Turning on a Dime: Using Bonus Incentives to Influence Project Completion

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ABSTRACT

Demand side management programs use a variety of methods to generate energy savings. A multitude of challenges and risks exist in this process, including project attrition and delays – preliminary analysis suggests up to 25 percent of projects where a participant has accepted and signed an offer delay by one year or abandon completely. The primary channel by which programs can influence participant behavior is through incentive design. Incentivizing energy efficiency, conceptually is relatively straightforward. By lowering the cost of efficient technologies or behaviors the individual or business on the margin of investing in efficiency will do so. But factors beyond the control of programs, such as changing economies may also influence efficiency projects.

Can bonus incentives influence project completion rates or enrollment patterns? Using project-level panel data from Energy Trust of Oregon's Production Efficiency program we study the effect of five distinct bonus design structures on participant attrition, energy savings, and completion timeliness. These bonuses vary by seasonal timing, incentive magnitude, and applicable project type. We found bonuses successful when they are designed thoughtfully for specific objectives. In general non-custom measures seem more responsive to deadline-based bonus incentives due to more nimble timelines. However, when custom measures can be influenced they have the greatest impact on annual savings. In addition to reducing attrition or increasing savings, appropriately designed bonuses may also be useful in shifting savings forward in time.

Introduction

Energy Trust of Oregon, an independent nonprofit organization dedicated to helping utility customers benefit from saving energy and generating renewable power, began offering cash incentives to utility customers in 2002. Our efforts extend to industrial customers who accounted for roughly 30 percent of electric savings garnered by Energy Trust in 2013.

The industrial sector is characterized by projects which are typically larger in magnitude but lower volume than residential or commercial sector projects. This composition introduces unique challenges because program savings are sensitive to the success of relatively few projects– risk is not smoothed by a large project volume. Furthermore industrial efficiency projects often require large investments by firms who may reserve capital in the face of market uncertainty.

The primary channel by which programs can influence participant behavior is through incentive design. Still, historical analysis shows approximately 25 percent of projects where a participant has accepted and signed an incentive offer will delay by one year or abandon

completely[1].One approach is to further lower the cost of efficient investment, through bonus incentives or special offers to capture projects on the outer margin. The Production Efficiency (PE) program at Energy Trust has done just that by offering bonus incentives when projected project volume is low or attrition is particularly high. Since 2010 five bonuses have been offered to boost completion rates, increase enrollments, or to smooth project volume. This paper will evaluate the effectiveness of each bonus in relation to its unique design and intent. We will also investigate if bonus incentives perform differently by fuel type or project type. This analysis will conclude with recommendations on effective bonus structure and design.

Production Efficiency at Energy Trust

Demand side management has been the purview of Energy Trust since 2002. All customers of Oregon's four gas and electric investor-owned utilities are eligible for incentives and Energy Trust distributes its efforts and funds by setting annual goals by sector. Energy Trust has increased savings each year to meet annual goals of the three key sectors: industrial, commercial and residential.

The PE program offers financial and technical service incentives to improve the electric and natural gas efficiencies of industrial and agricultural equipment, systems and processes in new and existing businesses. PE provides a diverse set of custom and streamlined offerings. The custom track is includes capital, operations and maintenance (O&M), and Strategic Energy Management (SEM) offerings. No bonuses have been applied to SEM projects therefore this paper does not include statistics from SEM projects. The streamlined program is roughly organized into lighting, streamlined, and prescriptive offerings. Program delivery contractors (PDCs) promote and sell the PE program in the market and employ highly skilled industrial energy efficiency engineers, analysts and specialists. They perform most customer facing work including the promotion of bonus incentives.

While Energy Trust programs are accountable to annual savings goals, goal setting cannot always account for market volatility or other aspects affecting projects throughout the year. The industrial sector is especially high risk – if a few projects delay or abandon the program can lose a significant portion of its 'pipeline', the projects that the program expects in the coming year. Bonus incentives have been used to bring in marginal and delayed projects when the pipeline is not in line with goal. A marginal project is a project where the customer is on the fence about committing to an energy efficient measure or who otherwise would not complete a project in a given year[2]. If incentives act in the marketplace as a tipping point to investment in efficient technologies, increasing that incentive should garner more projects and savings. In all cases and, most importantly, bonuses act as a sales mechanism to engage customers and create excitement and interest in energy efficient technologies. Some might hold the belief that bonuses simply move inevitable savings forward, the bigger picture is that everyone benefits from reducing energy consumption sooner rather than later. End users reduce operating costs and increase profitability and load on the grid is reduced resulting in additional capacity that will support business and population expansion. In cases where new or previously

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[1] *Source*: Energy Trust Production Efficiency Program data

[2] The word 'marginal' is in reference to customer motivation or ability to participate and is not a reflection of the resource potential or cost effectiveness of the project.

unengaged customers benefit from a successful efficiency project that they would not have done without a bonus, additional projects develop that further increase savings well into the future since the vast majority of industrial customers will implement additional projects after realizing initial success.

The Bonuses

90x90

The 90x90 Industrial Operations and Maintenance Bonus launched in Q2 of 2010 and was limited to custom O&M projects. By early 2010, the economic downturn had caused many businesses to behave cautiously and to pull back on spending capital funds unless absolutely necessary. The bonus was spawned by the resulting drop in the PE program pipeline between Q1 and Q2 of 2010. O&M projects tend to be very low cost and can be completed in considerably shorter timeframes than typical capital improvement projects. Custom O&M incentives were already available, although the offering was new and less well known. The program's intention was to generate excitement and urgency by significantly increasing the incentive when O&M projects were completed in a short timeline. Through the bonus, projects that completed within 90 days of Energy Trust signing their offer letter earned an incentive of up to 90 percent of their project cost, an increase from the standard incentive cap of 50 percent (incentive caps based on savings also applied).

Many new projects came in over the four-month bonus period with the majority completing within 90 days. Owing to the success of the 90x90 bonus offer in 2010, it was offered for a limited time again in 2011. In 2012 the 90x90 became a standard offering and remains available at any time throughout the year.

Fall Bonus

The 2011 Fall Bonus was developed in response to the announcement in June 2011 from the Oregon Department of Energy that the Business Energy Tax Credit (BETC) was immediately and retroactively (to April 15th) eliminated. The BETC had provided businesses with tax credits of up to 35 percent of efficiency project costs and the loss of this financial benefit was projected to have a negative impact on numerous not-yet-enrolled projects that were anticipated by the program. While the Fall Bonus was not intended to replace the full value of the BETC, the 20 percent bonus was expected to help lessen the impact of losing the BETC credit on applicable projects. The goal was to keep as many of these prospective projects alive as possible, resulting in minimal impact to the program pipeline. The Fall Bonus was offered to non-O&M projects enrolled on or after September 1, 2011 and completed by December 15, 2011.

Kick Start Bonus

Near the end of 2011, the 2012 project pipeline was substantially behind what was expected and the likelihood of reaching electric and gas savings goals was in doubt. There was concern that providing bonus dollars alone may not ensure that enough projects would actually start and complete in 2012 so a 'hook' was developed to capture new projects that were likely to complete within 2012. The 2012 Kick Start Bonus was applicable to new projects enrolled

between December 16, 2011 and June 29, 2012 with the requirement that customers must order a substantial portion of the capital equipment for the efficiency project within 90 days of the date that Energy Trust signed the project incentive offer. While there was not a hard deadline for customers to complete implementation of the bonus-eligible projects, the belief was that once customers made equipment purchases the likelihood of projects abandoning or delaying would be reduced. In other words, even though fewer projects were projected than usual, more of these projects were expected to actually close.

PDC Performance Compensation Bonus

The PDC Bonus was offered in 2014 in attempt to more evenly distribute project completion rates throughout the year. Historically the PE program experiences a 'hockey stick' where the majority of savings and projects close at the end of each year. (Figure 3 below demonstrates this phenomenon.) This effect creates uncertainty around progress toward goal at the end of the year when it is too late to stage an intervention. In effort to decrease this effect, a bonus was offered to the PDCs customers were unaware of the offering in 2014. Customers were unaware of the offering. PDCs qualified for the compensation bonus if they met an individual savings goal by the end of Q2. From a program design perspective this offers a unique opportunity to evaluate the effectiveness of a bonus outside of the marketplace as this was the only bonus where the customer was not incentivized.

Year End Bonus

The Year End Bonus was offered in Q4 2014 to spur project completion rates in the face of a dwindling pipeline. At the end of September project abandonment rates were high and the pipeline had dropped below goal. The bonus design logic was that if attrition rates could be lowered, final savings would exceed those predicted by the pipeline. Furthermore, if projects which had already indicated a delay into 2015 could be brought back into 2014 the program would further boost 2014 savings. The PE program offered a 20 percent bonus for custom projects that completed between October 15th and the end of the year.

Results

90x90 Bonus

The 90x90 Industrial O&M Bonus provides free technical assistance to identify and analyze low-cost O&M efficiency measures such as scheduling equipment, tuning controls and fixing leaks. For projects completed within 90 days of the incentive offer, the cash incentive is up to 90 percent of installation cost (with an incentive cap based on savings). After 90 days, the incentive returns to the standard rate of up to 50 percent. The 90x90 was introduced as a limited time bonus in 2010 and in 2011. In 2012 it became a standard offering and remains available any time throughout the year.

Goal: Increased O&M project volume

The primary goal of this bonus was to encourage O&M projects that could be completed on a short timeline to enroll and to finish quickly. O&M projects were a new offering in 2009.

Figure 1 demonstrates that within the four month enrollment period in 2010, 45 completed in time to take advantage of the 90x90 bonus, compared to only 9 completed O&M projects that either enrolled outside the bonus timeframe or otherwise did not qualify for the bonus. Those 45 projects accounted for more than 15 percent of the program's total electric savings in 2010. While it's difficult to know how many of those projects would have completed without the bonus, program staff believes the bonus was highly successful in promoting the O&M offering and securing savings in 2010.

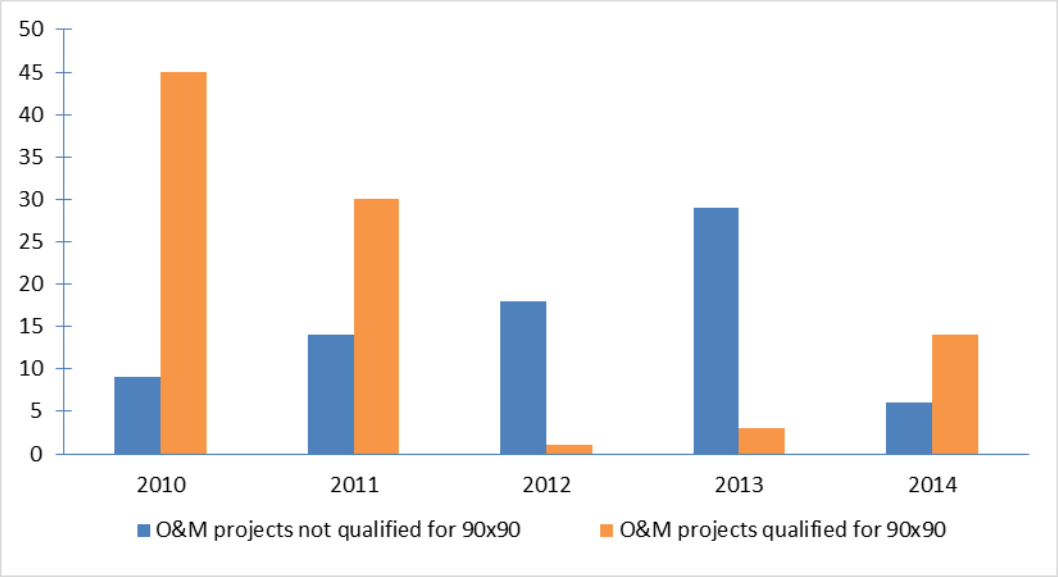

Figure 1. Number of 90x90 qualifying and not-qualifying O&M projects completing in the PE program each year through 2014 (Does not include SEM activities). *Source*: PE program data

Goal: Quick-turn projects

Operations and maintenance projects can often be completed quickly once they have been identified. Nonetheless, prior to the 90x90 bonus, it was common for projects to stall or abandon. The program hoped the time-based bonus would create urgency to complete projects that may seem low priority otherwise.

We used average number of months the projects were in committed status as a proxy for completion rates to study the success of the bonus. Figure 2 demonstrates a decrease in average months O&M projects were in committed status by more than half between 2009 and 2010. This trend of quickly completing projects continued through 2014.

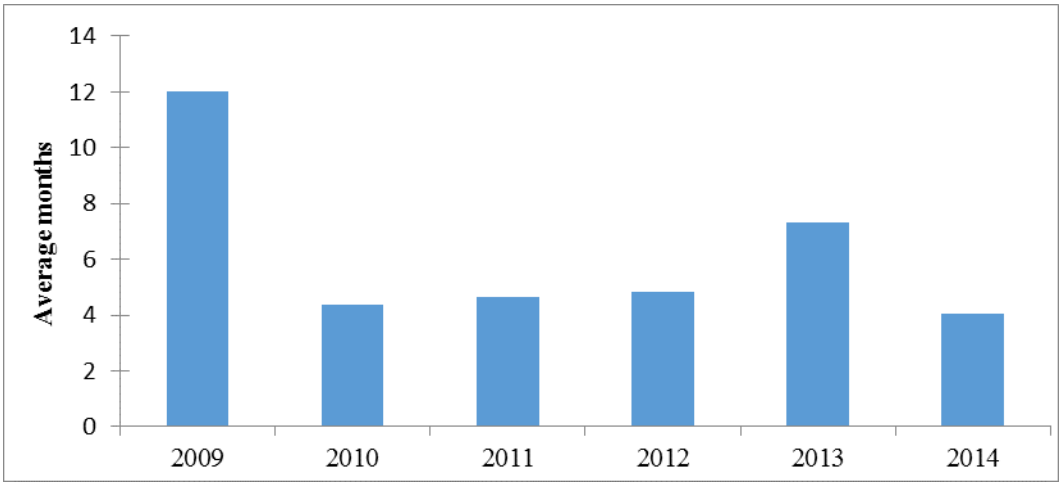

Figure 2. Average months in committed status of O&M projects, sorted by year enrolled. Note: Projects remain in committed status during some administrative activities so many qualifying 90x90 projects were in that status for longer than 90 days. *Source*: PE program data

Goal: Long term success

With the measureable success of the four month bonus offer in 2010, the program hoped for continued success and savings from O&M projects. In 2011, 90x90 was advertised as another bonus and in 2012 it was integrated into the program's standard offerings.

We used the quantity of completed O&M projects each year to study how the uptake of the presentation of the offering changed over time. Figure 1 above shows that participation in the 90x90 offer peaked in its first year and dropped in following years. More participants took advantage of the 90x90 bonus within four months in 2010 than did in 2013 and 2014 combined. The effect may be a form of 'bonus fatigue' where the excitement and activity spurred by a special offer fades as participants adjust their expectations, or the drop in participation in 90x90 may be due to high participation in our SEM program, which is another path for O&M savings.

Fall Bonus

The Fall Bonus began in September 2011 in response to the loss of BETC tax credits which diminished the pipeline in a time of year where historically the pipeline saw growth. Figure 3 below sums projected 2011 savings by project status. It shows that beginning in August 2011 the pipeline began to shrink, primarily through the loss of prospective projects without a customer signed incentive offer (shown in aqua). The bonus offered an additional 20 percent cash incentive for new projects, excluding O&M, completing before the year closed in an effort to reverse the declining trend. Any project without a signed incentive offer was eligible for the bonus.

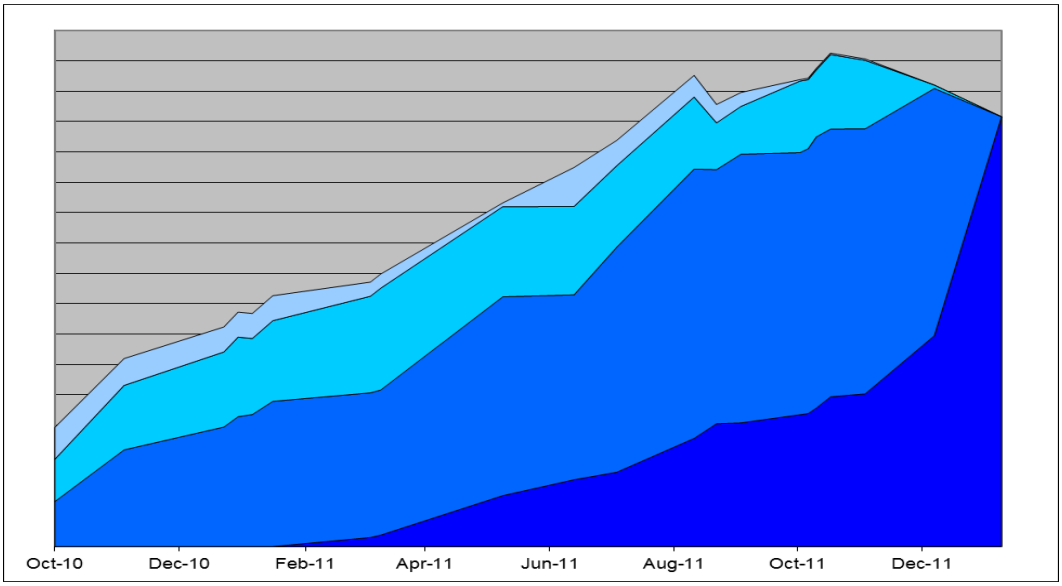

Figure 3: 2011 PE Program cumulative electric pipeline. Statuses are, from darkest to lightest (or bottom to top), completed projects, offers signed (committed projects), offers proposed, and enrollments. *Source*: PE program data

Goal: Increase savings from new projects

The Fall Bonus was designed to increase the number of projects entering the pipeline at the end of the year. Table 1 shows the percentage of new projects which completed in 2011 (bonus year) and the average of non-Fall Bonus years scaled to annual volume. The PE program completed 13.4 percent more projects that enrolled after Sept. 1 than in other years, resulting in 3.6 percent more electric savings[3]. Across all tracks the growth in projects is larger than the growth in savings providing evidence the extra projects are of smaller than average savings. This intuitively makes sense as the extra projects garnered by the bonus were smaller and more able to complete by the end of the year. This is especially noticeable in the custom track as the 7 percent increase in projects could not overcome the average non-bonus year growth in savings. Table 1 provides suggestive evidence the bonus was effective in both increasing fall enrollment and boosting annual kWh savings.

[3] Table 1 presents results, in bold, of a 'first-difference'. This technique differences out non-bonus years from the bonus year to control for temporal variation and to establish baseline program activity. Using percent of annual totals controls for within-year variation not correlated across time or with the treatment variable (the bonus). The resulting difference is interpreted as an estimate of activity attributable to the bonus.

Table 1: Projects committing after September 1

	All Tracks		Custom		Lighting		Streamlined	
	N	kWh	N	kWh	N	kWh	N	kWh
2011 (bonus)	37.4%	26.5%	27.2%	18.7%	44.0%	34.3%	33.6%	33.8%
Avg. other	24.0%	22.9%	19.9%	20.1%	27.3%	28.8%	19.8%	21.9%
Difference	**13.4%**	**3.6%**	**7.2%**	**-1.4%**	**16.8%**	**5.5%**	**13.7%**	**11.9%**

Note: All values are percent of yearly totals excluding O&M. N represents project count. Avg. other is the average of non-Fall Bonus years 2009, 10, 12, 13 and 14. *Source*: PE program data

A concern was the bonus would garner additional projects but would not be effective in making savings goal because those projects may not be able to complete within 2011. We investigated this in Table 2 which shows the percent of total projects per year delaying to the following year. The Fall Bonus did not increase project delays – in fact nearly a full percentage point fewer projects delayed compared to 2012 and 2013. This effect was primarily driven by custom track projects which saw a ten percentage point decrease in delays.

Table 2: September through December project attrition

	2011 (bonus)		2012		2013	
	N	kWh	N	kWh	N	kWh
All Tracks	5.8%	11.8%	6.5%	17.2%	6.8%	12.3%
Custom	10.0%	14.7%	25.6%	24.4%	28.0%	17.1%
Lighting	6.4%	8.7%	6.1%	9.3%	4.3%	3.3%
Streamlined	3.2%	4.0%	2.0%	2.3%	2.3%	4.1%

Note: All values are percent of yearly totals excluding O&M. n represents the project count. 2014 was omitted because a similar bonus was run (see Year-End bonus). Project delay data does not exist pre-2011. *Source*: PE program data

Kick Start Bonus

Projects qualifying for the Kick Start Bonus received a 20 percent increase in expected incentives in attempt to increase enrollments in 2012. Custom O&M measures were excluded because of the available 90x90 offer. The bonus was announced in late 2011 and promoted in the first half of 2012. It was open to new projects and projects that had committed late in 2011.

Goal: Increased enrollment in 2012

An increase in project enrollment was hoped for during promotion of the bonus. Figure 4 shows new project enrollments into the qualifying tracks of the PE Program in each quarter of 2012 and in the preceding years. In the years leading up to 2012, the PE Program saw a trend of 100-200 new enrollments per quarter, with the highest enrollments in Q2 each year. In 2012, enrollments were higher than average in Q1 and Q2, but slightly lower than preceding years in Q3 and Q4.

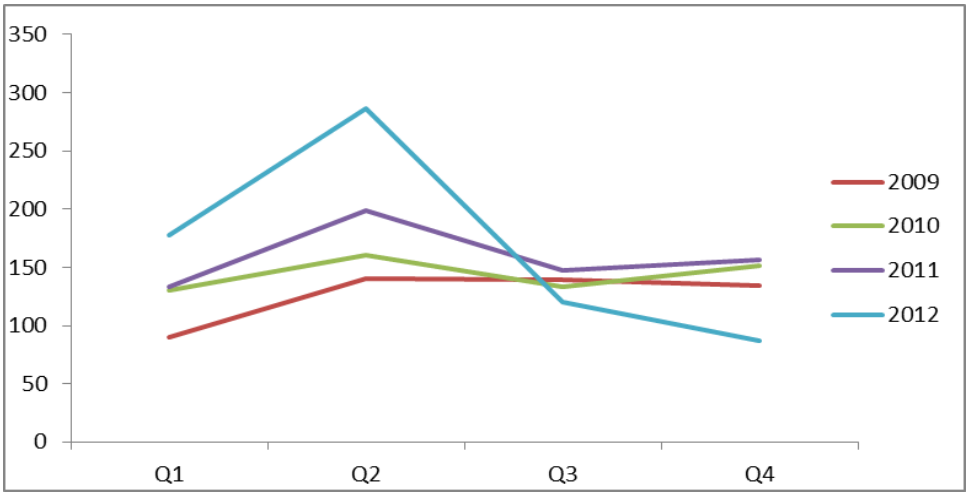

Figure 4: New PE program project enrollments by quarter (excluding O&M projects) in the years leading up to and including the Kick Start Bonus. *Source*: PE program data

The biggest shift in enrollment patterns happened in the streamlined track, where there was a 23 percent increase in enrollment share in Q2 compared to other years. In Q2 of 2012, there were notably more enrolments than any quarter of the preceding three years. On this basis, the bonus was successful in increasing enrollment and project volume.

Goal: Minimize insincere commitments and improve reliability of forecasts

A primary component of the Kick Start Bonus was the requirement that projects begin purchasing equipment within 90 days. The goal of this was to fill the pipeline with high-certainty projects but there was no requirement that projects complete within 2012. Some projects did delay. In 2012, 87 percent of bonus projects closed while the rest carried over into 2013 and 2014. Custom projects were more likely to carry over into following years than lighting and streamlined projects. Abandon rates for projects enrolled in Q2 2012 were similar to abandon rates for Q2 projects in recent years.

PDC Performance Compensation Bonus

The 2014 PDC Bonus was intended to decrease uncertainty. A significant amount of savings historically close in Q4, making savings forecasting in relation to goals difficult. PDCs were rewarded for meeting mid-year savings goals in attempt to smooth the pipeline.

Goal: Projects complete earlier in 2014

Figure 5 shows project completions by quarter for 2010-13 (non-PDC Bonus years) and 2014 for all project tracks. The bonus shifted approximately five percent of savings from Q3 and Q4 to Q2. The majority of this shift was out of Q3. The Year End Bonus was run in Q4 which increased savings in Q4 but is exogenous to pulling savings forward in 2014.

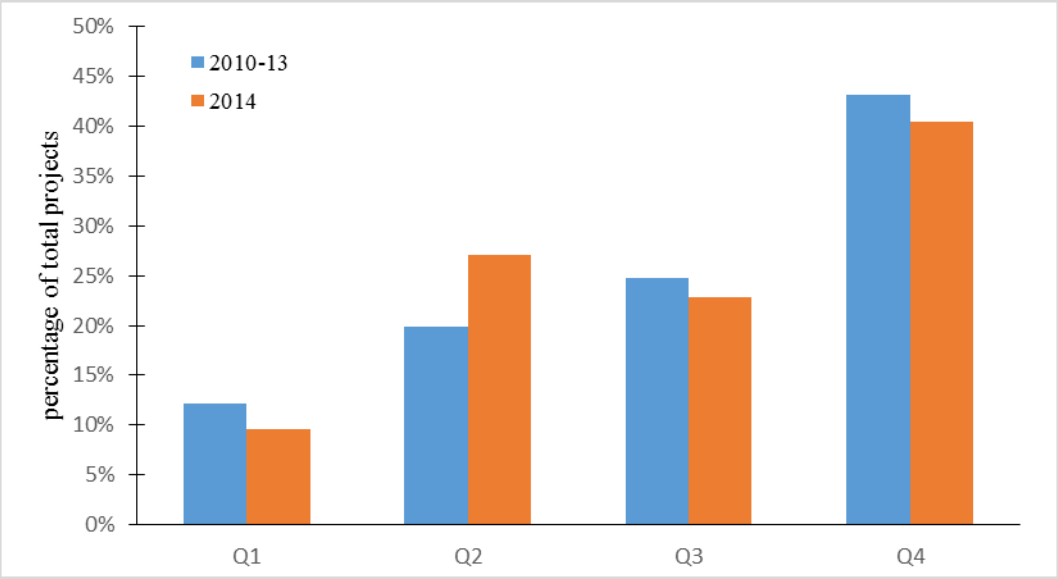

Figure 5: Percent of annual electric savings achieved by quarter, PDC bonus year and other recent years. *Source*: PE program data

Table 3 examines project completions by track, with lighting being especially responsive to the bonus and custom projects following the same trends in 2014 as they had in prior years.

Table 3: Project completions (percent of total) by quarter

	2010-2013			2014		
	Custom	Lighting	SI	Custom	Lighting	SI
Q1	7%	15%	12%	8%	13%	8%
Q2	12%	18%	23%	17%	31%	29%
Q3	21%	20%	29%	12%	21%	27%
Q4	60%	47%	35%	63%	35%	36%

Source: PE program data

Year End Bonus

The 2014 Year End Bonus was offered in Q4 2014 and limited to the custom track. Project attrition had increased in Q2 2014 and the pipeline was projected below goal across all tracks and fuel types. The PE program needed a quick intervention to bridge the gap to meet goal and therefore offered a custom track bonus which could be launched quickly through PDC communications. The Year End Bonus offered existing custom projects an additional 20 percent incentive for completing in 2014. This bonus is unique in that it was offered to every custom project regardless of the project stage or projected completion year.

Goal: Reduced attrition in 2014

The bonus was designed to reduce the rate of project abandonment in Q4. In 2014 (bonus year) 19 percent of projects abandoned compared to 23 percent in 2013[4], suggesting the bonus lowered abandonment rates by four percentage points.

A key difference between this and the Fall Bonus is that projects which had delayed into 2015 during Q2 were actively targeted. Table 4 shows 2014 project attrition compared to average Q4 activity in 2011-13.

Table 4: Q4 Custom Track Delays and Advances

	Avg. 2011-13			2014 (bonus)			*Difference*		
	N	kWh	therm	N	kWh	Therm	N	kWh	Therm
project advance	1.7%	0.8%	0%	10.1%	7.7%	3.5%	8.5%	6.8%	3.5%
project delay	13.3%	13.2%	10.7%	10.6%	9.0%	11.3%	-2.7%	-4.2%	0.6%
difference	-11.7%	-12.4%	-10.7%	-0.5%	-1.3%	-7.8%	**11.1%**	**11.0%**	**2.9%**

Note: Reported values are percent of annual custom track activity. An advance is a project moving from, for example, 2015 into 2014 while a delay is a project delaying from 2014 to 2015 or later. Bold values are the result of a 'first difference' estimation. *Source*: PE program data

The bonus was effective in reducing attrition. As shown in Table 4, net project attrition was 11 percentage points less than non-bonus years, resulting in an 11 percentage point increase in electric savings and a 3 percentage point gain in gas savings. Although delays reduced slightly from the non-bonus average this effect was driven primarily through projects advancing. The Year End Bonus was less effective in reducing gas project attrition.

Combining net delays and advances with abandonment the Year End Bonus is estimated to account for 15 percent of 2014 custom track projects. Furthermore, this bonus was effective in influencing projects of average size and resulting in approximately seven percent of 2014 electric savings.

Conclusions

Through examination of the results of five unique bonus designs we conclude that bonuses are effective in temporarily increasing project volume and savings. This effect seems to be consistent regardless of design as each bonus measurably increased savings and project volume in the short-run. In general non-custom measures seem more responsive to bonus incentives due to more nimble timelines. However, when custom measures can be influenced they have the greatest impact on annual savings.

While all the bonuses were successful, their successes were measured differently. Each bonus was designed in response to a unique circumstance and the results demonstrate these differences. We recommend that program designers take a thoughtful approach when designing bonuses to ensure the outcomes are in line with expectations. For example, a bonus structure

[4] *Source*: PE program data

similar to our Year End Bonus which was designed to reduce attrition and delays would not have been a successful as a tool to recruit new projects.

Bonuses designed to increase savings in a short timeframe, such as a strong push to meet a goal, should pay particular attention to customers and projects who are on-track to delay or are behind schedule. Delaying customers better fit the conceptual model of 'marginal customers', they often are far along in their project and can overcome small setbacks for additional incentive. Additionally, by targeting late-stage custom projects often characterized by larger savings, the PE program better increased short-term savings. The 2011 Fall Bonus and 2014 Year End Bonus, while differing in design, had a similar objectives of increasing savings at the end of the year to meet goals. Our results suggest the 2014 Year End Bonus was more effective in garnering additional savings; electric savings increased by an estimated seven percent that year compared to the four percent increase in 2011. The Year End bonus was quite effective in pulling delayed projects back into 2014. Almost eight percent of the year's custom track savings were from projects originally slated to delay into 2015. These customers stand in contrast to projects which would otherwise have abandoned. Although the Year End bonus lowered abandonment rates by four percentage points compared to 2013 this accounted for only seven custom projects while 19 custom projects were advanced by the bonus. During the Fall Bonus, which was not limited to only custom measures, there was measurable increase in quicker-turn projects such as lighting and prescriptive measures. However, these smaller projects led to an overall smaller savings increase.

There is suggestive evidence incentivizing completion dates is the most effective strategy in achieving quick savings. The other bonus designs, such as the Kick Start Bonus were less effective at increasing same-year savings may have shifted the timing of enrollments and completions. The Kick-Start Bonus and the PDC Performance Compensation Bonus each achieved increased enrollments and completions. These designs were effective tools for improving forecasting and smoothing workloads.

Bonuses may impact customer expectations. The 90x90 Bonus was the most unique bonus and was effective in increasing O&M projects, especially in the first two years of the bonus which saw record high O&M project volume. However, once 90x90 became a standard offer project volumes decreased. We hypothesized this could be due to the reduced sense of urgency to complete projects once the offer was not time limited but we could not verify through project data is this was the case. The reduced 90x90 volume may be due to the large number of SEM participants, whose O&M projects do not go through this channel. On the opposite side of the spectrum, there is anecdotally fear that repeated bonuses my lead customers into delays as the wait for the next bonus before enrolling or completing projects, much like a consumer waiting for a sale to make a purchase. Our analyses is these bonus designs could not shed light on such customer behavior.

More opportunities exist for research on this and similar topics. Future work could be conducted to identify the within-year net effect of each of these bonuses and to investigate market effects. Future research could examine any heterogeneity by project size, especially given the relationship between size and risk. Follow up research to assess any post-bonus effects of the Year End and PDC bonuses may shed light on the relationship between bonus design and market disruption.