## Spillover – Worth Crying Over: An Innovative Methodology for Quantifying Non-Participant Spillover in California

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### ABSTRACT

This paper describes an innovative methodology that is currently being used to estimate nonparticipant spillover in California for the 2010-2012 program years. Unlike traditional spillover studies which rely on self-reported installations of high-efficiency equipment, this study leverages the equipment inventories of 1,987 residential sites that were conducted as part of the *California Lighting and Appliance Efficiency Saturation Study (CLASS)* and 1,520 commercial sites that were conducted as part of the Commercial Saturation Survey (CSS) and Commercial Market Share Tracking (CMST) studies. This methodology is of interest to other jurisdictions that may be able to leverage residential and commercial baseline studies in a similar manner.

#### Introduction

From the 2006-08 program cycle until the end of the 2010-2012 program cycle, the California investor-owned utilities (IOUs) were not permitted to claim spillover savings in their ex-ante savings claims and cost-benefit analyses. However, circumstances have recently changed as California Public Utilities Commission (CPUC) decision (D.)12-11-015 allowed the California IOUs to apply a "portfolio-level market effects adjustment of 5% across the board to the entire 2013-2014 portfolio cost-effectiveness calculation."<sup>1</sup> The market effects adjustment that the IOUs are claiming in 2013-2014 includes spillover savings. D.12-11-015 also ordered CPUC staff to develop research methods and estimate spillover effects for the 2013-2014 period. Opinion Dynamics Corporation and Itron are currently conducting studies on behalf of the CPUC aimed at estimating residential and non-residential spillover savings, respectively. These studies are expected to be completed in late 2015.

#### **Definition of Non-Participant Spillover**

Spillover has been defined as the "energy savings associated with energy efficiency measures adopted by consumers who were influenced by an energy efficiency program, but without direct financial or technical assistance from the program."<sup>2</sup> While spillover may be categorized as *participant* spillover<sup>3</sup>

<sup>&</sup>lt;sup>1</sup> Decision Approving 2013-2014 Energy Efficiency Programs and Budgets (D. 12-11-015), California Public Utilities Commission,, November 8, 2012.

<sup>&</sup>lt;sup>2</sup> "The Estimation of Spillover: EM&V's Orphan Gets a Home," Ralph Prahl, Prahl & Associates, IEPEC Conference 2013.

<sup>&</sup>lt;sup>3</sup> *Participant spillover* occurs when a customer who installed a high efficiency measure under an IOU program installs another high efficiency measure outside of the program as a result of their interaction with the program. An example of this would be a customer that completes an HVAC upgrade through the program and then, based on that experience, decides to complete a lighting upgrade without the receipt of an IOU program incentive.

or *non-participant* spillover, this paper focuses on the latter type. Non-participant spillover occurs when a utility rebate program induces a customer to install a high efficiency measure without having participated in a utility rebate program. This could result from a customer's increased awareness or understanding of energy efficient equipment (as a result of customer outreach, education, or communication with a program participant). An example of non-participant spillover would include a customer who chooses to install high efficiency lighting due to awareness resulting from a utility program but for one reason or another does not pursue a utility rebate.

#### **Methodology Overview**

Traditional spillover assessments rely on self-reported survey findings to identify installations of high-efficiency measures that occur outside of energy-efficiency programs. The methodology described in this paper, however, supplements self-reported survey information with data from residential and commercial saturation studies to quantify spillover. This approach reduces the uncertainty associated with self-reported information pertaining to energy-efficiency equipment. This approach estimates spillover by calculating: 1) non-self-reported counts and unit savings of high-efficiency equipment purchased outside of programs, and 2) self-reported attribution of program influence on those purchase decisions. The self-reported attribution survey will be administered to the sites identified as having installed energy-efficient equipment outside of an IOU program.

## **Data Sources**

Saturation studies provide a unique opportunity to mine the results of on-site audits to identify customers who have installed high-efficiency equipment outside of IOU programs. This methodology eliminates the need for self-reported installation information or most additional on-site verification of self-reported claims. In particular, this methodology eliminates the pitfalls associated with self-reported equipment information, as respondents may lack the knowledge to accurately identify the efficiency level of installed equipment. The three saturation studies referenced in this paper, namely the *California Lighting and Appliance Efficiency Saturation Study* (CLASS), *Commercial Saturation Survey* (CSS), *Commercial Market Share Tracking* (CMST) study are collectively referred to in this paper as the "saturation studies."

**Residential.** To identify non-participant spillover among residential customers, this methodology leverages CLASS data to identify customers who may have installed program-eligible measures outside of IOU programs. The CLASS database includes data on residential building characteristics, lighting and appliance saturations and efficiencies from 1,987 on-site home surveys. Data collection for CLASS is based on a stratified random sample of California homes from 2010 billing data for all residential accounts submitted by electric IOUs.

**Commercial.** To identify non-participant spillover among commercial customers, this methodology uses data collected from the 1,520 non-residential sites in California that were surveyed in the 2010-2012 CSS and CMST studies. The CSS study analyzed the baseline of electric equipment of food stores, liquor stores, medical clinics, offices, restaurants, retail, schools, warehouses and other miscellaneous businesses. The CSS did not include hotels, hospitals, industrial businesses, agriculture or colleges and universities. The CMST on-site data collection effort includes the same businesses types surveyed for the CSS and a limited number of sites representing hotels, hospitals, industrial businesses, and colleges/universities. Agriculture was not included in the CMST data collection effort.

From the equipment characteristic data (i.e. make and model number) obtained through these studies, spillover cases are identified and quantified.

### **Identification of Installed Energy-Efficient Measures**

To identify the installation of energy-efficient measures, this methodology uses the data collected from the saturation studies for two purposes:

To identify sites with measures purchased during the spillover study period, the methodology may also rely on equipment age or installation date, as recovered from the equipment manufacturing date.

**Commercial.** CSS/CMST on-site data is used to identify customers installing new measures. The make and model numbers associated with the measures installed from 2010-2012 are then analyzed to determine the efficiency level. Installation date is determined through discussions with facility staff and and cross-checked with other data such as manufacture date, make/model numbers and facility maintenance history. The analysis of the CSS/CMST data is focused on the installation of lighting, HVAC, EMS, and refrigeration measures installed during the spillover timeframe.

### **Participation Status**

After identifying sites that purchased high-efficiency measures during the 2010-2012 period, this methodology uses tracking data from IOU energy-efficiency programs to determine if these measures were installed through an energy-efficiency program. For each site, IOU program tracking data are used to identify non-participant spillover candidacy by:

- 1) Confirming that the high-efficiency measures installed during the 2010-2012 period did not receive a rebate from an IOU energy-efficiency program; and
- Confirming that the customer site did not participate in an IOU energy-efficiency program during the 2010-2012 period.<sup>4</sup>

Table 1 and Table 2 summarize potential non-participant spillover sites by end-use. Sites installing multiple measures within an end-use are listed only once; sites installing multiple end uses are listed in all end-uses that apply. The sample frames were developed by removing all sites that had participated in a 2010-2012 IOU energy-efficiency program from the saturation study data. This action led to the identification of 1,310 residential sites and 254 commercial sites<sup>5</sup> where high-efficiency measures were installed during the spillover timeframe without having participated in an IOU program.

<sup>&</sup>lt;sup>4</sup> Customer sites that did participate in an IOU energy-efficiency program during the 2010-2012 period are included in the sample frame for participant spillover.

<sup>&</sup>lt;sup>5</sup> These figures representing 66% of the 1,987 residential sites and 17% of the 1,520 non-residential sites in the respective CLASS and CSS/CMST studies.

Table 1: Residential Non-Participant Sites with Non-Rebated High-Efficiency Equipment<sup>6</sup>

	HVAC	Appliance	Envelope	Domestic Hot Water	Total <sup>7</sup>
Sites	71	398	1,172	105	1,310

#### Table 2: Non-Residential Non-Participant Sites with Non-Rebated High-Efficiency Equipment

	Lighting	Refrigerati on	HVAC	EMS	Total
Sites	160	22	92	25	254

# Attribution

A self-report telephone survey is used to determine if IOU energy-efficiency programs influenced the customer decision to purchase high-efficiency equipment. A series of program attribution questions determine to what extent exposure to an IOU energy-efficiency program influenced the decision to install high-efficiency equipment at a non-participant site.

Respondents are first asked if they are aware of IOU energy-efficiency programs. If so, then respondents are asked to rate one or both of the following items:

- a) The influence of the program in the decision to install the unincentivized equipment;
- b) The likelihood that the unincentivized equipment would have been installed in the absence of the program.

For each measure associated with spillover, attribution is either awarded entirely or not at all (i.e. partial attribution is not awarded). So any response to question a) or b) that indicates even the slightest amount of spillover, results in the full attribution of spillover. In other words, the incidence of spillover may only be expressed numerically as a "1" or a "0," and not in terms of partial spillover as is done in net-to-gross studies of partial freeridership.

# **Calculation of Spillover Savings**

**Unit Savings.** Once spillover has been attributed for a given spillover site, spillover savings values are calculated for each instance of identified spillover by using one of two values: 1) the ex-ante values provided by the Database of Energy-Efficient Resources (DEER); or 2) ex-post savings values, if the measure was evaluated as part of an evaluation study conducted for the 2010-2012 program timeframe.

**Expansion Weights.** The residential and non-residential spillover studies will use similar methods to expand the non-participant spillover measures to the population, but the exact methodology for developing expansion weights is still under consideration. In any case, spillover results will be expanded

<sup>&</sup>lt;sup>6</sup> There are limitations in the CLASS data for assessing spillover for certain measure types. Notably, lighting is not included since CLASS does not collect install/purchase data for light bulbs. To incorporate spillover from lighting, the evaluation team will leverage other ED/IOU studies to collect relevant data for estimating spillover from lighting.

<sup>&</sup>lt;sup>7</sup> Because sites may have multiple measures, site counts by measures category do not sum to total sites.

by business type using the weights developed for the saturation studies. Wherever certain customer or business types are not represented in the frame, results will be extrapolated based on the spillover savings rate for all business/customer types. Savings ratios will also be extrapolated for the measures that were not studied as part of the onsite data collection effort.

Analysis of Measure-Level Savings. Measure-level savings are calculated for all measures associated with non-participant spillover. These savings are weighted and presented by measure end-use and at the portfolio level by IOU in the following manner:

- ex ante and ex post non-participant spillover savings (kWh, kW, therms) by end-use; and
- ex ante and ex post non-participant spillover savings (kWh, kW, therms) by portfolio.

Ex ante non-participant spillover savings are calculated based on the ex ante savings found in DEER. Ex post non-participant spillover savings are calculated based on the relevant PY 2010-2012 impact evaluations. If a particular measure was not evaluated as part of a previous study, the measure savings incur a "pass-through" realization rate of 100%. Furthermore, these ex post figures do not account for any adjustments pertaining to free-ridership.

**Calculation of Spillover Savings Rate.** The non-participant *spillover savings rate* is calculated as the portfolio-level energy savings associated with non-participant spillover divided by the 2010-2012 savings associated with the portfolio. More specifically, the spillover savings rate entails the following:

Total spillover savings (kWh, kW, therms) / total portfolio savings (kWh, kW, therms)

The calculation of spillover savings on ex ante and ex post levels will not likely result in a large difference because the numerator and denominator of such calculations changes proportionately. For non-participant spillover measures not evaluated during the PY 2010-2012 impact evaluations, a 100% realization rate is assigned in a manner consistent with a pass-through evaluation rate.

### **Evaluation Results**

Spillover results will be available in late 2015. Draft results will be available for public comment on the CPUC's Public Documents Area (<u>www.energydataweb.com/cpuc/</u>). Final results will be published on Calmac (www.calmac.org), California's repository for ratepayer-funded research studies (calmac.org). These results will include the estimated amount of savings resulting from measures associated with nonparticipant spillover, and the non-participant spillover rate

# References

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