Telling the "Story" of Program Influence for Custom Programs in California

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ABSTRACT

This paper presents findings from a recently completed evaluation study of the California Statewide Commercial and Industrial Custom Programs, which included both gross/M&V and net-to-gross elements. In what was one of the largest and most expansive efforts ever, nearly 1,400 Net-to-Gross surveys were completed using the standardized Self-Report methodology developed by the NTG Working Group[1]. This afforded an opportunity for a much deeper and broader analysis of attribution at the program level than had ever been attempted before in impact evaluations of the industrial customer programs in California. In addition to standardized NTG ratios by sampling domain and program/program grouping, the analysis of this expansive data set included additional assessments of NTG ratios by business type, project size, project payback, and delivery approach. The analysis also included a detailed examination of program and non-program contextual factors behind each project that may have influenced the project, either directly or indirectly.

A separate Net-to-Gross report was completed recently[2], covering this work effort. A key focus of this report was on channeling the findings toward continuous improvement of the Custom programs going forward. The reporting went beyond numerical results to include a set of qualitative information that provided important insights into the "story" behind each energy efficiency project undertaken. This broader set of information was accompanied by a set of actionable recommendations aimed at improving the influence of the Custom programs offered in the future. These recommendations address improvements in both the program design and implementation procedures. Many of these are grounded in industry-leading best practices.

Introduction

There is a significant amount of cost-effective energy savings potential in the industrial sector, which accounts for nearly one-third of national energy use. Energy savings opportunities abound in outdated manufacturing buildings and machinery, industrial process boilers, and obsolete lighting systems. As noted in a recent ACEEE publication[3] , improvements in energy efficiency are increasingly seen as providing multiple energy and non-energy related benefits to businesses. They are a critical part of the solution to reducing greenhouse gas emissions, as well as enabling businesses to compete in a global economy.

In this environment, industrial businesses are highly motivated to make investments in their buildings and infrastructure to upgrade energy-using equipment and drive down energy use. Record numbers of businesses have participated in voluntary energy efficiency rebate programs in recent years, and continue to do so. This high level of interest in rebate programs presents industrial program implementers with an interesting challenge – how to capitalize on this customer interest while continuing to exert a high level of influence over what gets installed. Since programs are often given credit only for those projects in which

[1] A full version of this methodology is provided in Appendix D of the 2010-2012 Custom Impact Evaluation Final Report, available here: http://www.calmac.org/publications/2010-12_WO033_Custom_Impact_Eval_Report_Final.pdf

[2] http://calmac.org/publications/2010-12_WO033_Custom_Net-to-Gross_Report_-_Final_-_Posted_on_Calmac.pdf

[3] Russell, Christopher, "Multiple Benefits of Business Sector Energy Efficiency: A Survey of Existing and Potential Measures", Report IE1501, American Council for an Energy Efficient Economy, 2015.

they had significant influence in the customer's purchase decision, they must be able to get out ahead of the decision making process in order to meaningfully contribute to the project concept, ideally at its inception. This is the crux of the challenge to increase program influence and reduce free ridership.

Study Approach

The body of work discussed in this paper was undertaken as a part of the impact evaluation of program year 2010-2012 California IOUs Custom energy efficiency projects. The purpose of the report on which this paper is based was 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 or third party 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 included the effects of free ridership only, and excluded the effects of spillover.

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. This rich set of data, however, afforded the possibility of a much more detailed reporting than the Custom programs' integrated impact evaluation Report could support. Therefore, a separate Custom programs Net-to-Gross report was prepared.

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. 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. Other key data sources included utility program tracking data and utility-provided project specific documentation.

Summary of Net-to-Gross-Related Findings and Related Recommendations

High Level NTG Findings

On a statewide basis, the NTGR across all program categories averaged 0.48 for Custom electric programs and 0.53 for Custom gas programs as shown in Figure 1 below. These values indicate a medium high level of free ridership, and a resulting medium low level of program influence.

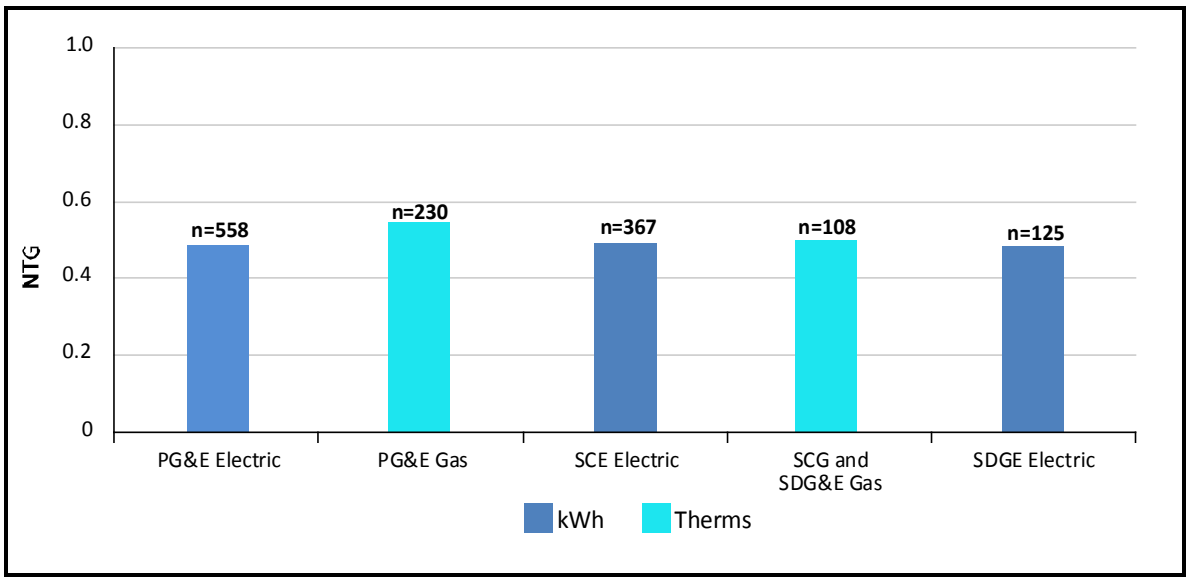

Figure 1. Weighted Net-to-Gross Ratios by IOU Fuel Domain

Significant levels of free ridership were found to have continued into this 2010-2012 program cycle. Evaluated NTGRs were similar in magnitude to those from the results of evaluations dating back to program year 1998 as shown below in Figure 2. While there are many potential reasons for high free ridership in this market segment, 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. The report recommended that evidence for these changes, both qualitative and quantitative should be a focus of subsequent program year evaluations.

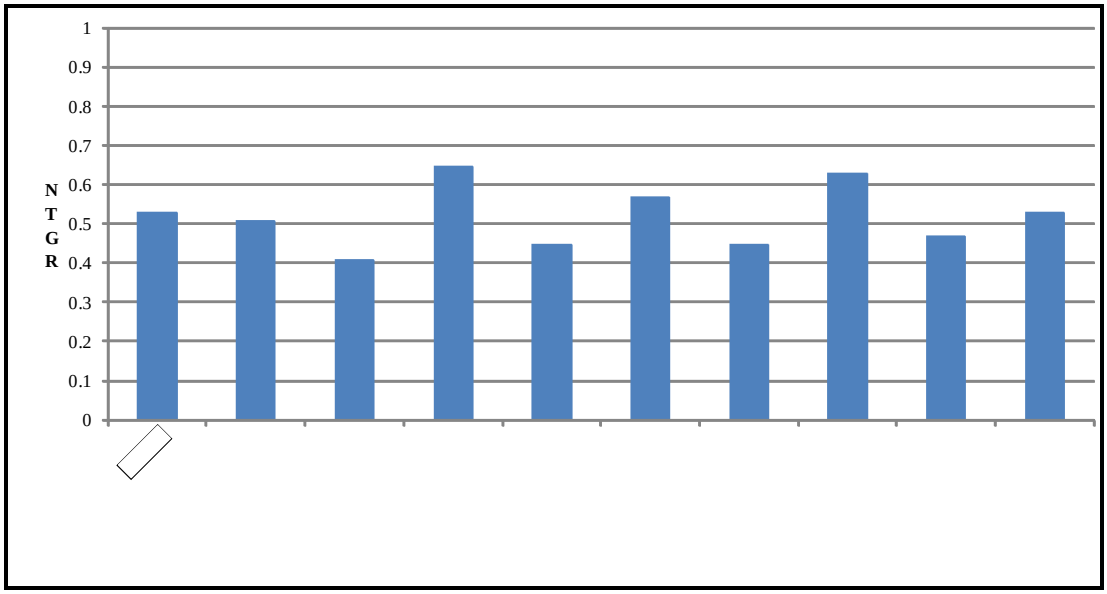

Figure 2. NTGR Trends Since 1998 for Custom-Type Programs[4]

[4] 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.

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. This "slicing and dicing" approach allowed us to directly examine how NTGRs correlated with particular project variables. Some of these variables were specific sampling domains (e.g., IOU, fuel, and program), while others were categories used by the evaluation team to classify projects.

At the ***program category/program group*** level of analysis, the weighted NTGRs for the electric fuel domain were substantially the same as evaluated values from the past several previous evaluation cycles. However, gas results had improved significantly for PG&E customers. In addition, certain niche programs experienced much lower NTGRs, while others had above average NTGRs.

Results by ***measure type*** (Figure 3 below) revealed that on the electric side, Water/Wastewater measures had very high free-ridership levels, *suggesting that the set of Water/Wastewater measures eligible for incentives needed to be revisited, and those measures with low NTGRs need to be eliminated from program eligibility.* Further, within the HVAC measure category, NTGRs for rooftop or split system units and pump VFDs were somewhat lower, around 0.40 to 0.45, *indicating that a study of what constitutes standard practice installations for industry may be warranted.* Finally, results for the Energy Management System (EMS)/Controls category were more promising, with NTGRs ranging from 0.59 to 0.70. *Given these favorable results, it may be worthwhile to bundle EMS with standard measures, or emphasize an EMS focus in the Retrocommissioning offering.*

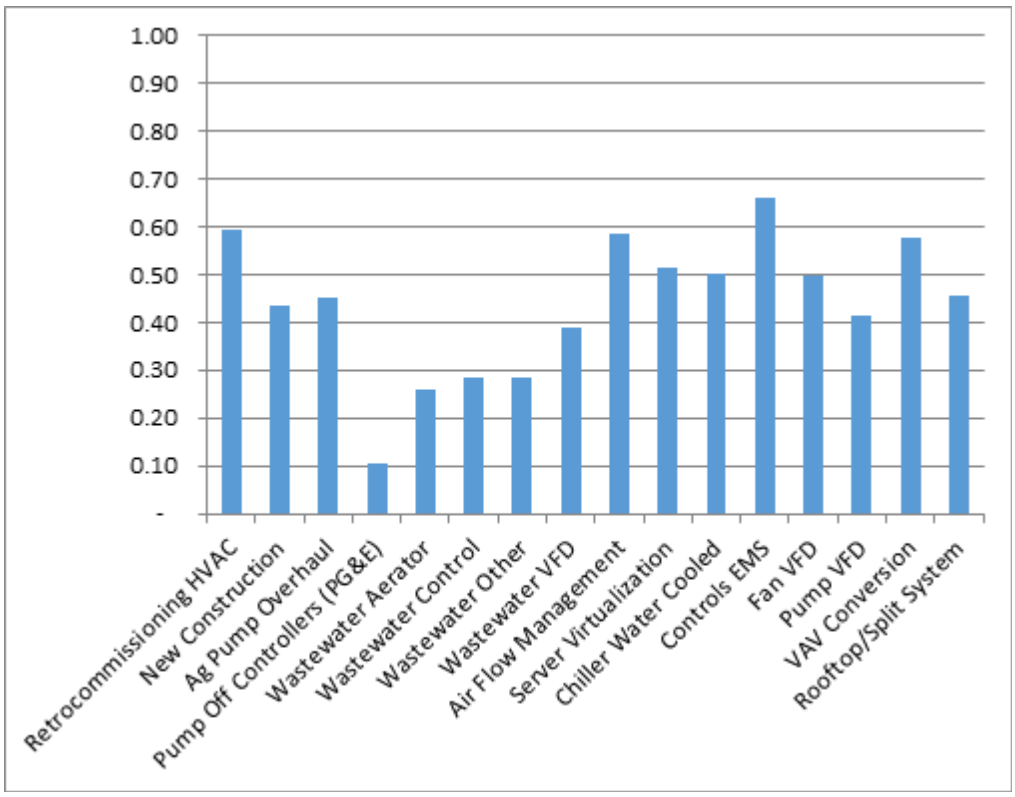

Figure 3. NTGRs for Electric Measures

NTGRs were also computed for a number of Gas measures (see Figure 4 below). These measures included Process Boilers, Steam Traps, Process Heat Recovery, and Whole Building New Construction (gas measures only).

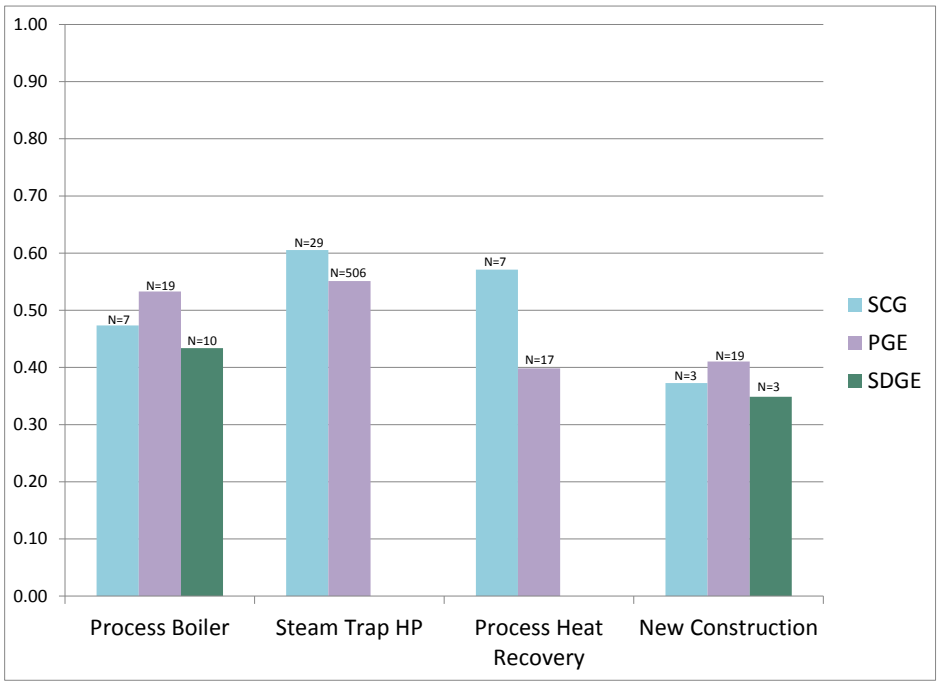

Figure 4. NTGRs for Gas Measures

While all gas measures were found to have a medium level of program influence based on values generally ranging from 0.40 to 0.60, certain measure categories performed more strongly than others. For example, the steam trap measure category had among the highest NTGRs, in the 0.55 to 0.60 range. New construction project NTGRs of 0.40 were among the lowest.

By ***baseline disposition***, the findings indicated that projects in the Major Renovation and Add-On Measure categories had the highest levels of program influenced adoptions, with NTGRs approximating 0.70. Further, the Early Replacement category NTGR results (between 0.43 and 0.56) did not present a convincing case for program-induced early installments. Finally, 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*** *(in absolute dollar terms)*, the results indicated a weak relationship between NTGR and the total electric or gas incentive level. Both electric and gas project NTGRs were relatively insensitive to the total amount of incentive provided.

The main conclusions for the analysis of NTGRs by ***business type*** were that NTGRs were very low for programs serving water and sewage treatment and agriculture facilities. In general, the business sector classification with the most favorable NTGR results was colleges and universities.

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 the analysis of the main factors influencing NTGRs indicated that:

- 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 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.
- 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, a sizable percentage of new construction projects were implemented by firms already using advanced energy efficiency in designs, including national chains and big box stores.

Table 1 below illustrates the Key Factors framework and analysis for one of the utilities, PG&E.

Table 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%

	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	
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[5]	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%

Causes of Free Ridership in Large Nonresidential Market

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. The root causes of free ridership in this market 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

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

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.

- *Generally inclined to pursue low cost energy conservation measures on their own.* Findings from previous surveys of program-eligible customers indicate that a majority of firms were already taking low cost energy saving actions on their own. These actions included: changing thermostat set-points, switching off lights in unused rooms, switching off office equipment and shifting high energy processes to off-peak hours Larger customers are more likely to take these actions than smaller customers.
- *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 installation approaches, 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 regulatory 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 was not within the scope of this study.

The nature of the Custom program design. Another factor contributing to high free ridership is related to the characteristics of the Custom program design. The program design in particular:

- *Is very flexible in terms of the measures that are eligible for incentives*. The very nature of the Custom program is as a catch-all for measures that don't qualify for other Prescriptive 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.* No evidence was provided 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.

Key NTG Recommendations

Despite these challenges, there are a number of different strategies available to program implementers, 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. Program implementers 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.

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

Adjust the set of technologies that are eligible for incentives. A number of different strategies are available:

- Program implementers can *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. 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 can *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*. This is really a gross savings-related issue that frequently overlaps with net-to-gross assessment. 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. Again, this is a multi-faceted approach with several options available:

- 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 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. 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 program-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. Experience has shown that programs that lead with technical studies or assessments have early up-front involvement and broader influence than those with involvement after measures have been identified and decisions have largely been made.

Conclusions

The industrial sector has vast energy savings potential and is critically important to successfully achieving mandated energy savings goals. However, developing high quality industrial energy efficiency projects is very challenging. This paper has highlighted the most important causes of low program influence

and related high free ridership, and has offered numerous recommendations for how to bridge this gap and improve program savings estimates going forward. Use of these recommended procedures will lead to improved program influence (and reduced free ridership), and will result in reducing the gap between claimed and evaluated results. These procedures will help to improve the overall quality of projects that are participating in the program, and support the general goal of continuous program improvement.

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