

The Gift That Keeps Giving: A Structured Approach for Measuring Participant Spillover

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ABSTRACT

This paper describes a structured approach for measuring participant spillover. We developed this methodology after: 1) reviewing past approaches for measuring participant spillover to identify best practices; and 2) refining the methodology through practical experience measuring participant spillover for the Wisconsin Focus on Energy Business Programs. The paper describes how we approached the various challenges of a self-report participant spillover methodology including: finding the right decision-maker, avoiding double-counting, estimating program attribution, estimating spillover savings, and recording other indicators of market effects. The paper also summarizes the levels of participant spillover savings and other market effects that we found. Finally the paper discusses both the advantages and disadvantages of this approach.

Introduction

In recent years there has been increased discussion and debate over the nature and extent of spillover effects from energy efficiency programs, whether these spillover effects are coming from program participants or non-participants influenced by the program. In some cases, dramatic claims have been made concerning the extent of spillover effects. The main focus of this paper is to describe a structured methodology for measuring participant spillover. We developed this methodology after: 1) reviewing past approaches for measuring participant spillover to identify best practices; and 2) refining the methodology through practical experience measuring participant spillover for the Wisconsin Focus on Energy Business Programs.¹

Before discussing the methodology, it is useful to define participant spillover and provide some background on the Wisconsin Focus on Energy Business Programs.

Defining Participant Spillover

California's *Quality Assurance Guidelines For Statistical, Engineering, and Self-Report Methods for Estimating DSM Program Impacts*² give the following definitions for spillover and participant spillover:

Spillover is defined as: Reductions in energy consumption and/or demand in a utility's service area caused by the presence of the DSM program, beyond program-related gross savings of participants. These effects could result from:

- (a) additional energy efficiency actions that program participants take outside the program as a result of having participated;*

¹ Goldberg, M., C. Dyson, V. Goepfrich, December 22, 2005. *Business Programs: Participant Spillover Savings Study*. Prepared for State of Wisconsin Department of Administration Division of Energy by KEMA Inc; Evaluation Contractor: PA Government Services Inc.

² Various Authors. June, 1998. *Quality Assurance Guidelines for Statistical, Engineering, and Self-Report Methods for Estimating DSM Program Impacts*. Prepared for Retrofit Modeling Standards Subcommittee.

- (b) changes in the array of energy-using equipment that manufacturers, dealers, and contractors offer all customers as a result of program availability; and
- (c) changes in the energy use of non-participants as a result of utility programs, whether direct (e.g., utility program advertising) or indirect (e.g., stocking practices such as (b) above, or changes in consumer buying habits).

Part “a” of above definition is referred to as participant spillover.

The Wisconsin Focus on Energy Program

Focus on Energy (Focus) is Wisconsin’s statewide program to improve the energy efficiency of Wisconsin electric and gas customers and to encourage greater use of renewable energy. Begun in April 2001, Focus is funded by a fee assessed on electric and gas bills and serves approximately 85 percent of Wisconsin electric and gas customers. The Focus Business Programs (Focus BP) encourage energy efficiency in Wisconsin’s commercial and industrial sectors primarily through a strategy of resource acquisition using custom and prescriptive rebates.

Methodology

The methodology that we used to estimate participant spillover energy savings for the Focus BP participants included the following steps:

1. *Locating the right decision-maker* – We developed approaches for collecting the contact names of those associated with projects and then verifying their familiarity with the measures in question.
2. *Avoiding double-counting* – We developed methods to minimize the chance that apparent participant spillover measures were being double-counted elsewhere as tracked program-influenced measures³.
3. *Estimating program attribution* – We developed methods for estimating program attribution for both the participant spillover measures and the tracked program-influenced measures that preceded them.
4. *Estimating spillover savings* – We developed methods for estimating the energy savings from the participant spillover measures that we had identified.
5. *Recording other indicators of market effects* – We developed methods for measuring the program’s influence on the participant’s perceptions and practices that might be forerunners of future implementation of energy-efficient measures.

The primary data collection instrument for this analysis was a survey of Focus BP program participants that was conducted in October 2005. We defined Focus BP participants broadly as anyone who had participated since the program began in 2001. We went back to the earliest participants to capture participant spillover effects that might have taken a long time to manifest

Throughout this paper, we differentiate between “CFL participants” -- participants who received only a compact fluorescent lamp (CFL) rebate from Focus BP -- and all remaining participants (“non-CFL participants”). We assumed that non-CFL participants had a richer interaction with Focus BP than those who received only a CFL rebate and therefore were subject to a broader set of program influences. Therefore we treat these groups separately in our analysis. We sought to complete 250 surveys with non-CFL participants and 50 surveys with CFL participants.

³ In this paper we use the term “tracked program-influenced measures” to indicate energy-efficient measures that the program claimed for energy savings credit by entering the measures into the program tracking databases, often in association with a financial incentive paid to the participant by the program.

Literature Review

Before developing our methodology we first reviewed recent program evaluation reports and conference papers that addressed participant spillover. We did this to learn the various methodologies being used for estimating participant spillover, learn what challenges other evaluators had encountered when attempting to estimate participant spillover; and collect other estimates of participant spillover energy savings so we could compare these to our own estimates.

This literature review revealed that most evaluators are using participant self report methodologies for estimating participant spillover. Although the self-report method has its limitations, the general consensus of the evaluation literature was that it is a reasonably reliable method, provides greater transparency, and is much less costly than alternative methods.⁴ However, the evaluation literature also indicated that there were a number of challenges to effectively using the self-report method. These challenges included:

- *Locating the right decision-maker* - Large commercial and industrial companies have multiple decision-makers and it is often difficult to find someone who is familiar with both the tracked program-influenced measure and the spillover measure. Employee turnover can also complicate this.
- *Avoiding double-counting* – Companies that received financial incentives from an energy efficiency program for one measure are likely to seek these incentives for future measures. Hence it is important to get the program’s latest tracking data to make sure that a potential participant spillover measure did not receive program support.
- *Estimating program attribution* - A common way of assessing participant spillover is to ask how much the participant’s experience with the tracked program-influenced measure influenced their decision to implement measures that are candidates for spillover attribution. It is difficult to turn this “fuzzy” assessment of program influence into a more concrete attribution factor necessary for attributing a certain quantity of kilowatt-hours or therms from the spillover measure to the program.
- *Estimating the energy savings for the participant spillover measures.* Because spillover measures occurred outside the program, evaluators do not have access to the same information about the size, type, and quantity of the implemented energy-efficient measures that they would find in a program tracking database.

The following sections of this paper described how we tackled each one of these challenges.

Locating the Right Decision-Maker

To locate the right decision-maker we did a number of things including:

- *Looked at multiple program tracking databases for project contact names* – We looked at three different tracking databases maintained by the Focus BP program for project contact names. These sources provided as many as nine unique contact names for a particular measure.
- *Verified that the contact was familiar with the measures in question* - Before proceeding to complete a survey with any contact we first confirmed their familiarity with the decision to install the program tracked energy-efficient measures. We provided brief descriptions of the measures installed through the program based on the program-tracking databases. We also provided the year each measure was installed and where it was installed. If a respondent was familiar with only a subset of the Focus BP

⁴ For example, one conference paper said: “Based on an assessment of past methodologies, we conclude that the Self-Report methodology was the most transparent and appropriate approach for evaluating this complex and diverse program and market, given what the BEA study was trying to accomplish and the needs of the evaluation audience.” (Chappell, Mahone, Brown, Keating, Megdal, Net Savings in Nonresidential New Construction: Is a Market Based Approach the Answer?, IEPEC 2005). The authors of this paper discuss why they selected the self-report method after carefully considering other methodological approaches such as Difference of Differences and econometric approaches.

measures, we completed the survey for the measures they were familiar with and obtained the names and telephone numbers of the appropriate contacts for the remaining measures.

- *Obtained additional contact information from survey respondents* - Towards the end of the survey, we asked all respondents for additional contact names and telephone numbers. These additional contact names proved particularly useful when engineering estimates (as opposed to deemed savings estimates) were needed to calculate energy savings for participant spillover measures.

Avoiding Double-Counting

To avoid double-counting we did a number of things including:

- *Reminding the respondent of all tracked program-influenced measures* – As noted, we provided brief descriptions of the measures installed through the program based on the program-tracking databases. We also provided the year each measure was installed and where it was installed. Then we asked: “since making the energy efficiency improvements I just listed, has your organization made additional energy efficiency improvements at any of its Wisconsin locations.”
- *Asking about program influence over newly-identified measures* – If a survey respondent had identified any energy efficiency improvements that we had not previously identified through the program tracking databases, respondents were asked: 1) “Do you think you received a rebate, a price discount, or any other financial assistance to help with this additional energy efficiency improvement?” And if they answered “yes” to this question, we followed up with: “Do you think the rebate, price discount, or the majority of any other financial assistance was paid for by Focus on Energy?” 2) “Do you think you received any assistance, other than financial, from Focus on Energy to make this additional energy efficiency improvement?” The answers to these questions allowed us to identify a subsequent energy efficiency improvement as either a measure likely installed through Focus BP (and included in the program tracking system) or a measure likely installed outside the program.
- *Double-checking the tracking databases* – If a survey respondent identified energy efficiency improvements that we had not previously identified through the tracking databases, after the survey we double-checked these databases to make sure that we had not simply overlooked these measures.

Estimating Program Attribution

To credit participant spillover energy savings to an energy-efficient measure, we had to make sure that it was installed due to previous participation in the program. For this to be the case, two criteria had to be met:

1. The original tracked program-influenced measures must be at least partially attributable to the program (Attribution Factor A).
2. The subsequent measure must be at least partially attributable to the participant’s experience with their earlier Focus BP measures (Attribution Factor B).

If a measure met these two criteria, we assigned it spillover savings. Otherwise we determined its spillover savings to be zero. Specifically, the subsequent measure’s spillover savings were calculated as:

(the measure’s annual savings) X (Attribution Factor A) X (Attribution Factor B).

It was necessary to apply both Attribution Factor A and Attribution Factor B because the fact that a program-tracked project causes spillover savings does not mean that the program should get credit for this spillover savings. If the program had no influence on the original tracked project, the program should not get credit for any additional measure installations resulting from that tracked project.

At first we considered limiting this study to participants previously surveyed for a Focus BP impact evaluation. For these participants we had a rigorous assessment of program attribution (Attribution Factor A) for at least some of their tracked program-influenced measures. However, restricting the spillover study to prior impact evaluation survey respondents would not have given us large enough initial pool to complete our target sample. For example, using this filter would have given us only 684 non-CFL participants to meet a goal of 250 survey completes and 194 CFL participants to meet a goal of 50 survey completes. In addition, limiting this study to participants included in an impact evaluation would require designing a sample that accommodated multiple impact evaluation sample designs rather than designing a sample specifically for this study. Finally we were concerned that employee turnover would often make it difficult for us to use the same respondent for estimating Attribution Factors A and B. For these reasons, we allowed any participant, regardless of whether or not they were previously included in an impact evaluation survey, to be eligible for this study.

Determining program attribution for the tracked program-influenced measures

Before asking survey respondents about the apparent participant spillover measures, we asked them a few questions about each of the tracked program-influenced measures they had installed. In addition to confirming they in fact had installed these tracked program-influenced measures, we asked:

1. Was this the first time your organization made an energy efficiency improvement like this?
2. How important a role did the equipment dealer, installation contractor, or other supplier play in the decision to make the energy efficiency improvement [interviewer briefly describes Focus improvement, including year and location at which the improvement was made]?
3. Do you think you received a rebate, a price discount, or any other financial assistance to help with the energy efficiency improvement [interviewer briefly describes Focus improvement, including year and location at which the improvement was made]? And if they answered (3) “yes,” we followed up with:
 - How important was the rebate, price discount, or other financial assistance in the decision to make this energy efficiency improvement?
 - Do you think the rebate, price discount, or the majority of any other financial assistance was paid for by Focus on Energy?
4. Do you think you received any assistance, other than financial, from Focus on Energy to make the energy efficiency improvement [interviewer briefly describes Focus improvement, including year and location at which the improvement was made]? And if they answered (4) “yes,” we followed up with: “How important was this non-financial assistance from Focus on Energy in the decision to make this energy efficiency improvement?”

These questions had a dual purpose. We used the responses to calculate program attribution for tracked program-influenced measures (Attribution Factor A). We also designed these questions to get the respondents to think about the role that Focus BP played in their decisions to install the tracked program-influenced measures.

For CFL participants, program attribution for their tracked program-influenced CFLs was based on the question “how important was the rebate in the decision to purchase the [quantity] compact fluorescent light bulbs at [store] in [year]?” Table 1 gives the values assigned to Attribution Factor A based on the reported level of importance.

Table 1. Program Attribution for Tracked Program-Influenced CFLs

Reported Importance of Focus BP in Installing CFL	Assigned Attribution Factor A
1 (not at all important)	0.00
2	0.25
3	0.50
4	0.75
5 (very important)	1.00

For non-CFL participants, program attribution for their tracked program-influenced measures was assessed across all of their tracked program-influenced measures and multiple indicators of the importance of Focus BP. As a first pass, we took the maximum of the customer’s “importance of Focus” responses across all their tracked program-influenced measures and considered both financial and non-financial Focus assistance. We then applied the same assignment rules to this maximum importance as indicated in Table 1. We chose to use the maximum “importance of Focus” response rather than average of these responses, because we realized that one important effect of Focus BP could be enough to influence a measure, even though other program effects were inconsequential. We later assessed the sensitivity of the results to using the maximum importance response rather than an average or minimum. As it turned out, the results were almost identical using an average or minimum importance score to those using the maximum importance score.

A few non-CFL participants did not think they received financial assistance (from anybody) or non-financial assistance from Focus BP for any of their tracked program-influenced measures. These participants did not answer the importance of the financial assistance or the importance of non-financial assistance from Focus BP questions. Therefore, for these non-CFL participants, we based program attribution for their tracked program-influenced measures on the maximum of the participant’s responses to the importance of the supplier question across all their tracked program-influenced measures. Again, we used the same assignments of attribution based on the reported level of importance.

Finally, a few non-CFL participants did not think they received financial assistance or non-financial assistance from Focus BP for any of their tracked program-influenced measures and they responded, “don’t know” to the importance of the supplier question(s). For these non-CFL participants, we based program attribution for their tracked program-influenced measures on whether or not any of their tracked program-influenced measures represented the first time the participant had made that type of improvement. If at least one of a non-CFL participant’s tracked program-influenced measures represented the first time they made that type of improvement, we assessed the importance of Focus BP as a 3 (middle importance level); otherwise, we assessed the importance of Focus as a 1 (not at all important). Based on Table 1, the corresponding values of Attribution Factor A were 0.50 and 0, respectively.

Estimating program attribution for subsequent measures

For both CFL and non-CFL participants, program attribution for participant spillover measures was based on the question, “if you had not made the earlier energy efficiency improvements I just listed, how likely would you have been to make this additional energy efficiency improvement.”⁵ Table 2 gives

⁵ The wording of this question is slightly different for participants who received only a Focus BP CFL rebate: “if you had not purchased the rebated compact fluorescent light bulbs I just described, how likely would you have been to make this energy efficiency improvement?”

the possible responses to this question as well as the values then assigned to Attribution Factor B. We assigned Attribution Factor B a value of 0 for the “very likely” response to ensure the follow up necessary to estimate the annual savings for a participant spillover measure is worth the effort. We assigned a value to Attribution Factor B for a “don’t know” response depending on the type of participant (CFL or non-CFL) and whether or not the participant spillover measure was in the same end-use category as the participant’s tracked program-influenced measures.

Table 2. Program Attribution for Subsequent Measures

If Had Not Installed Tracked Program-Influenced Measure, Reported Likelihood of Installing Subsequent Measure	Assigned Attribution Factor B
Very likely	0.00
Somewhat likely	0.55
Not very likely	0.90
Very unlikely	1.00

Estimating energy savings for participant spillover measures

To estimate the annual savings for participant spillover measures, we used deemed savings estimates when available; otherwise, we based the estimates on engineering reviews. From the initial survey we had a brief description of the participant spillover measure, which included both the location (street address and city) and the year it was installed. We followed up with respondents that had participant spillover measures (Attribution Factor B greater than 0) to obtain any additional information necessary to estimate the annual savings.

To estimate the savings for each participant spillover measure, we applied the survey respondent-specific Attribution Factor A and the measure and respondent-specific Attribution Factor B using the previously-cited formula:

$$(\text{the measure's annual savings}) \times (\text{Attribution Factor A}) \times (\text{Attribution Factor B}).$$

The next step was to total each survey respondent’s spillover savings over all subsequent measures, separately for each energy unit: kW, kWh, and therms. To estimate the spillover savings for the population of all program participants over the years of interest, the sample weights were applied to the estimates of respondent-level spillover savings.

Other Indicators of Market Effects

Although the installation of energy-efficient measures was the ultimate market effect of interest for our participation spillover analysis, we realized that changes in participant perceptions and practices may be forerunners of future installations. Therefore we asked non-CFL participants, who had likely received a richer program interaction than the CFL participants, if their participation had changed their practices or perceptions in relation to some of the common barriers to adoption of energy efficiency measures. They were asked whether their experience with Focus BP had:

- Increased their confidence in the energy savings from efficiency measures,
- Increased their confidence in the reliability of energy-efficient technology,
- Improved their energy management practices, or
- Introduced them to new suppliers.

Summary of Findings

Spillover Levels

Our analysis found that 12 percent of the CFL participants and 5 percent of the non-CFL participants in Focus BP installed spillover measures (i.e. subsequent measures with at least some positive attribution to the program). The total spillover savings for CFL and non-CFL participants combined ranged from less than 1 percent to 6 percent of in-program savings. This range in estimates was largely because a single respondent reported a very high level of spillover CFL installation. Based on different treatments of this outlier case, we estimated spillover savings from CFL participants at between 2 and 36 percent of the in-program savings.

For the CFL participants, all the spillover measures reported were lighting measures. This finding was not surprising since the CFL rebate was likely the only direct interaction of the program with such customers. In addition spillover effects have often been attributed to CFL purchasing since shoppers may purchase multiple bulbs in a single trip even if rebates are not available for all of them.

For most of the non-CFL participants with spillover savings, the spillover measure was for a different end use than the original tracked program-influenced measure. This also was understandable since if participants had received program financial incentives for one type of energy-efficient measure and then subsequently did another installation with a similar technology, they would likely also seek financial incentives for this second measure. However, if the second measure was a different technology, they might not be aware that program incentives were available.

Figures 1 and 2 show the percentage of CFL and non-CFL participants who implemented energy-efficient measures since their participation and to what degree these subsequent energy-efficient measures were attributed to the program. The dark segments indicate those participants who were credited with some participant spillover.

Figure 1. Distribution of CFL Participants' Subsequent Energy Efficiency Implementation

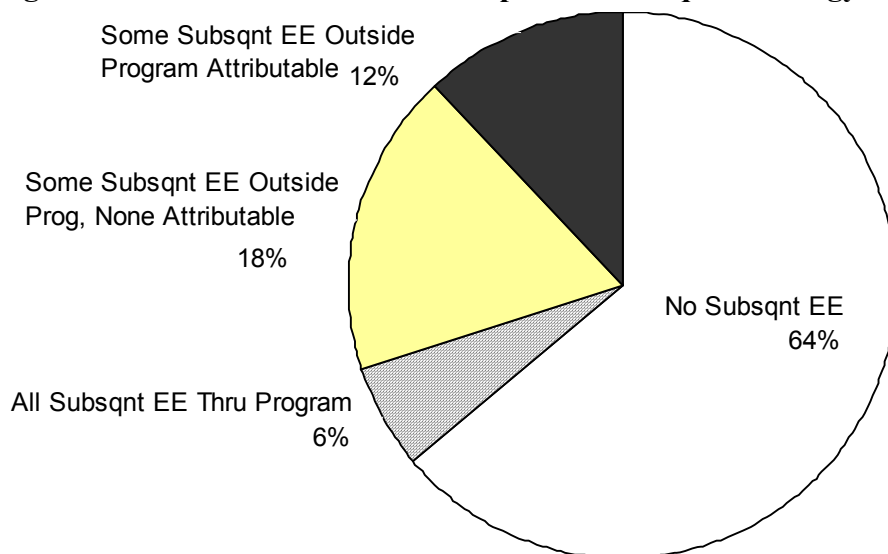
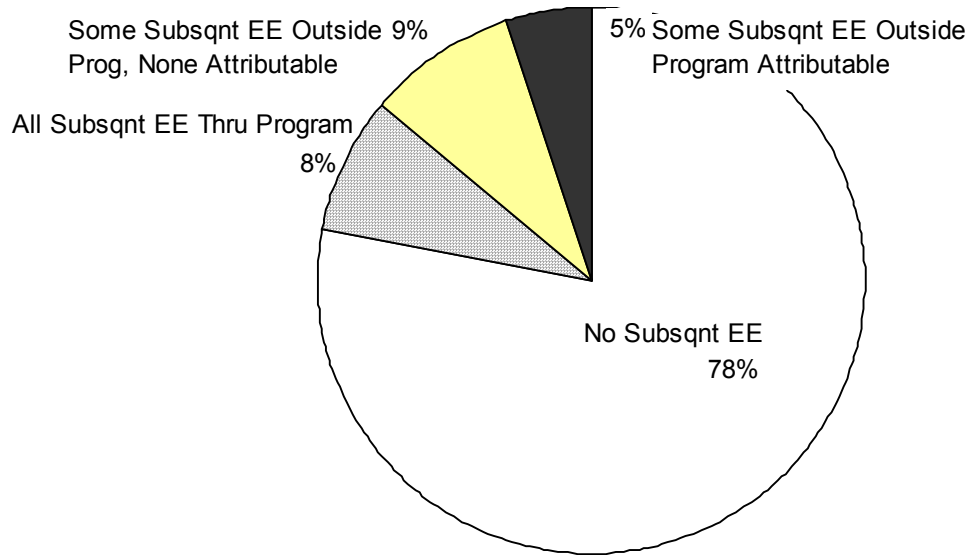


Figure 2. Distribution of Non-CFL Participants' Subsequent Energy Efficiency Implementation

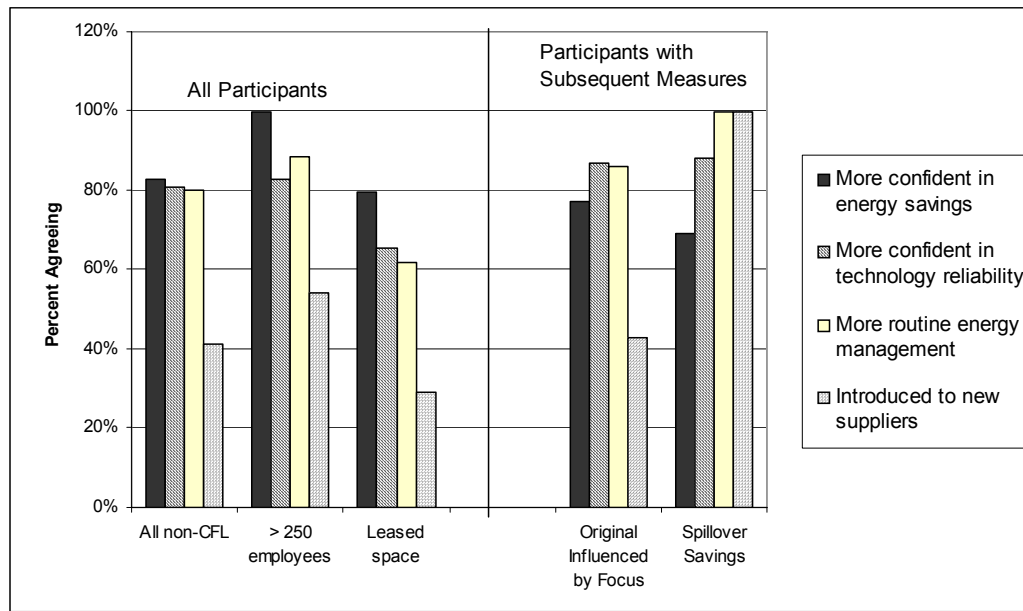


Other Indicators of Market Effects

As noted, non-CFL participants were asked if their participation had: 1) Increased their confidence in the energy savings from efficiency measures; 2) Increased their confidence in the reliability of energy-efficient technology; 3) Improved their energy management practices; or 4) Introduced them to new suppliers. Eighty-nine percent of these non-CFL participants agreed that Focus BP had helped in at least one of these four ways.

Figure 3 shows how these indicators of market effects differed depending on the type of customer. For participants with spillover savings, one noticeable indicator of market effects is the proportion who indicated that program participation introduced them to new suppliers. All the spillover participants cited this program influence compared to 50 percent or less for the other participant types. Introducing customers to new suppliers who will subsequently promote other energy efficiency measures is one means by which Focus BP would like to stimulate ongoing energy efficiency improvements outside the program. While the total number of participants with spillover savings is small, this finding suggests that the role of suppliers is one factor that makes a difference to whether participants have subsequent spillover savings or not.

Figure 3. Market Effects Indicators for Non-CFL Participants



Summary

This paper describes a structured approach for measuring participant spillover. This approach addresses the various challenges of a self-report participant spillover methodology including: finding the right decision-maker, avoiding double-counting, estimating program attribution, estimating spillover savings, and recording other indicators of market effects.

To properly implement this methodology, however, it is important that evaluators have access to a program's historical tracking data as well as more current tracking data. Before we surveyed a participant, we prepared an inventory of all the energy-efficient measures that their company had implemented over the program's history including information such as contact person, type of technology, installation location, and year of installation. This was useful for a number of reasons including:

- Since large commercial and industrial customers often have multiple decision-makers and multiple program-influenced projects, it allowed us to determine more precisely which company contact should be asked about which project.
- By being able to provide the survey respondent with a complete list of tracked program-influenced measures we were able to minimize "double counting."
- By being able to talk about the full breadth of energy efficient measures that the respondent had conducted with the Focus BP program, we were able to increase the chance that they would identify causal links between tracked program-influenced measures and any subsequent energy-efficient measures they implemented "outside the program."
- Being able to talk more precisely about the past projects – e.g., "the lighting retrofit that you did in your Milwaukee plant in 2004" – was especially important since our method of calculating spillover savings involves multiplying two attribution factors.
 - Attribution Factor A measured the influence of the program on the tracked project. Since some of these tracked projects were a few years old, providing this additional detail would help jog the memory of the respondent and therefore produce a more reliable attribution estimate.

- Attribution Factor B measured the influence of the tracked project on the potential spillover project. In this case, providing this additional detail would help the respondent recall any causal links between the tracked project and the potential spillover project. For example, being reminded that Focus BP provided financial incentives for a lighting project in a Milwaukee plant in 2004 would make it easier for the respondent to realize that this project influenced a subsequent untracked lighting project in a Green Bay plant in 2005.

Yet some evaluators may not be able to readily collect comprehensive historical participation information of this kind due to incomplete or inconsistent

One possible objection to this approach is that it forces survey respondents to assess program attribution (Attribution Factor A) for a tracked project that may have happened as many as four years previous. Although this is a valid concern, there are a number of considerations:

- *In our analysis, Attribution Factor A rarely removed a project from spillover consideration – We found that Attribution Factor A was responsible for eliminating spillover savings (e.g., because Attribution Factor A was zero) in only 3 of 91 cases.*
- *While using a program attribution estimate that was collected soon after project implementation might be preferable for Attribution Factor A, this is difficult to do. As noted, even though we had historical program attribution ratings for nearly 900 Focus BP participants, it would have been difficult to complete 300 surveys with a starting sample of this size. In addition, employee turnover can complicate the use of historical attribution factors for Attribution Factor A. Ideally one would want the same decision-maker to estimate both Attribution Factor A and Attribution Factor B.*

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