Traps
  - Process Heat Recovery
  - Whole building New Construction

7.1.1 Electric End Uses

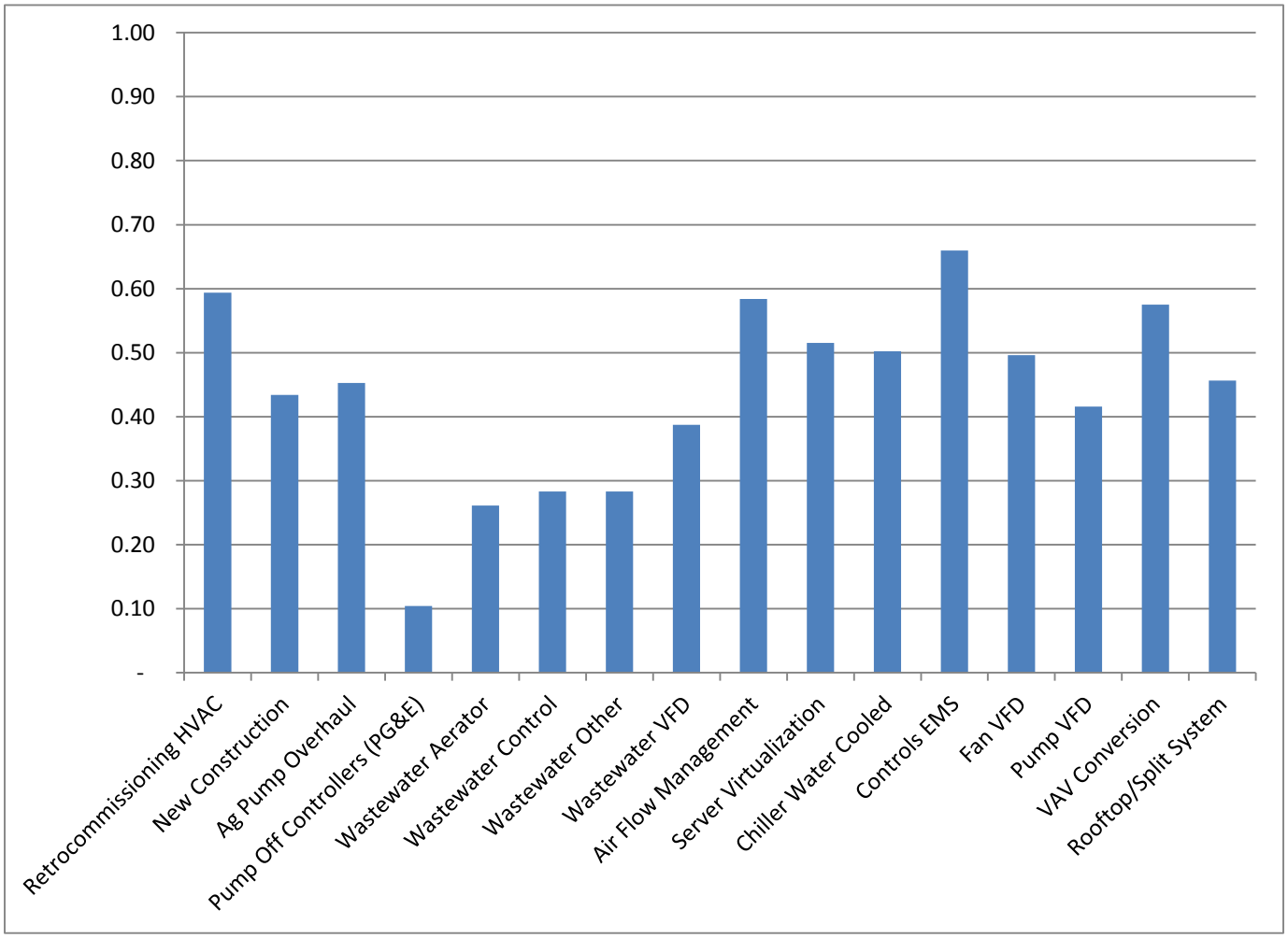
Based on the large sample of interviews completed, it was possible to compute NTGRs across a significant number of electric end-use and measure categories. Table 7-1 below reports average NTGRs across each category examined.

The NTGRs for all but five categories were at or below 0.50. The categories with NTGRs higher than 0.50 included two HVAC measures (Controls/EMS and VAV Conversion), two Data Center measures (Air Flow Management and Server Virtualization), and Retrocommissioning HVAC.

The category with the lowest NTGR was Pump-Off Controllers (PG&E only). Many of these were legacy projects from PY2006-2008, which were being installed as a standard practice during PY2010-2012. Various wastewater measures also had among the lowest NTGRs.

Following this is a detailed discussion of NTGR results for each electric measure category examined.

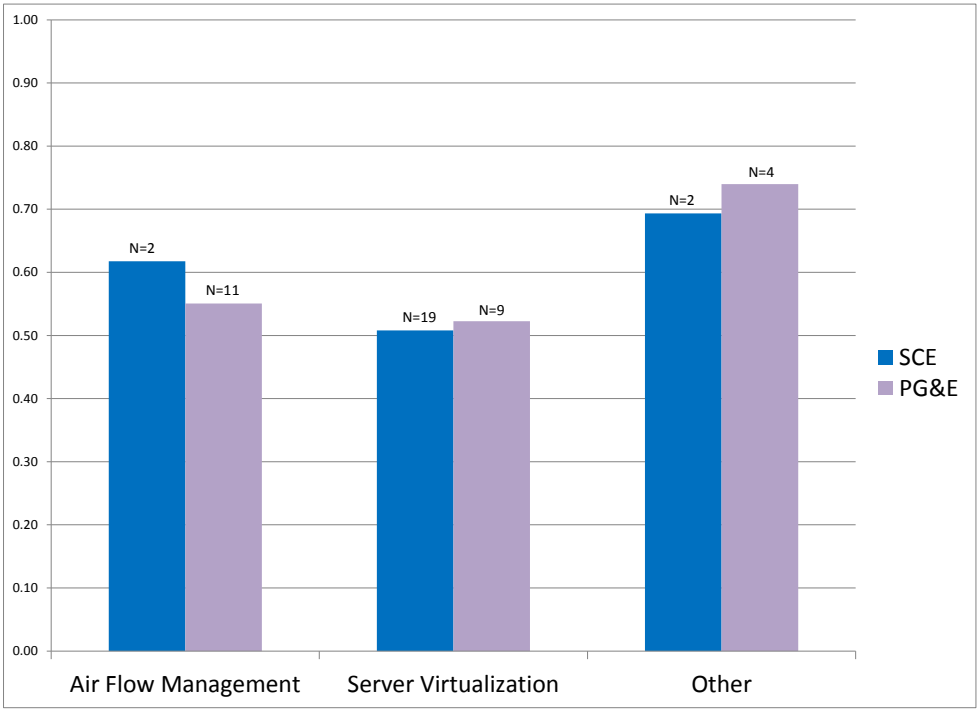
Table 7-1: NTGRs for Electric Measures



Data Center Measures

NTGRs for Data Center measures are presented in Table 7-2 below.

Table 7-2: NTGRs by Measure Group - Data Center Measures



These measures were installed through both the PG&E and SCE Calculated Incentives programs. NTGRs for Data Center Measures ranged between 0.51 and 0.74 depending on the measure. In addition to the Air Flow Management and Server Virtualization measures, an Other measure category, consisting of HVAC Other (SCE), and Uninterruptible Power Supply/UPS (PG&E) was examined.

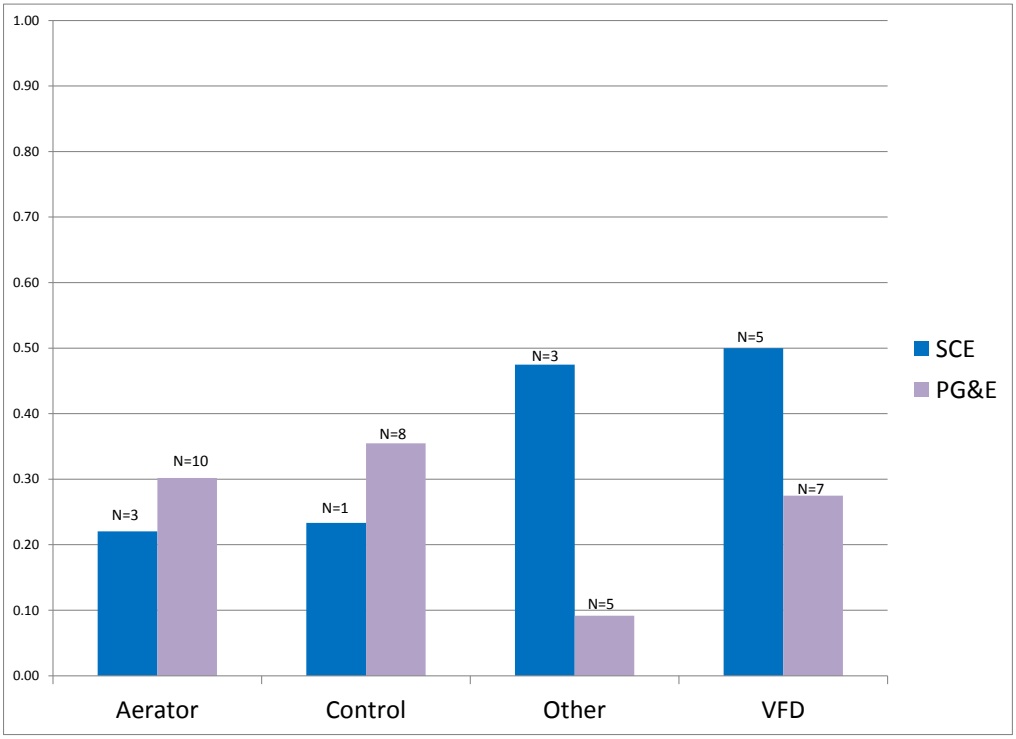
Of the three measures analyzed, the Server Virtualization measure had the lowest level of program influence, with NTGRs of 0.51 (SCE, 19 projects) and 0.52 (PG&E, 9 projects). This measure is becoming standard practice across much of the industry, a fact that has been documented in research undertaken by PG&E, among others.[2] The remaining Air Flow Management, HVAC Other (SCE), and Uninterruptible Power Supply/UPS (PG&E) measures had higher NTGRs, ranging from 0.55 (PG&E Air Flow Management, 11 projects) to 0.74 (PG&E UPS, 4 projects). *The medium Server Virtualization NTGRs reinforce the need to phase out incentive eligibility for this measure.*

Water/Wastewater Measures

In general, Water/Wastewater measure NTGR findings suggest very high free-ridership levels as shown below in Table 7-3.

[2] E.g., "Energy Efficiency Baselines for DATA CENTERS", Integral Analytics, Revision 1, March 1, 2013

Table 7-3: NTGRs by Measure Group – Water/Wastewater Measures



NTGRs ranged from a low of 0.09 (PG&E, Other category, five projects) to a high of 0.50 (SCE, VFDs, five projects). Four separate measure categories were analyzed; Aerators, Controls, VFDs and Other. Note that the SCE results are based on a small number of cases, generally five or fewer.

While none of the measures performed very well, both Aerators and Controls had particularly low NTGRs. VFD NTGR results, especially for PG&E, also demonstrated a low level of program influence.

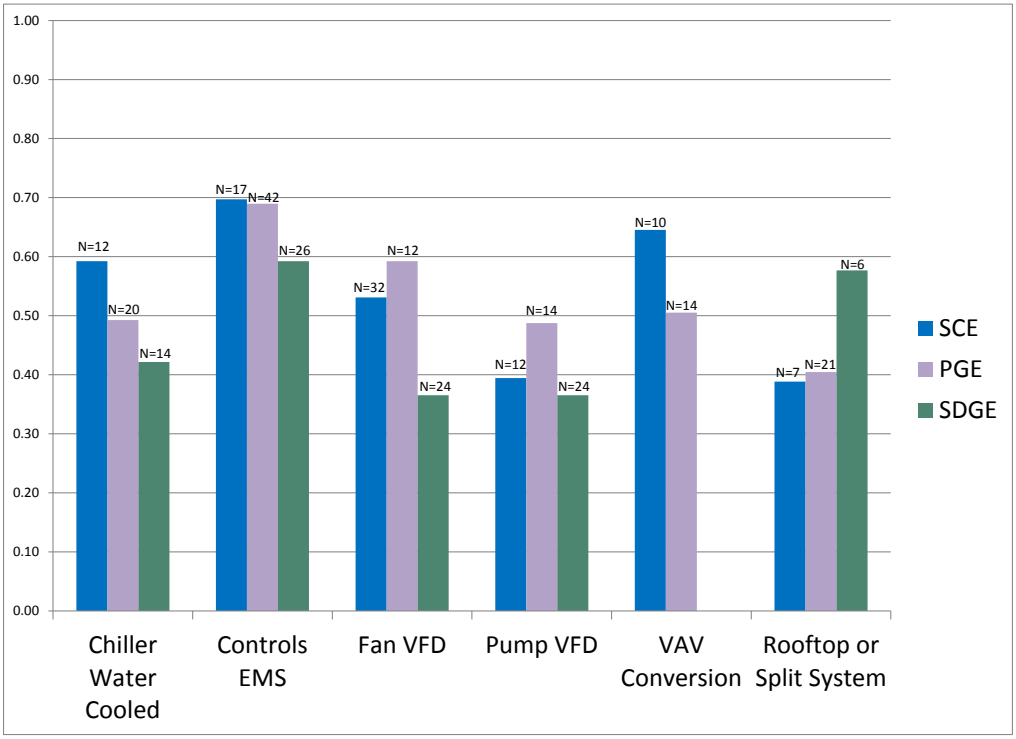
These results suggest that the set of Water/Wastewater measures eligible for incentives needs to be revisited, and those measures with medium-low or low NTGRs need to be eliminated from program eligibility. Further, the last baseline study for the Water/Wastewater sector[3] was completed by PG&E in 2006, and has not been updated since then. The IOUs should seriously consider conducting a new Water/Wastewater Baseline study in the near future.

HVAC Measures

HVAC measure results are shown in Table 7-4 below. NTGRs were computed for a number of HVAC measure categories. These included water cooled chillers, controls/EMS, fan/VFD, pump/VFD, VAV conversion, and rooftop or split system units.

[3] Energy Baseline Study For Municipal Wastewater Treatment Plants, Base Energy, Inc. September 2006.

Table 7-4: NTGRs by Measure Group – HVAC Measures



NTGRs for most of these measures exceeded 0.50, however, rooftop or split system units[4] and pump VFDs were somewhat lower, around 0.40 to 0.45. *The medium-low NTGRs for rooftop/split system and pump/VFDs suggest an industry standard practice (ISP) study may be warranted to assess whether these measures are becoming standard practice.*

NTGR results also varied somewhat by IOU.

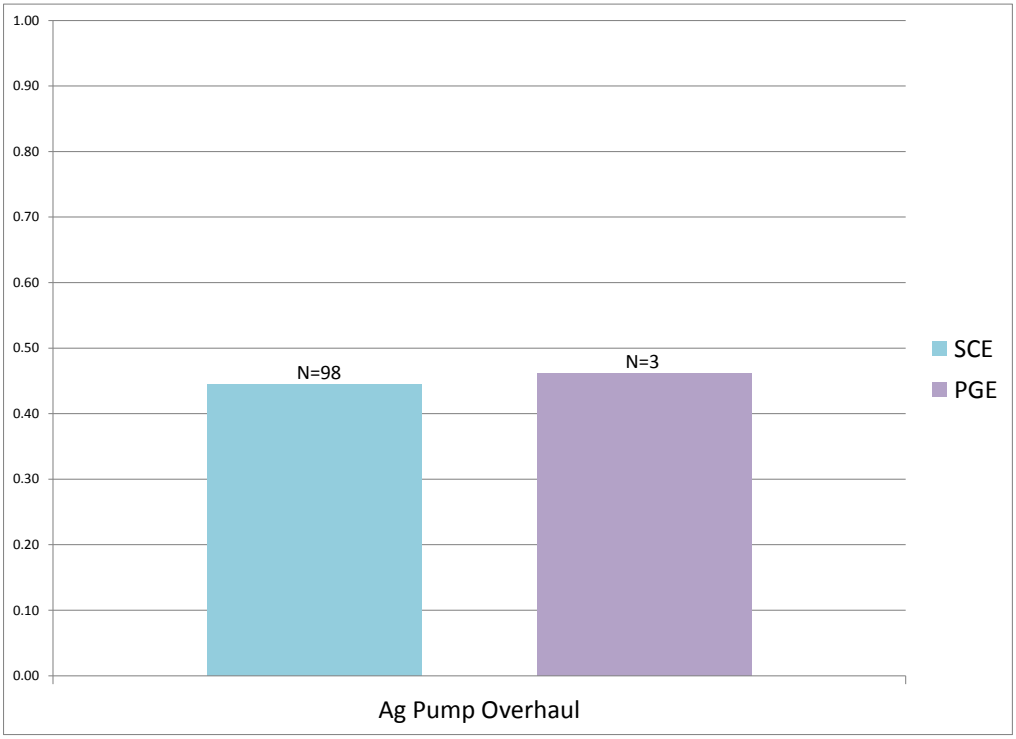
- The **EMS/Controls** measure category had the least amount of variation, with NTGRs ranging from 0.59 (SDG&E, 26 cases) to 0.70 (SCE, 17 cases). The PG&E value of 0.69 (42 cases) was very close to SCE's NTGR of 0.70.
- Other measure NTGRs such as those for water cooled chillers fan/VFDs, VAV conversions, and rooftop or split system units had far more variation across IOUs.

Agricultural Pump Overhaul

NTGRs for Agricultural Pump Overhaul projects were approximately 0.45, suggesting medium-low program influence as shown in Table 7-5.

[4] Note that the SDG&E result is based on 6 cases only.

Table 7-5: NTGRs by Measure Group - Agricultural Pump Overhaul



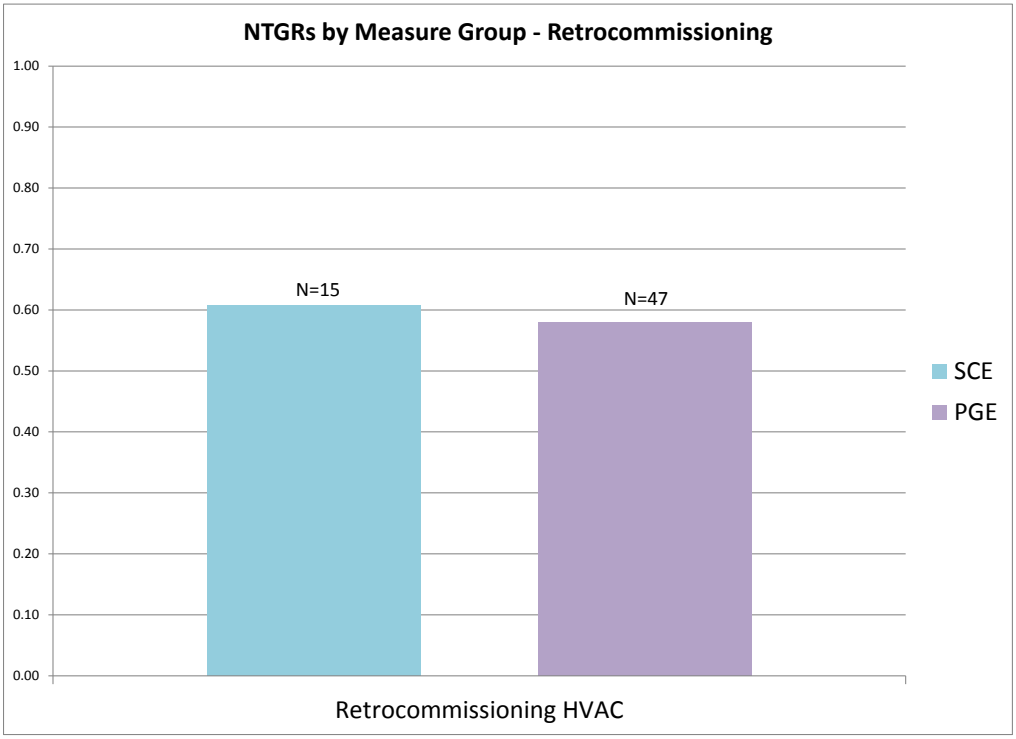
Values were very similar for PG&E (3 cases) and SCE (98 cases). Both values were below 0.50. *Note that the SCE NTGR has dropped significantly from the finding in the PY2006-2008 evaluation, which had an NTGR of 0.63.*

In general, these pump overhaul projects are motivated by a mix of program and non-program factors, as the data show. The program's involvement is up-front, and a key role is to conduct pump tests and identify which wells need replacement. But non-program influences, such as the desire to have a reliable source of water pumping are also important as these results confirm.

Retrocommissioning HVAC

The final electric measure group examined was Retrocommissioning (RCx) for HVAC. Table 7-6 presents these results.

Table 7-6: NTGRs by Measure Group – Retrocommissioning HVAC



Results confirmed a medium level of program influence, with NTGRs for SCE of 0.61 (15 projects) and for PG&E of 0.58 (47 projects). However, these results are down significantly from PY2006-2008, where NTGRs were 0.75 and higher for all IOU programs.

In the PY2006-2008 RCx evaluation,[5] the conclusion was that the NTGR values were relatively high and that there were several factors contributing to the high average NTGR:

1. Selection of projects at an early stage in the program cycle.
2. Low level of RCx activity outside of the IOU programs.
3. Participants were less inclined to undertake RCx studies on their own due to their perceived uncertainty and risk associated with RCx projects. A thorough RCx study of a large, complex building typically costs tens of thousands of dollars, and there is no certainty that the study will pay for itself through the potential savings it identifies.
4. Many of the decision makers were constrained by funding cutbacks, staffing shortages, and reductions in maintenance budgets, particularly in public institutions, but also by hard-hit private sectors such as office buildings and the hospitality industry.

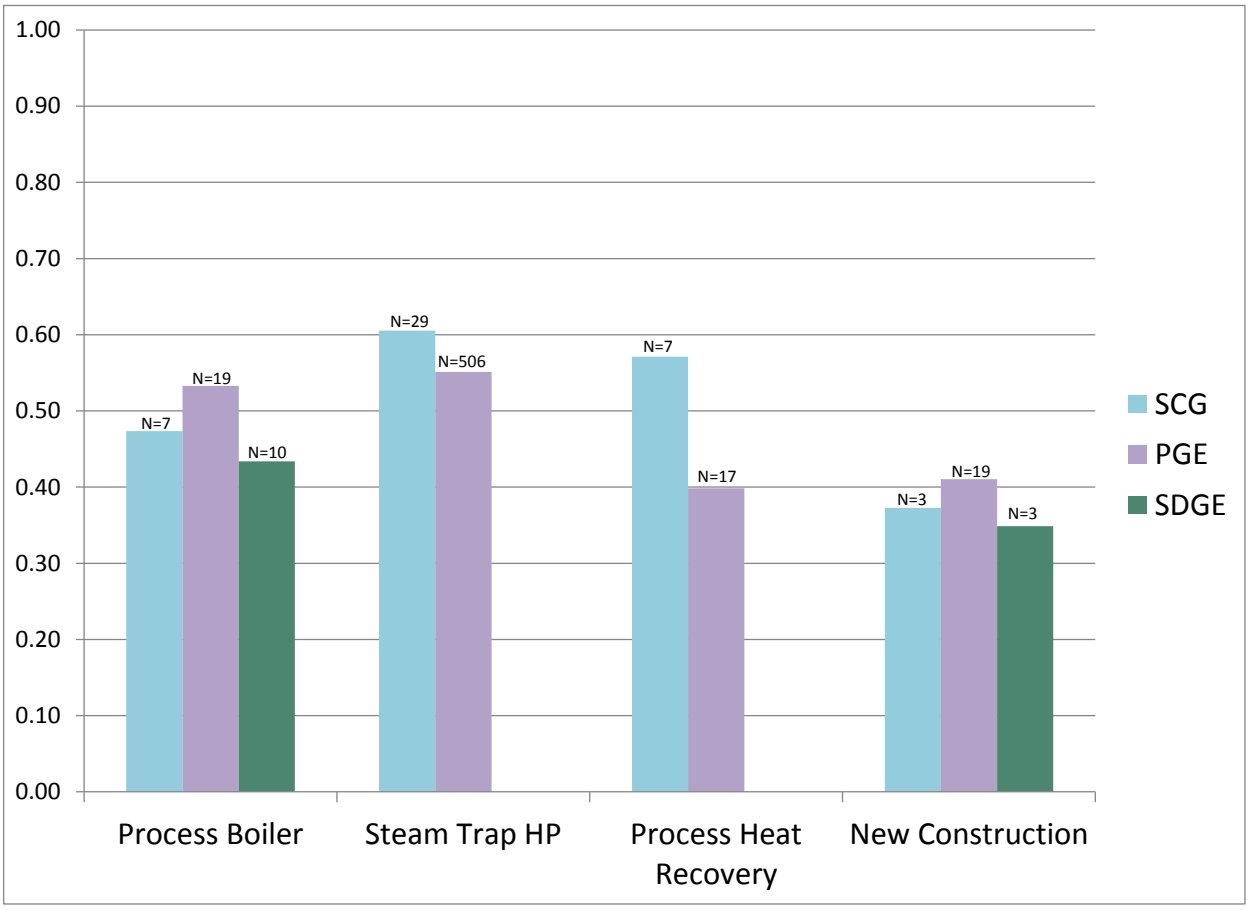
5 Final Report, 2006–08 Retro Commissioning Impact Evaluation, February 8, 2010.

Now that the RCx programs have been in place for a number of years, it is likely that some of these conditions have changed as the target market has become better educated,[6] more aware of the benefits of RCx at their facilities and has become more inclined to undertake RCx on their own.

7.1.2 Gas End Uses

NTGRs were also computed for a number of Gas measures (see Table 7-7 below). These measures included Process Boilers, Steam Traps, Process Heat Recovery, and Whole Building New Construction (gas measures only).

Table 7-7: NTGRs by Measure Group – Gas Measures



Among these four measures, New Construction projects had the lowest NTGRs with medium-low values of between 0.35 (SDGE, 3 projects) to 0.41 (PG&E, 19 projects). The reasons behind this medium low level of program influence have been discussed previously.

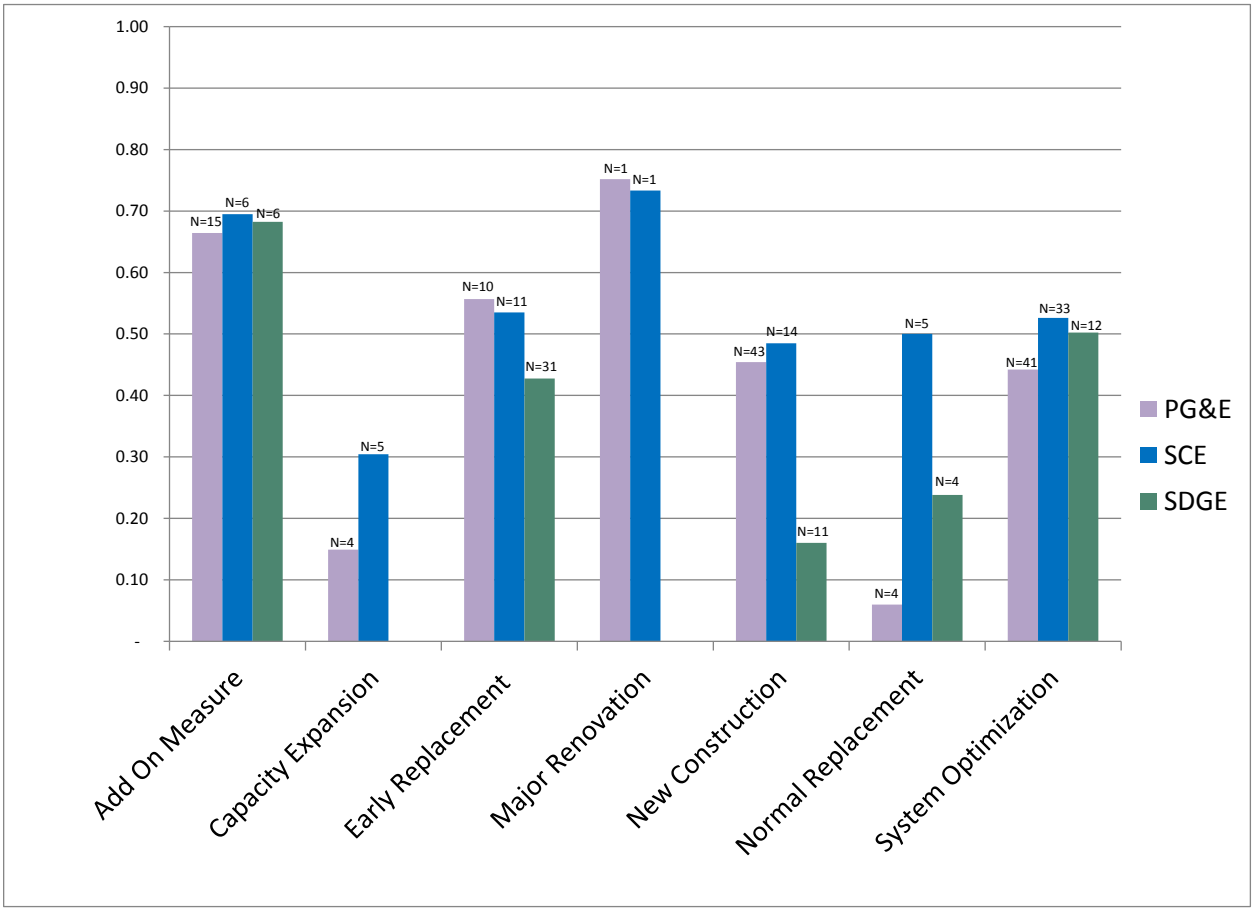
[6] For example, training courses such as Building Operator Certification, LEED certification, AEE and courses offered by the IOUs have all contributed to these higher education and awareness levels.

Among the remaining three measures, Steam Traps performed the strongest, with medium NTGRs of 0.61 for SCG (29 projects) and 0.55 for PG&E (506 projects). These results, while favorable, are slightly more favorable than Industrial Steam Trap NTGR levels from the PY2006-2008 programs which are 0.52 for High-Pressure traps, and 0.57 for Low Pressure traps. The remaining two measures, Process Boilers and Process Heat Recovery, had NTGRs ranging from 0.40 to 0.55, with some fairly wide variation in IOU-specific results.

7.2 NTGR Analysis by Baseline Disposition

The evaluation team also explored the relationship between NTGRs and the Baseline Disposition for gas and electric projects. This was only possible for the sub-set of projects in the NTG sample that overlapped with the Gross M&V sample, since the baseline disposition was an outcome of the site-level Gross M&V work. Separate analyses were completed for Electric and Gas measures, respectively. Electric results are shown in Table 7-8 below.

Table 7-8: NTGRs by Baseline Status (Electric Projects)

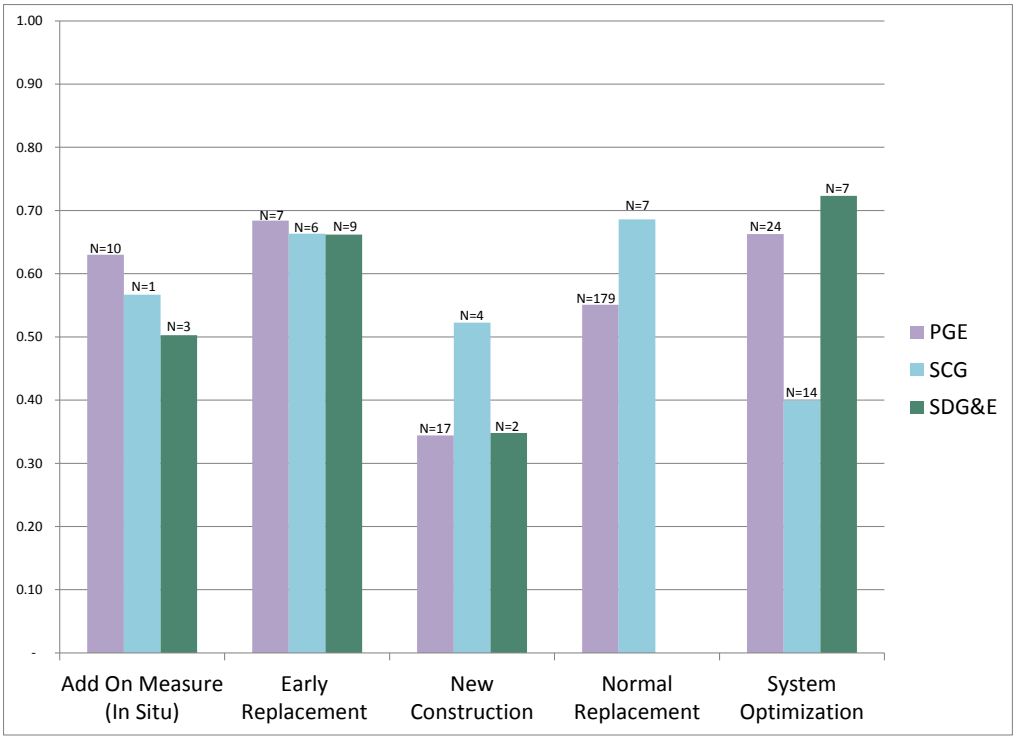


The following general observations can be made:

- Projects in the Major Renovation and Add-On Measure categories had the highest levels of program influenced adoptions, with NTGRs approximating 0.70
- The Early Replacement NTGR results (between 0.43 and 0.56) did not present a convincing case for program induced early installments
- The level of program influence for Capacity Expansion projects was very low, with NTGRs ranging from 0.15 to 0.30. Such projects are largely motivated by non-program reasons (i.e., the desire to expand production capability)
- Normal Replacement project NTGR results showed wide variation across utilities. Both PG&E and SDG&E values were low, while SCE's value was significantly greater; However, note that all of these results were based on a small number of completed surveys (PG&E and SDG&E - 4 projects, SCE - 5 projects).
- New Construction and System Optimization projects likewise had a moderate level of program influence with NTGRs nearing 0.50. Such projects have equally strong program and non-program reasons for being done.

Results for Gas projects are presented below in Table 7-9.

Table 7-9: NTGRs by Baseline Status (Gas Projects)



- Results for the Early Replacement category present a consistent picture of medium-high program influence across all three IOUs, with NTGRs exceeding 0.65. Normal Replacement NTGRs, while fairly strong, show fairly wide variance across utilities.
- Results for the System Optimization category provide a very mixed portrayal of program influence based on the IOU involved. Note that PG&E has the largest sample by far (24 projects) versus SDG&E and SCG (7 and 14 projects, respectively).
- New Construction results are generally consistent with Electric measure findings, with NTGRs ranging from 0.34 to 0.52.

7.3 NTGR Analysis by Size of Incentive

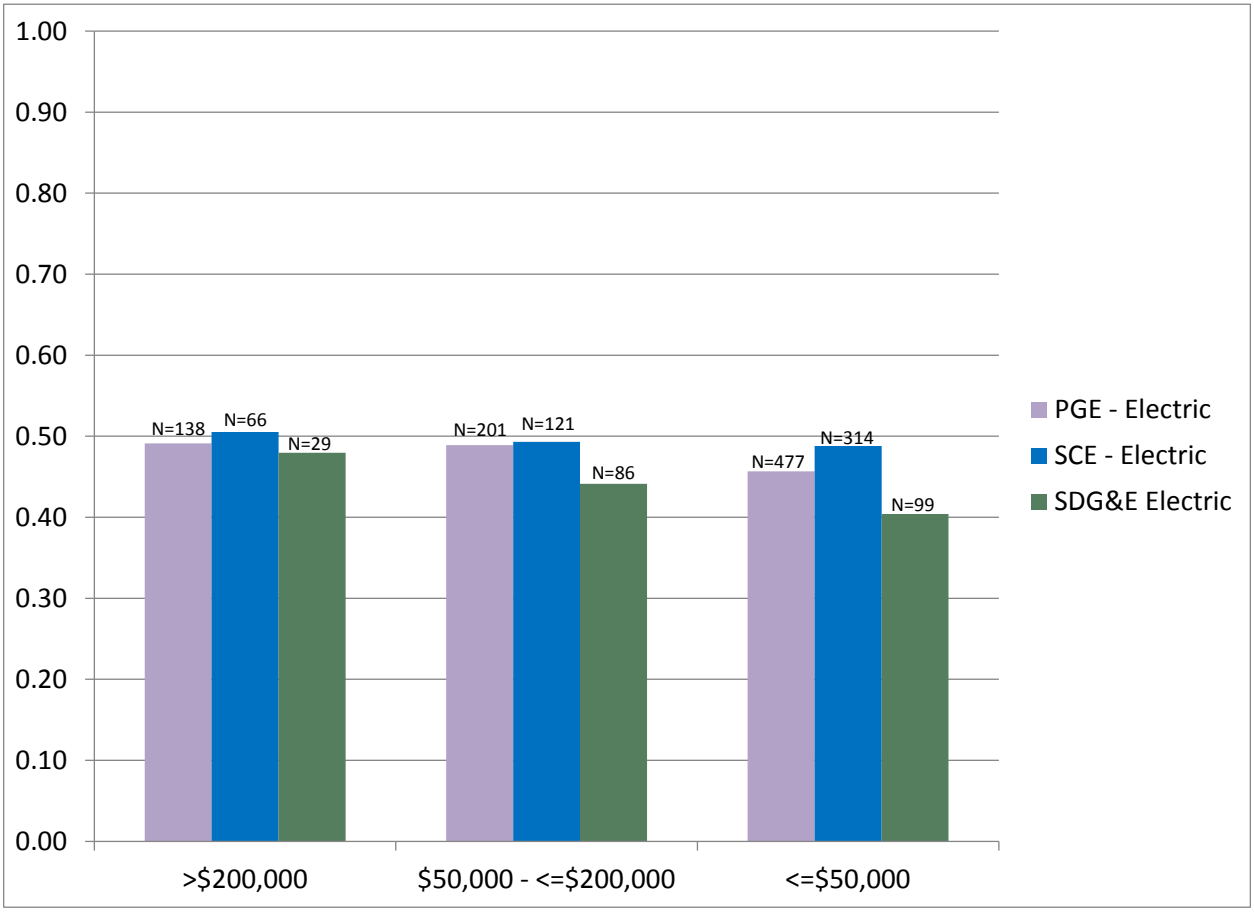
The relationship between NTGRs and the size of the incentive paid was also examined. The analysis was based on three incentive level categories:

- Low - defined as less than $50,000 per project
- Medium – between $50,000 and $200,000 per project
- High – more than $200,000 per project

Note that these categories correspond to the levels of Rigor applied to the NTG analysis. The Low incentive category is analogous to a Basic level of Rigor, the Medium incentive level ties to the Standard level of Rigor, and the High incentive level is associated with the Enhanced rigor.

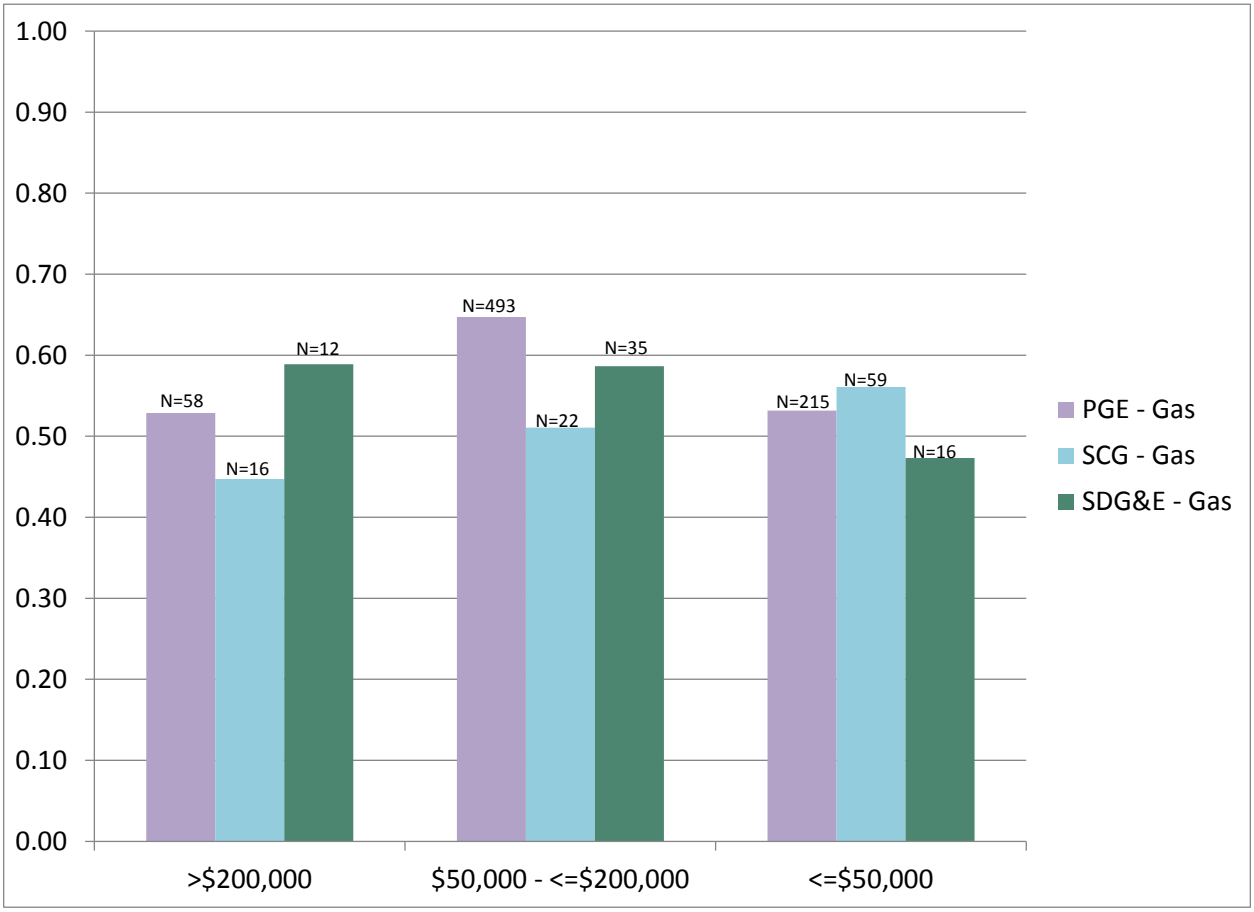
Electric results are shown in Table 7-10 below. These results indicate that the project NTGRs are relatively insensitive to the total amount of incentive provided, as values in all cases ranged from 0.40 to 0.51. At best, this indicates a weak relationship between NTGR and the total electric incentive level.

Table 7-10: NTGRs by Size of Incentive (Electric Projects)



Gas project results lead to a similar conclusion (Table 7-11). As with electric projects, the gas project NTGR levels are very similar irrespective of the total amount of incentive provided. NTGRs for projects in the Low incentive category are clustered around 0.50 as are those for projects in the High incentive category. Medium incentive project NTGRs are slightly higher.

Table 7-11: NTGRs by Size of Incentive (Gas Projects)



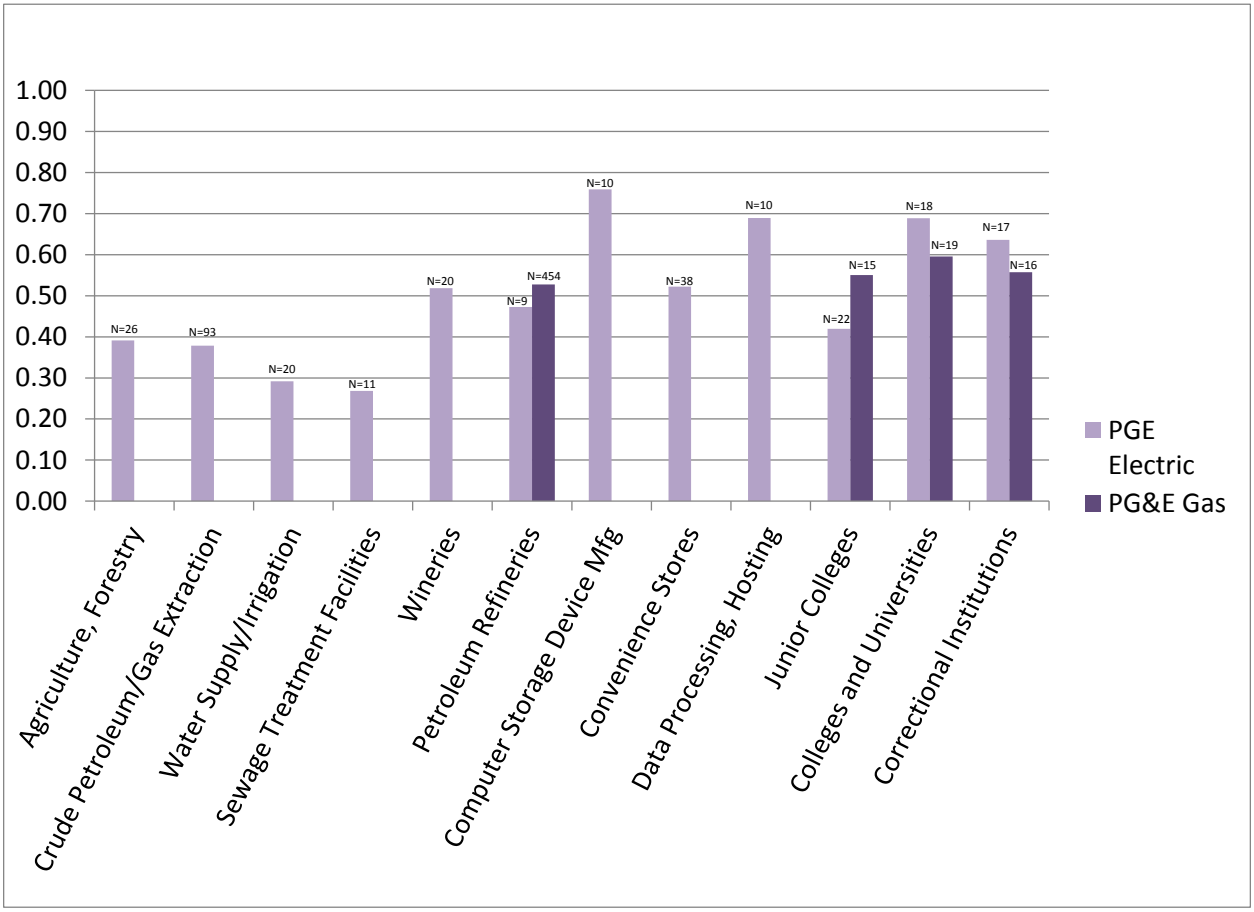
7.4 NTGR Analysis by Business Type

One final set of analyses was to examine variations in NTGRs by the type of businesses participating. The objective was to see if there were any systematic variations in NTGRs based on business type. Business categories with at least 10 projects were included in the analysis. Separate analyses were done for each utility since there was a large degree of variation by IOU in the mix of businesses represented by completed NTG surveys.

7.4.1 PG&E Results

Results for PG&E electric and gas projects are presented in Table 7-12 below. The number of completed surveys for PG&E Electric projects was sufficient to support reporting for a large number of business types, however, there were only four categories on the gas side that met this requirement.

Table 7-12: NTGRs by Business Type (PG&E)



The business sector classifications with the most favorable NTGR results included computer related business segments, colleges and universities, and correctional institutions. Those with the least favorable NTGRs comprised water and sewage treatment facilities, oil and gas extraction, and agriculture facilities.

Several of the business category-specific results are consistent with findings reported earlier in this report. For example,

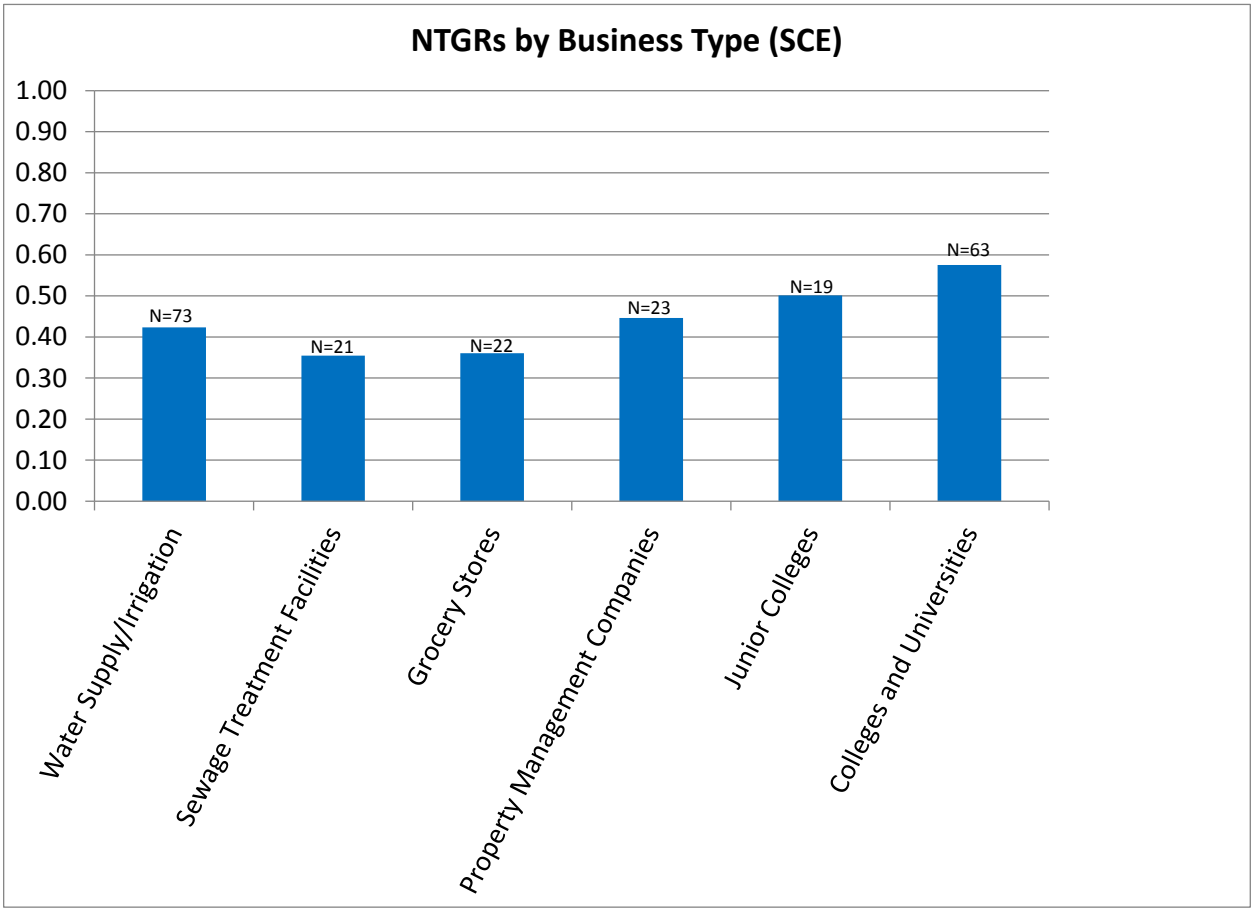
- NTGRs for the Water Supply/Irrigation and Sewage Treatment Facilities categories are among the lowest, with values of 0.29 and 0.27, respectively. These results mirror findings for the Water-Wastewater measure category reported earlier.
- Results for the Agriculture and Forestry category are generally consistent with findings for the Agricultural Pumping category reported earlier.
- Computer Storage Device Manufacturing NTGRs of 0.69 and higher are consistent with the strong NTGR performance for Data Center measures reported previously. However,

note that these businesses are concerned with manufacturing computer equipment as opposed to data storage which is the key focus of the Data Center segment.

7.4.2 SCE Results

Table 7-13 presents NTGRs sorted by Business Type for SCE. Similar to PG&E, the lowest NTGRs were for the Sewage Treatment and Water Supply/Irrigation business categories (mirroring previously-reported results by measure). The Grocery Store segment also performed poorly. The College and Universities segment achieved the most favorable NTGR, a medium value of 0.58 and consistent with the program-specific NTGR results for the UC/CSU Statewide Partnership reported earlier.

Table 7-13: NTGRs by Business Type (SCE)

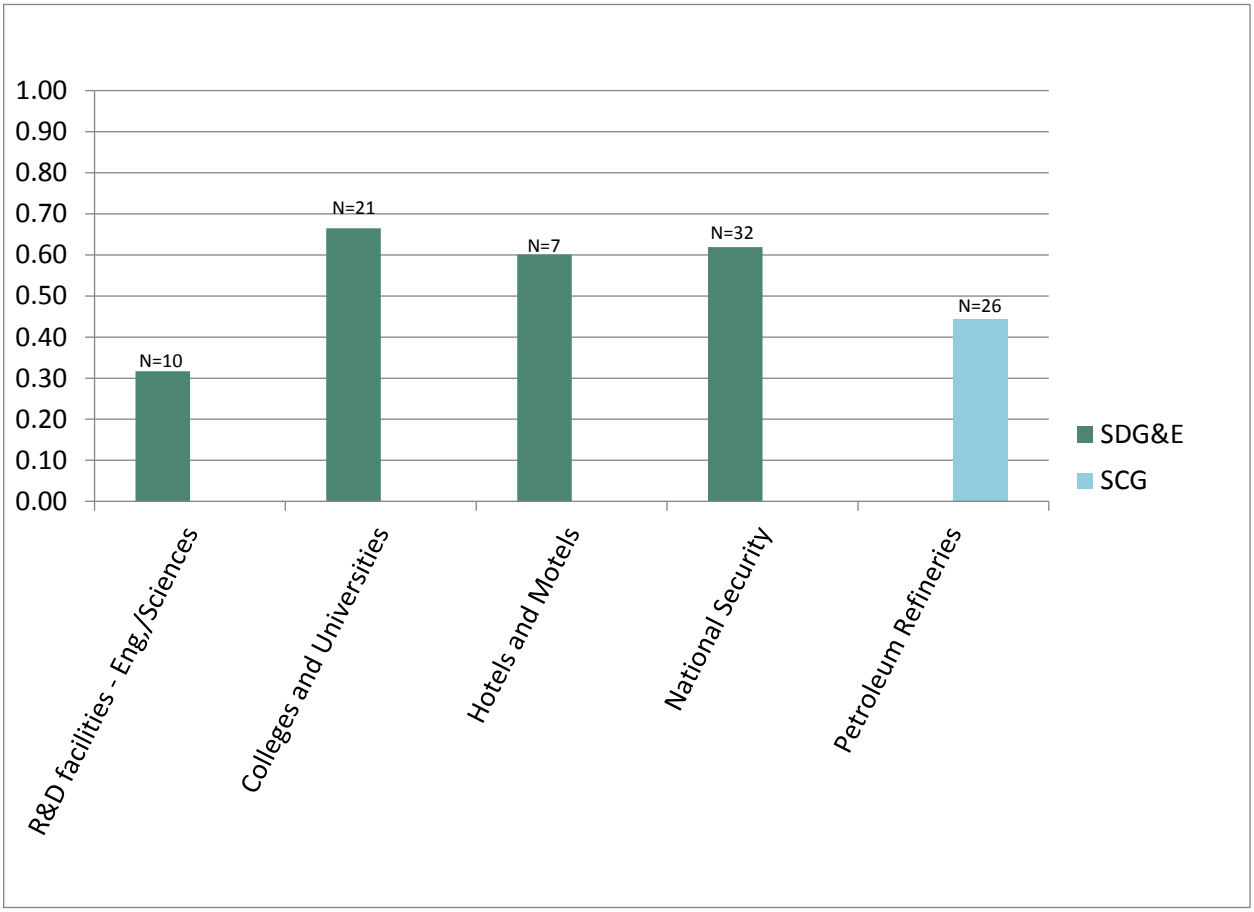


7.4.3 SDG&E and SCG Results

Finally, Table 7-14 presents a summary of NTGR findings by business type for SDG&E and SCG. The main conclusions are:

- The Colleges and Universities category had the strongest performance, with an NTGR of 0.66. Again, this is consistent with earlier findings for the Statewide UC/CSU program.
- The poorest performance, signified by the lowest NTGR, was for the Research and Development category, with an NTGR of 0.32. This result was based on a total of 10 completed surveys, and reflected a number of different projects with largely non-program motivations for completion.
- The Petroleum Refinery NTGR of 0.44 was consistent with PG&E findings for the Oil and Gas category. A significant driver of both of these sets of findings was projects undertaken by a small number of refineries with facilities in both IOUs' service territories.

Table 7-14: NTGRs by Business Type (SDG&E and SCG)



8

Key Factors Influencing NTGRs

Behind each of the NTGRs calculated for each project is a host of contextual factors that may have influenced the project, either directly or indirectly. These factors provide a set of clues to what is driving project decision making. In this chapter, we provide tables and analyses summarizing the relative presence of these factors for each major program group. The key contextual factors were first examined within each project, and then summarized across all evaluated projects within a given program or program grouping.

The intent was to look at a deeper level, beyond the numerical responses used in the NTGR algorithm, into the complete set of factors that may have influenced the project decision making. Factors were selected for this analysis if they were scored highly[1] during the NTG interview. Note that the scoring for these factors does not influence the overall NTGR on a given project, except indirectly. See Chapter 3 Methods for a full description of the NTGR algorithm.

The following are general themes and observations across these analyses:

- **Corporate policy is present for virtually all evaluated projects.** Corporate standard practice is nearly-universal as a motivating factor. Related to this is the strong presence of corporate environmental policies. Corporate policies that favor energy efficiency investment are a favorable characteristic of end- user decision making that aligns well with the state's overall, long-term goals for energy efficiency adoption and climate change mitigation. At the same time, correlation of this and other efficiency oriented decision making characteristics with program free ridership presents challenges to program designers, administrators and implementers with respect to policy objectives to maximize the net impact of ratepayer-funded efficiency programs while also achieving aggressive total savings goals.
- **For programs and program groups with the lowest NTGRs, there were one or more other strong drivers present that contributed to reduced program influence**. For SCE, a common theme was replacement of failing equipment. For SDG&E, environmental compliance features prominently. For some PG&E projects, additional non-energy benefits like automation were cited as the project driver, and low program influence was evident when projects were already in advanced stages of design and

[1] Defined as a score of 8, 9, or 10.

implementation (and therefore not influenced substantially by the program). Finally, for new construction projects, a significant percentage of projects were implemented by firms already using advanced energy efficiency in designs, including national chains and big box stores.

Next is a discussion by IOU of the results of this Key Factors analysis across the programs and program groupings for which the weighted NTG factors were developed.

8.1 Key Factors Analysis – PG&E

Table 8-1 below provides the detailed results for PG&E Core and Third party programs.

Table 8-1: Key Factors Analysis – PG&E Core and Third Party Programs

	PGE Core Comm Ind Ag	Energy Efficiency Services for Oil Production	New Construction	Heavy Industry	RCx Group	Other 3P PGE
		PGE2222	PGE21042	PGE2223	RCx Group	
Completed Surveys (N)	242	46	18	37	14	71
Distribution of NTGRs						
High - 0.76 to 1.00	9%	0%	10%	5%	14%	13%
Medium High- 0.51 to 0.75	30%	7%	24%	55%	50%	42%
Medium Low- 0.26 to 0.50	49%	50%	43%	32%	36%	38%
Low - 0.00 to 0.25	12%	43%	24%	8%	0%	7%
Key Project Drivers						
Project Maturity						
Project is in the capital and/or operating budget	5%	33%	11%	3%	7%	0%
Equipment has already been ordered	1%	22%	6%	0%	0%	0%
Corporate Policy/Practice						
Measure is part of corporate standard practice	67%	46%	61%	68%	86%	62%
Measure is installed elsewhere in company, in places that do not offer rebates	14%	41%	22%	3%	7%	1%
Company has Environmental policy in place	53%	22%	78%	49%	71%	52%
Energy Efficiency A Secondary, not Primary, Benefit						
Measure automates existing manual processes	11%	65%	11%	14%	7%	13%
Measure improves workplace quality	14%	0%	33%	0%	7%	14%
Environmental Compliance						
Measure is associated with environmental compliance (e.g., pollution reduction)	6%	0%	0%	3%	0%	7%
Market Segment						
Measure is installed by a market segment that is ahead of curve on Energy Efficiency[2]	10%	33%	17%	0%	0%	4%
Measure is installed by national chain/big box firm	10%	0%	22%	0%	0%	6%
Project Cost vs. Rebate						
Rebate is very small % of overall project cost	7%	28%	11%	16%	0%	1%
Project Context						
Measure is part of an expansion/remodeling	16%	26%	28%	14%	7%	7%
Measure installed to replace failing equipment	20%	4%	0%	5%	29%	18%

[2] For example, IT firms, and major oil and gas companies.

Some general observations based on these findings are:

- Three of PG&E's programs or program groupings - those with the majority of NTGRs in the Low and Medium Low categories – have lower overall program influence. These are the PG&E Core programs (NTGR = 0.47), PGE2222 Energy Efficiency Services for Oil Production (NTGR = 0.37), and PGE20142 New Construction (NTGR = 0.46). For these programs, **there are one or more other strong drivers present that may be contributing to poor performance.** For example:
  - NTGR results for the Industrial component of the PG&E Core programs were adversely affected by legacy Pump-Off Controller projects that originated in PY2006-2008 and have become standard practice now.
  - For PGE2222, Energy Efficiency Services for Oil Production, a majority of projects had **automation benefits in addition to energy savings**. Also, a significant percentage of projects were already in an **advanced stage,** whereby project funding had already been included in the operating budget (33 percent of projects) and/or equipment orders had already been placed (22 percent of projects). Finally, nearly half of these projects were done by companies that had installed the same measure elsewhere, in locations that did not offer rebates. This strongly suggests the measure had largely become **standard practice** for these firms.
  - New Construction projects have many non-energy efficiency drivers. For PGE21042, New Construction, a significant percentage of projects are being done by **firms advanced in their adoptions of energy efficiency**, including national chain and big box stores. Fully 78 percent of these firms have **corporate environmental policies in place**.
- The remaining PG&E programs or program groupings had stronger program influence as evidenced by the distribution of the majority of NTGRs in the Medium High and High categories. These programs and program groups were PGE2223 Heavy Industry Energy Efficiency (NTGR = 0.62 electric, 0.57 gas), the Retrocommissioning program group (NTGR = 0.62 electric, 0.63 gas), and the Other Third Party program group (NTGR = 0.47 electric, 0.68 gas). Note that with the exception of the presence of Corporate Standard Practice and in some cases, an Environmental Policy in place, none of the remaining key project drivers were commonly reported. This suggests that a main characteristic of these programs that perform better with respect to program influence is the relative **absence of these key project drivers.**

This Key Factors analysis was also completed for PG&E Statewide and Local Government programs (see Table 8-2 below).

- Two of the 5 programs/program groupings had the majority of NTGRs in the medium low and low categories. These two programs – State of California Partnerships and Statewide Community Colleges Partnerships, as well as a third program group (Energy Watch Local Government) – also had medium-low and low NTGRs. In addition, these program categories had strong non-program motivations cited for significant percentages of projects:
  - **Environmental policies** were in place for 60 percent, 62 percent and 42 percent of projects for the State of California Partnerships, Statewide Community Colleges Partnerships, and Energy Watch Local Government program grouping, respectively.
  - Strong non-energy benefits in terms of **improved workplace quality** were cited for 30 percent of projects for the State of California Partnerships and 29 percent of projects for the Statewide Community Colleges Partnerships.
  - A substantial percentage of projects were done to **replace failing equipment** - 50 percent of projects for the State of California Partnerships, 29 percent of projects for the Statewide Community Colleges Partnerships, and 28 percent of projects for the Energy Watch Local Government program group.

8.2 Key Factors Analysis – SCE

Results of the analysis of key decision factors for SCE Core and Third party programs are presented in Table 8-3 below.

Table 8-2: Key Factors Analysis – PG&E Statewide and Local Government Programs

	Institutional Partnerships - UC/CSU	Institutional Partnerships - State of California	Institutional Partnerships - Energy Watch, Local Government	Institutional Partnerships - Department of Corrections	Institutional Partnerships - Community Colleges
	SW UC/CSU	SW CA State	SW EW/LG	SW CA DOC	SW CCC Group
Completed Surveys (N)	38	10	74	5	34
Distribution of NTGRs					
High - 0.76 to 1.00	5%	0%	12%	71%	8%
Medium High- 0.51 to 0.75	66%	10%	46%	29%	33%
Medium Low- 0.26 to 0.50	24%	70%	26%	0%	42%
Low - 0.00 to 0.25	5%	20%	16%	0%	17%
Key Project Drivers					
Project Maturity					
Project is in the capital and/or operating budget	3%	0%	3%	0%	9%
Equipment has already been ordered	0%	0%	0%	0%	0%
Corporate Policy/Practice					
Measure is part of corporate standard practice	41%	90%	70%	0%	53%
Measure is installed elsewhere in company, in places that do not offer rebates	0%	0%	0%	0%	0%
Company has Environmental policy in place	78%	60%	42%	0%	62%
Energy Efficiency A Secondary, not Primary, Benefit					
Measure automates existing manual processes	0%	30%	4%	20%	6%
Measure improves workplace quality	57%	30%	18%	80%	29%
Environmental Compliance					
Measure is associated with environmental compliance (e.g., pollution reduction)	35%	20%	4%	0%	18%
Market Segment					
Measure is installed by a market segment that is ahead of curve on Energy Efficiency	3%	0%	9%	0%	0%
Measure is installed by national chain/big box firm	0%	0%	11%	0%	0%
Project Cost vs. Rebate					
Rebate is very small % of overall project cost	22%	0%	0%	0%	0%
Project Context					
Measure is part of an expansion/remodeling	5%	0%	4%	0%	21%
Measure installed to replace failing equipment	8%	50%	28%	0%	29%

Table 8-3: Key Factors Analysis – SCE Core, Third Party and Statewide Programs

	SCE Core Comm Ind Ag	Calculated Incentives Commercial	Calculated Incentives Industrial	Calculated Incentives Agricultural	Core New Construction	Institutional Partnerships - UC/CSU	Other 3P SCE Group
		SCE-SW-002B	SCE-SW-003B	SCE-SW-004B	SCE-SW-005A	SW UC/CSU	
Completed Surveys (N)	161	58	39	64	37	32	54
Distribution of NTGRs							
High - 0.76 to 1.00	6%	2%	13%	5%	3%	0%	6%
Medium High- 0.51 to 0.75	36%	28%	51%	34%	29%	59%	37%
Medium Low- 0.26 to 0.50	49%	57%	31%	53%	63%	38%	48%
Low - 0.00 to 0.25	9%	14%	5%	8%	5%	3%	9%
Key Project Drivers							
Project Maturity							
Project is in the capital and/or operating budget	1%	2%	0%	2%	8%	0%	0%
Equipment has already been ordered	0%	0%	0%	0%	5%	0%	0%
Corporate Policy/Practice							
Measure is part of corporate standard practice	80%	83%	67%	84%	70%	56%	76%
Measure is installed elsewhere in company, in places that do not offer rebates	3%	5%	3%	2%	5%	0%	0%
Company has Environmental policy in place	54%	57%	59%	48%	73%	81%	63%
Energy Efficiency A Secondary, not Primary, Benefit							
Measure automates existing manual processes	9%	17%	3%	5%	0%	0%	11%
Measure improves workplace quality	7%	12%	13%	0%	11%	34%	9%
Environmental Compliance							
Measure is associated with environmental compliance (e.g., pollution reduction)	2%	7%	0%	0%	14%	28%	2%
Market Segment							
Measure is installed by a market segment that is ahead of curve on Energy Efficiency	4%	16%	0%	0%	0%	0%	2%
Measure is installed by national chain/big box firm	6%	5%	8%	0%	0%	0%	6%
Project Cost vs. Rebate							
Rebate is very small % of overall project cost	3%	7%	3%	0%	11%	0%	0%
Project Context							
Measure is part of an expansion/remodeling	7%	10%	10%	2%	19%	13%	6%
Measure installed to replace failing equipment	23%	21%	15%	30%	0%	3%	39%

Key findings are:

- The NTGR distributions indicate that 4 programs (Calculated Incentives – Commercial, Calculated Incentives – Agricultural, Core New Construction and the Other Third Party program group) have a majority of project NTGRs in the medium-low and low categories. Program-specific NTGRs were also in the medium-low and low categories for the two programs (New Construction and Other Third Party) that had a sufficient number of completes to support program-specific NTGRs. Overall, SCE's programs had an NTGR of 0.49, indicating significant free ridership.
- Among these four programs, factors reported for a significant percentage of projects included:
  - The majority of projects in all four program categories reported having an **Environmental Policy in place**.
  - For all program categories except New Construction, a substantial share of projects, between 21 and 39 percent, reported that the measure was installed to **replace failing equipment.**
  - **Environmental compliance** was cited as a motivating factor in 14 percent of New Construction projects.
  - For 16 percent of projects in the Calculated Incentives – Commercial category, the project was installed by a **market segment considered to be proactive on energy efficiency.**
  - For 10 percent of projects in the Calculated Incentives – Commercial category, and 19 percent of the New Construction projects, the installed measures were **part of an expansion/remodeling project**.

8.3 Key Factors Analysis – SDG&E and SCG

The key decision factors for SDGE and SCG Core, Third party and Local programs are summarized in Table 8-4 below. The main takeaways from these findings are:

- Two programs, SDGE3117 Nonresidential BID, and SDGE3118 New Construction programs, had the majority of project NTGRs in the medium-low and low categories. Both of these programs had NTGRs in the medium-low range.
- The factors present for a significant percentage of projects for these 2 programs included the following:
  - **Environmental compliance** had a strong presence in the decisions of over one-fourth of the projects for the SDGE3117 Nonresidential BID, and SDGE3118 New Construction programs.

- Another significant driver was related to the project being installed for non-energy reasons, such as **improvement in workplace quality.**
- Last, a substantial percentage of projects in both programs were **associated with expansion or remodeling projects.**

Table 8-4: Key Factors Analysis – SDG&E and SCG Core, Third Party and Local Programs

	SCG Core Calculated	SCG Deemed	SCG Third Party	SDGE Core Calculated	SDGE Local	SDGE New Construction
	SCG3602/07/11	SCG3612	SCG3663	SDGE3100/05/09	SDGE3117	SDGE3118
Completed Surveys (N)	62	10	2	60	56	15
Distribution of NTGRs						
High - 0.76 to 1.00	8%	0%	50%	2%	4%	0%
Medium High- 0.51 to 0.75	44%	70%	50%	48%	43%	20%
Medium Low- 0.26 to 0.50	42%	30%	0%	37%	38%	73%
Low - 0.00 to 0.25	6%	0%	0%	13%	16%	7%
Key Project Drivers						
Project Maturity						
Project is in the capital and/or operating budget	2%	0%	0%	0%	9%	7%
Equipment has already been ordered	0%	0%	0%	0%	0%	0%
Corporate Policy/Practice						
Measure is part of corporate standard practice	55%	90%	100%	90%	59%	80%
Measure is installed elsewhere in company, in places that do not offer rebates	8%	20%	0%	2%	9%	0%
Company has Environmental policy in place	50%	40%	50%	70%	70%	67%
Energy Efficiency A Secondary, not Primary, Benefit						
Measure automates existing manual processes	10%	0%	0%	13%	13%	0%
Measure improves workplace quality	10%	0%	0%	10%	14%	20%
Environmental Compliance						
Measure is associated with environmental compliance (e.g., pollution reduction)	11%	10%	0%	0%	25%	27%
Market Segment						
Measure is installed by a market segment that is ahead of curve on Energy Efficiency	3%	0%	0%	7%	0%	7%
Measure is installed by national chain/big box firm	8%	0%	0%	0%	2%	0%
Project Cost vs. Rebate						
Rebate is very small % of overall project cost	10%	0%	0%	0%	0%	13%
Project Context						
Measure is part of an expansion/remodeling	15%	0%	0%	3%	16%	20%
Measure installed to replace failing equipment	15%	40%	0%	22%	29%	0%

9

Conclusions and Recommendations

9.1 Key Findings

Evaluation net-to-gross ratio (NTGR) results reveal that significant free ridership has persisted into this program cycle. On a Statewide basis, the NTGR across all program categories averaged 0.48 for electric programs and 0.53 for gas programs. The main conclusions are that free ridership remains moderately high for Custom programs and further, that insufficient adjustments appear to have been made with respect to either the Custom program designs or their implementation procedures in order to reduce free ridership. While we are sensitive to the fact that it is not easy to provide the level of expertise needed at the right time to move industrial customers to higher levels of efficiency given their complex production- and site-specific processes, we also observe that very few readily identifiable steps have been taken by the programs with the specific goal of reducing free ridership.

Evaluated NTGRs are similar in magnitude to those from the results of evaluations dating back to program year 1998, as shown in Table 9-1.

Table 9-1: Statewide California IOU Custom-Type Program[1] Evaluation Net to Gross Ratios, Program Years 1998-2008

(1 – Free Ridership)	1998 Non-Res	1999 Non-Res	2000 Non-Res	2001 Non-Res	2002 Non-Res	2004-2005 Non-Res	PY2006-2008	
							PG&E Ind	SCE Ind
Weighted	0.53*	0.51	0.41	0.65	0.45	0.57	Electric - 0.45, Gas - 0.31	0.63

* Weighted by incentives rather than by kWh savings.

More detailed results, at the program, program group and measure levels are presented in Chapter 6.[2] The key findings from this more detailed analysis are:

[1] From 1998 to 2005, the Standard Performance Contracting (SPC) program results are represented. The PY2006-2008 results are for the PG&E Fabrication, Process and Manufacturing Contract Group and the SCE Industrial Contract Group, respectively.

[2] For categories where there were sufficient numbers of completed surveys; generally eight or more.

- ***Certain market segments and energy efficient measure categories experienced higher free ridership***. For example, within the Water-Wastewater sector, NTGRs for the Water Supply/Irrigation and Sewage Treatment Facilities categories were among the lowest, with values of 0.29 and 0.27, respectively. Among the measures analyzed, both Aerators and Controls had particularly low NTGRs. VFD NTGR results, especially for PG&E, also demonstrated a low level of program influence. Similarly, for the Agricultural sector, the Agriculture and Forestry category had among the lowest NTGR levels (0.39 for PG&E Agriculture and Forestry; 0.41 SCE Water Supply Irrigation).
- ***Net-to-Gross Ratios for certain categories analyzed are significantly down from the PY2006-2008 evaluation, signifying an increase in free ridership for these categories***. For Retrocommissioning programs, the current NTGR findings for SCE of 0.61 (15 projects) and for PG&E of 0.58 (47 projects) are substantially less than the PY2006-2008 evaluation values of 0.75 and higher for the all IOU programs results. Similarly, the Agricultural Pumping NTGR for SCE of 0.45 in this cycle represents a significant decrease from the finding of a 0.63 NTGR in the PY2006-2008 evaluation.
- ***Within the analysis of NTGRs by Baseline Status, at least 2 types of projects had low program influence.*** The Early Replacement NTGR results (between 0.43 and 0.56) did not present a convincing case for program-induced early installments. The level of program influence for Capacity Expansion projects was also very low, as such projects were largely motivated by non-program reasons (i.e., the desire to expand production capability) with efficiency increases occurring as a non-primary (secondary or tertiary) benefit.
- ***If there is no energy efficient version of a given measure type, and natural equipment turnover is the main reason for the replacement, more than likely the project is a free rider.*** Note that in some cases there is no efficiency increment available for some niche equipment, that is, the savings occur only in comparison to old in situ equipment. If natural equipment turnover is the overwhelming driver for the equipment then the project will very likely be a free rider.
- ***Ex Ante NTG values used by IOUs are inconsistent and above DEER values for custom programs.*** Program administrators sometimes use the DEER custom NTG value in the ex ante claims but in some cases use other DEER values that are not appropriate for custom programs. The result is a weighted average NTG in the utilities' claims that is higher than the ex ante DEER value for custom programs and the ex post results estimated for PY2010-2012. For example, across all IOUs, the ex ante NTGRs ranged from 0.65 to 0.70. The corresponding ex ante DEER values for Custom programs are 0.60 for electric measures, and 0.50 for gas measures. Note that the ex ante NTG value for electric projects exceeds the ex post NTG values from this evaluation of 0.47, while the gas value is somewhat less (0.50 ex ante vs. 0.53 ex post).

Spillover was also investigated within each of the surveys conducted. Spillover was able to be documented in only five cases that met the requirement of strong program influence.[3] Only a small number of projects, nine in total, initially met the requirements for spillover estimation based on the telephone survey results. Based on the follow up phone survey results, spillover could only be verified in five of these projects. The results of this analysis are available in a separate memo that is available on the CPUC ED's public documents website.

The fact that these NTGR values are relatively unchanged from those in prior program funding cycles is also problematic in light of the Commission's recent Efficiency Savings and Performance Incentive (ESPI) Decision, D.13-09-023, dated September 5, 2013. This decision has adopted an approach to measuring IOU performance related to the resource savings component of the ESPI mechanism that uses ex-post evaluation results for custom projects and for specific "deemed" measures with ex ante parameters that we identify as highly uncertain.[4] This approach will be applied beginning with PY2013-2014 projects.

9.1.1 Causes of Free Ridership in Custom Segment

Without a doubt, the large non-residential market is perhaps the most challenging to address in terms of the size and sophistication of end-use customers and suppliers, and the complexity of end-user projects. As a result, a certain amount of free ridership is to be expected in this market. The root causes of free ridership in this Custom program grouping include:

- ***The size and sophistication of eligible customers.*** The Custom programs explicitly target a set of participants that include the largest and most highly sophisticated of energy users. These customers are:
  - *Highly motivated to reduce their facility energy use/intensity.* Many are already well-aware of areas of energy waste in their facilities and general strategies for dealing with them.
  - *Already very knowledgeable about available energy efficient technologies and process improvements.* To such customers, programs offer little in the way of awareness building or further education on strategies for improving the energy efficiency of their facility [thereby contributing to free ridership].
  - *Very proactive in their program participation and leveraging of program incentives.* Many are repeat participants, and have participated during the past several funding cycles. They assume energy efficiency incentives will be available and incorporate them as a standard element of their project decision making - including for those projects that are already at a very advanced stage.

[3] As indicated by a program importance score of 8, 9 or 10 in spillover decision making.

[4] CPUC Efficiency Savings and Performance Incentive (ESPI) Decision, D.13-09-023, dated September 5, 2013, pg. 50.

- *Generally inclined to pursue low cost energy conservation measures on their own.* Findings from surveys of program-eligible Nonparticipants conducted in 1998, 2002, 2005, and reported in the 2004-2005 Standard Performance Contracting program evaluation[5] indicate that a majority of firms are already taking low cost energy saving actions on their own. These actions include: changing thermostat set-points, switching off lights in unused rooms, switching off office equipment and shifting high energy processes to off-peak hours Also, larger customers are more likely to take these actions than smaller customers. In addition, in the 2005 survey, a significant percentage of nonparticipant firms (78 percent) reported that they had taken actions to improve energy efficiency or conservation in the past year in their facility. This percentage was the same as in 2002, but significantly higher than in 1998, suggesting these behaviors are becoming more entrenched.
- *Many are subject to regulations and government policies that frequently drive project decision making.* Included in this category are industry guidelines, federal standards, and federal regulations. In addition, naturally-occurring market changes have led to significant reductions in the prices of energy efficient technologies and the easing up of performance concerns for new technologies. All of these factors have created an environment in which the adoption of energy efficient technologies does not appear to be as challenging as it was 20 years ago.
- *As a result of the combination of factors above, there is some evidence that some of the key custom-related market segments may be relatively transformed, particularly with respect to certain equipment, practices, decision making practices, and policies.* The fact that many, in particular, larger, non-residential customers now have strong inclinations to pursue some key aspects of energy efficiency for a variety of reasons is a market condition that aligns well with the goals of state and CPUC policies, and utility program and portfolio goals, over the past ten to twenty years. This state of affairs should be appreciated and leveraged for further gains. It is important to note that assessment of market transformation and program-induced market effects over the long term is not within the scope of this study and we are not drawing a conclusion on the extent to which the current state of these markets is due to long term program effects as compared to long term non-program effects. We do recommend further investigation of this question; however, from a going forward point of view, the key is to try to focus the programs on pushing the market to the next levels.

- **The nature of the Custom (Calculated) program design.** Another factor contributing to high free ridership is related to the characteristics of the Custom (Calculated Statewide) program design. The Calculated program design in particular:

[5] Findings from 2004-2005 Statewide Nonresidential Standard Performance Contract Program Measurement and Evaluation Study, completed September 30, 2008.

- *Is very flexible in terms of the measures that are eligible for incentives.* The very nature of the Calculated program is as a catch-all for measures that don't qualify for other Deemed programs. The downside of this is it allows any measure to be funded – including those that are either standard practice or already widely accepted by large C/I customers.
- *Does not explicitly target less-accepted technologies.* The program design is very general and as a result, there is little emphasis on less well-adopted, cutting edge, or emerging technologies, of the type that would be less prone to high free ridership.
- *Uses a simplistic formula for the incentive calculation*. This structure does not incorporate features that can potentially reduce free ridership, such as a payback floor, or a tiered incentive rate structure by technology class, to enhance promotion of technologies that are less well accepted versus those that are already established.
- *Permits virtually any eligible project to qualify for incentive funding without regard for free ridership potential.* Itron did not see evidence in the documentation received on sampled projects of advance screening for free ridership being conducted by program implementers. In general, utility and program implementers have been reluctant to adopt procedures for screening out projects known to have high free ridership, based on their belief that all projects deserve to be funded for reasons of equity and customer service.

9.2 Key Recommendations

Despite these challenges, there are a number of different strategies available to the IOUs, to adjust program design elements and implementation procedures in order to reduce free ridership. Several of these recommendations for reducing free ridership have been provided repeatedly in previous evaluation reports and studies; however, the custom program designs and implementation procedures for the PY2010-2012 program cycle have generally not incorporated them.

These recommendations are as follows:

Recommendation: Adopt procedures to identify and affect projects with low program influence.

The IOUs should carefully screen projects during the project development stage for potential issues with a high likelihood of very low program influence. This process should provide timely feedback to program implementers regarding the estimated level of program influence. This would afford implementers an opportunity to screen out projects found to have low program attribution by encouraging project decision makers to adjust the project scope to higher efficiency levels, where warranted.

Recommendation: Adjust the set of technologies that are eligible for incentives

Program implementers need to *carefully review the list of qualifying measures for each program and eliminate eligibility for those that are standard practice*. Findings reported earlier in Chapter 8 provide further validation of the preponderance of efficient measure installations that result from a corporate standard practice and/or existing environmental policy. Measures that are already likely or very likely to be installed by a significant fraction of the market should, in most cases, not qualify for incentives. A number of such measures can be identified through investigation of industry practices (for example, interviews with manufacturers, distributors, retailers, and designers), analysis of sales data, literature reviews, project application pipeline, measure economics, and review of evaluation results. In the latter category, standard practice is highly likely for those measure categories with high free ridership based on evaluation results. In determining measure eligibility, sub-technology niche markets can be selected for the program that are less well established, but where substantial technical potential still lies.

In addition, program implementers should *actively highlight and promote technologies that are less well-adopted, cutting edge, or emerging technologies*. Such measures are much less likely to be prone to high free ridership.

Related, the *designation of the proper baseline* for a given measure type is critical. Program implementers should take great care in establishing program baselines and in developing a firm understanding of the underlying economics that most customers face when a given technology is acquired.

For technologies that are already well established, another strategy is to *incent based on bundling of mandatory requirements or optional features* that enhance performance of the base technology. For example, non-commonly installed control and/or optimization technologies can be combined with standard efficiency measures for certain types of projects.

Another option is to *use a comprehensive rather than a prescriptive approach* to discourage free ridership. For example, for Water-Wastewater plants, implementing a comprehensive approach and requiring the project to reach a minimum savings threshold (such as 15 percent) is less likely to be prone to high free ridership than a prescriptive measure-level approach. Note that the specific savings threshold adopted should be designed to the requirements of specific market segments, when feasible.

Recommendation: Adopt procedures to limit or exclude known free riders.

Another potential way to accomplish this, and to verify and enable implementation of other NTG-related changes in program rules, is to conduct screening for high free ridership on a project-by-project basis. In cases where it is found, the program implementer should encourage

such customers to move to a higher level of efficiency, undertake a bundled retrofit to ensure deeper savings or should ask about any other energy efficiency retrofit projects under consideration. Any of these options will likely increase the likelihood of funding a project that would not have been implemented absent the program. Another path is for the program to set the standard for incentive eligibility higher across-the-board so that all such projects will need to meet a higher standard to qualify. Note that, in most cases, **none** of these options necessarily equates to rejecting a customer for energy efficiency funding. Instead, the concept is to "upsell" the customer to an energy efficiency project that they weren't already planning to do on their own. There may be some cases where there is no upsell opportunity and the project does not meet program requirements. In such cases, customers will likely have future opportunities to participate in the program.

One way to assess the rate of free ridership likely on a given project is to critically examine the key reasons behind the project **before** the incentive is approved. For example:

- Has the project already been included in the capital or operating budget? Has the equipment already been ordered or installed?
- Is the measure one that the company or other comparable companies in the same industry/segment routinely installs as a standard practice? Is the measure installed in other locations, without co-funding by incentives? Is the measure potentially ISP?
- Is the project being done, in part, to comply with regulatory mandates (such as environmental regulations)?
- Are the project economics already compelling without incentives? Is the rebate large enough to make a difference in whether or not the project is implemented?
- Is the company in a market segment that is ahead of the curve on energy efficiency technology installations? Is it part of a national chain that already has a corporate policy to install the proposed technology?[6]
- Does the proposed measure have substantial non-energy benefits? Is it largely being considered for non-energy reasons (such as improved quality or increased production)?

By conducting a brief interview regarding these issues before the incentive is approved, the implementer can better assess the likely degree of free ridership and may be able to then decide if the project should be excluded or substantially re-scoped to a higher efficiency level. Each of the bullets above can be tied to a new or enhanced program rule or guidance such that the

[6] We acknowledge that there may be tension at times between the goals of maximizing short term net impacts and the longer term goals of market transformation. According to one theory, this may manifest especially with respect to market leaders. Even though some of them may be free riders there may be indirect program benefit due to early and late majority adopters (in the Rogers' *Diffusion of Innovation* model) that are strongly influenced by these early adopters. Of course, the argument can also be made that if they were going to adopt anyway they still provide a leading example to latter adopters and laggards.

program administrators can point to these requirements and avoid the problem of customer concern over unequitable or capricious decision making.

Recommendation: Make and/or pilot changes to the incentive design

Consider tiering incentives by technology class, such as end-use, to enhance promotion of technologies that are less well accepted versus those that are already established. Under this approach, the incentive level for less widely adopted and emerging technologies would be higher, while the incentive level for more widely-adopted measures would be lower.

Consider Incorporating a Payback Floor, Excluding Projects for Which the Payback Time is Less Than, Say, One Year. Certain projects with extremely short payback periods are more likely to be free riders, all else being equal. For example, projects with less than a one year payback can be funded out of the current year's energy budget and are prime candidates for high free ridership. Although it is certainly true that sometimes customers do not adopt attractive efficiency projects with very low paybacks, a payback floor can still be helpful, particularly if it is not set too high and if the administrator is allowed some flexibility in its application. Several program administrators in other parts of the country[7] have used payback floors effectively, although such criteria present project cost verification challenges. A short floor (e.g., less than one year) guideline makes sense because projects with a one-year payback or less can usually be funded out of the current year's energy budget. The use of a payback floor (a minimum payback level based on energy savings alone) can help to reduce free ridership by eliminating projects that have extremely quick paybacks and thus little need for ratepayer-funded incentives. Such an approach could be tried for a year or two and then assessed with respect to results inclusive of implementation issues, if any.

Offer bonuses to incent desirable behavior, such as installation of multiple measures or installation by a first-time participant.

Recommendation: More information is needed on industrial project costs, non-energy costs and benefits, net present value analysis, and associated participant cost-effectiveness analysis.

There has been very little analysis conducted supporting the actual incremental cost of industrial and custom energy efficiency projects and further research is needed in this area. Rules of thumb, such as assuming that incentives represent half of incremental costs, appear to have been used instead as proxies. There is inadequate financial analysis conducted to determine what portion of the customer's financial investment threshold is associated with the energy savings of

7 See National Energy Efficiency Best Practices Study, Non-Residential Large Comprehensive Incentive Programs Best Practices Report Volume NR5, http://www.eebestpractices.com/Summary.asp?BPProgID=NR5

particular projects versus non-energy factors[8] such as increases in production and reductions in labor, materials, and regulatory compliance costs. Increased financial analysis should be considered for inclusion in industrial project applications, especially for the projects with the largest incentives. A key reason for scrutinizing large incentive projects more fully is that the sheer size of such projects merits additional analyses as part of the project justification. Increased review of project financials inclusive of non-energy factors can also help to reduce free ridership.

Recommendations by Measure Type

The following are recommendations specific to individual measures that resulted from the program and measure level analysis discussed in Chapters 6 and 7.

- For Server Virtualization, the medium level NTGRs and the empirical data demonstrating that this measure is becoming standard practice across much of the industry reinforce the need to phase out rebate eligibility for this measure.
- The set of Water/Wastewater measures eligible for incentives needs to be revisited, and those measures with medium-low or low NTGRs need to be eliminated from program eligibility. Further, the last baseline study for the Water/Wastewater sector was completed by PG&E in 2006, and has not been updated since then. The IOUs should seriously consider conducting a new Water/Wastewater Baseline study in the near future.
- The medium-low NTGRs for the rooftop/split system and pump/VFDs suggest an Industry Standard Practice study may be warranted to assess whether these measures are becoming standard practice.

[8] In custom projects, non-energy factors can sometimes drive project installation more than the economics associated with direct energy savings. Whether or not those factors also correlate with free ridership is likely related to the extent to which the program did or did not influence the end users' or trade allies' awareness, knowledge, and certainty of those benefits.