Deep Savings for Small Commercial Direct Install: A Replicable Model for High Volume, Cost Effective Energy Savings

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Josiah Adams – Ecology Action
Alexi Miller – New Buildings Institute
Cathy Higgins – New Buildings Institute

ABSTRACT

Achieving large scale, cost effective, and comprehensive energy retrofits in small commercial buildings has long been elusive. However, a US DOE-funded evaluation of a direct install efficiency program operated by the Sacramento Municipal Utility District (SMUD) confirms that energy savings of nearly 20% over baseline is already occurring, and that these deep savings can be delivered in large quantities and for moderate cost. This paper discusses the program design elements, regulatory environment, and delivery strategies that have driven these results and the EM&V details that verify these notable outcomes.

Three fundamental characteristics define this model. First, Sacramento Municipal Utility District's program model transfers both the responsibility and the reward to an independent program implementer, offering them both support and the contractual obligation to achieve results. Second, the regulatory environment where SMUD operates fosters a culture of innovation within the utility, accompanied by the latitude to actually implement change. Third, the program implementer applied a distinct delivery model designed to enhance program performance, including a blended customer acquisition model, hybrid energy savings calculations, and rigorous contractor and equipment management.

Together, these elements created a large-scale program that is achieving 20GWh of annual energy savings while simultaneously achieving comprehensiveness, with more than 42% of savings coming from refrigeration and HVAC measures. Simultaneously, the program remains cost effective with a cost of $0.0346 per lifetime kWh and an estimated Total Resource Cost of 3.1.

BACKGROUND

Serving the energy efficiency needs of the small to medium sized business (SMB) market has long been challenging. Energy decisions are in the hands of small business owners who have little time to be concerned or informed about energy management[1]. Because the energy savings potential of each individual project is modest, it has been difficult to justify the full service, comprehensive offerings that are common to larger projects. Instead, this sector has traditionally been served by contractor-driven prescriptive programs offering basic lighting "direct install" replacements, often for free. This model captures minimal energy savings at each site as contractors are incentivized to install the easiest and lowest cost measures available, stranding deeper savings. Further, it has proven vulnerable to contractor fraud and often delivers low

[1] California Energy Commission "Existing Buildings Energy Efficiency Action Plan" 2015.

customer satisfaction scores. But the energy savings potential and customer service concerns are so large that regulators and utilities across the country continue to explore new delivery mechanisms for this important sector. This paper describes one model that is achieving remarkable success in California.

Utility

Sacramento Municipal Utilities District is a large municipal utility providing electricity (not gas) to 1.4M customers in the greater Sacramento CA area. [2] SMUD is a publicly owned utility overseen by a Board of Directors and regulated by the California Energy Commission. SMUD has a broad portfolio of EE programs that serve all customers from residential to large industrial. SMUD annually spends approximately $40M on Energy Efficiency programs and achieves about 175GWh in energy savings[3]. This paper discusses SMUD's Complete Energy Solutions (CES) program that served commercial customers with less than 500 kW demand. The CES program offers commercial customers with a turnkey energy efficiency program, including no-cost energy audits and proposals, project management of independent contractors, and rebates up to 95% of project cost.[4]

Program Implementer

Ecology Action has served as SMUD's program implementer for the Complete Energy Solutions program since 2013. Ecology Action is a non-profit environmental consultancy that provides energy efficiency program delivery services for several IOU and POU utilities throughout California, focusing on the SMB market. In the past 14 years Ecology Action has installed over 15,000 retrofits resulting in over 500GWh of energy savings.

In 2014, Ecology Action was awarded a US Department of Energy (DOE) grant to measure, analyze, and refine the achievements of the SMUD CES program. The goal of the DOE project, known as Small Market Advanced Retrofit Transformation (SMART Scale), is to quantify the depth of savings possible in the SMB sector, and to investigate ways to scale the results nationally. SMUD's CES program has served as the proving ground for the SMART Scale project, allowing for the identification and deployment of new measures, and piloting hybrid customer acquisition and financing models. Ecology Action retained the New Buildings Institute as the EM&V consultant to quantify CES program performance and suggest improvements. The New Buildings Institute's EM&V methodology and results are discussed in detail beginning in the Measurement & Verification portion of this paper.

SUMMARY OF RESULTS

The CES program has greatly exceeded conventional understanding of the energy savings results that can be achieved with direct install programs serving SMB customers. Not only are

[2] "Company Profile" https://www.smud.org/en/about-smud/company-information/company-profile.htm
[3] *Energy Efficiency in California's Public Power Sector: A 2015 Status Report.* California Municipal Utilities Association, et al. http://cmua.org/wpcmua/wp-content/uploads/2015/03/2015-FINAL-SB-1037-Report.pdf
[4] "Complete Energy Solutions." Sacramento Municipal Utility District https://www.smud.org/en/business/save-energy/energy-management-solutions/complete-energy-solutions.htm

deep and comprehensive retrofits possible in the SMB market, they can be delivered cost-effectively and at a large volume.

Deep Savings

SMB direct install programs typically achieve minimal total energy savings at each site because they install a limited number of measures. By installing highly efficient equipment, addressing multiple measure types, and identifying as many energy savings opportunities as possible, the CES program is able to reduce customers' total electrical kWh consumption by 19% over baseline. This represents a huge leap forward in eliminating stranded savings. This is especially significant considering that SMUD only provides electricity to customers, so gas-saving measures were not installed and are not part of this analysis.

Comprehensive Projects

Multiple End Uses – We evaluate comprehensiveness based on the distribution of energy savings across the three primary measures types: lighting, HVAC, and refrigeration. In typical direct install programs the vast majority of energy savings are achieved through lighting retrofits. However, in SMUD's program only 58% of total savings was achieved from lighting retrofits. The remaining 42% was realized through refrigeration and HVAC retrofits, demonstrating that comprehensive savings is indeed possible in this market segment. Even in SMUD's cooling-dominated climate, HVAC continues to be the most difficult end use in which to obtain savings, primarily due to a lack of cost effective measures that can be applied to the rooftop units common to this market. Despite this, CES was able to realize 13% of total program savings in HVAC by placing control systems on Package Terminal Air Conditioning systems and optimization retrofits on Roof Top Units. This is significantly better than the 3% HVAC savings achieved during the prior cycle with a different implementer, but still short of the 20% goal. Refrigeration accounted for the remaining 29% of energy savings.

Addressing All Opportunities – The other important measure of comprehensiveness is the degree to which retrofits are addressing all appropriate energy savings opportunities at each site. While we lack an industry standard value, we do have a decent proxy: What % of energy savings was achieved in retrofits that include at least two measure end use types (ex: HVAC and lighting)? Using this measurement, 46% of the CES program's total energy savings was realized in projects that addressed at least two measure use types, demonstrating that the program is avoiding stranding savings.

High Volume of Savings

SMUD's program also demonstrates that these results can be achieved en masse. In 2015, the CES program installed more than $5 million in equipment for 350 customers, resulting in 20 GWh of first year electricity savings. This program model shows these types of results can be delivered in high volume.

Cost Effectiveness

Maintaining cost effectiveness is one of the key achievements of the CES program as it disproves the myth that the SMB market cannot be served at a reasonable cost. SMUD pays a

total of $0.0346 per lifetime kWh saved, yielding an estimated program TRC of 3.1. These numbers show that saving energy through the CES program costs SMUD significantly less than purchasing electricity. These values are particularly significant for program delivery in the SMB market that is widely believed to be "hard to reach" and expensive to serve. Taken together, these results demonstrate that by bringing together the right factors, direct install programs can deliver a large volume of comprehensive energy savings for reasonable costs.

ELEMENTS OF SUCCESS

In the following section we discuss (I) the essential elements of the CES program design, (II) the regulatory environment where it exists, and (III) the key delivery tactics.

I. Program Design

SMUD's early SMB direct install program began as many do – offering a limited number of lighting measures offered directly to customers by independent contractors. Unfortunately, like many similar programs, the program suffered from contractor abuse and a lack of comprehensiveness. The utility found that while these programs cost-effectively delivered almost 10% of SMUD's entire energy efficiency portfolio savings, cream skimming by contractors provided limited customer value and failed to reach any level of comprehensiveness[5]. SMUD reimagined the program to create a cost-effective, turnkey, direct install program that would garner comprehensive retrofits and customer co-pay[6]. To that end, SMUD re-engineered their program design by developing a number of requirements that have driven results.

Establish Pay-For-Performance Contract - To ensure cost-effectiveness and minimize risk, SMUD designed CES as a performance-based program where the Program Administrator is compensated not on a time and materials basis but on the energy savings delivered in the program. This "performance payment" is set at a fixed $/kWh that covers all aspects of program implementation, guaranteeing what SMUD would pay for program savings and providing the program administrator strong incentive to deliver on savings goals.

Require Comprehensiveness from Program Implementer - To promote variety in the technologies and measure types implemented in the program, SMUD distributed savings targets into 3 categories, or "tiers," based on technology (table 1 below). Common, low-cost retrofits comprise Tier I, while high cost and/or difficult to sell measures are classified as Tier III. These targets are written into the contract, requiring that the Program Administrator tune delivery techniques to achieve the desired distribution of savings. By assigning every measure to a Tier, SMUD was able to stimulate comprehensiveness while simultaneously maintaining the flexibility necessary for the program administrator to build a program to address the variety of conditions in the field, while still hitting goals.

[5] Davis, Cheri. "Complete Energy Solutions: Delivering Comprehensive Savings to the SMB Market." 2014 ACEEE Summer Study on Energy Efficiency in Buildings. http://aceee.org/files/proceedings/2014/data/papers/4-788.pdf
[6] Ibid

Table 1: SMUD Saving Distribution by Measure Tier

	Program Savings	Example Technologies
TIER I	30%	Linear fluorescent lamp replacement, screw in lamps, occ sensor
TIER II	50%	LED wall pack, ECM motors, linear fluorescent with lamp reduction
TIER III	20%	LED full fixture replacement, HVAC optimization controls

Using Incentive Structure to Drive Comprehensiveness

Varying Rebates. SMUD requires the Program Administrator to offer an incentive structure that provides varying rebate levels for equipment in the different tiers. Simple measures from Tier I receive lower rebates, while Tier III measures that address typically overlooked opportunities or involve emerging technologies receive higher rebates. Because of this, customers are rewarded for pursuing more comprehensive retrofits while simultaneously helping the program implementer achieve the specified distribution of savings discussed above.

Rebate Caps. Customer financial participation is required for all projects. The overall program was required to cap rebates at 80%, collecting at least a 20% copayment from participating customers. However, individual project rebates are capped at 95%, providing the program implementer the flexibility to reduce the copay for the most needy customers. Another important nuance in the application of rebate caps is that the limit is applied to projects rather than at each individual measure. This allows highly cost-effective measures within a single project to "buy down" the cost of measures with longer pay back periods, ultimately facilitating comprehensiveness.

Delegating Program Management

Contractor Management. SMUD requires the Program Administrator to manage and take responsibility for all aspects of contractor participation in the CES program. In order to ensure customer satisfaction and high quality retrofits, the program administrator carefully vets, trains, and oversees a limited number of highly qualified independent contractors. These contractors are carefully managed and 100% of projects receive pre and post inspection by program administrator staff to ensure quality. To further ensure quality, contractors must participate in regular trainings and do not receive payment until customers are satisfied. This detailed oversight of contractor behavior and installation quality eliminates contractor fraud and ensures customer satisfaction.

Equipment Management. In order to ensure long-term savings persistence and customer satisfaction with the program, SMUD requires the program implementer to carefully manage the equipment that is provided through the program. The program implementer is responsible for screening equipment to ensure that only durable, high quality retrofits are provided to customers. This ensures that the energy savings SMUD is expecting will endure for many years to come and provides assurance that customers remain satisfied with the CES program and SMUD for the long-term.

II. Regulatory Environment

A significant portion of the program success can be attributed to the regulatory environment and business structure where SMUD and the CES program operate. There are three core factors that, combined, created the environment that enabled the CES program to take shape and prosper.

Regulatory Environment - In California, Publicly Owned Utilities such as SMUD are regulated by the California Energy Commission. The California Energy Commission (CEC) sets energy savings goals and establishes broad guidelines for EE program design and delivery, but does not dictate the details of program design and delivery. Rather, the CEC gives utilities the freedom to create new program models without the smothering effect of regulatory micromanagement. To ensure accuracy, utilities hire independent EM&V firms to evaluate accuracy and program impacts. The regulatory latitude provided by CEC has created an environment where California POUs operate with considerable discretion and freedom to build creative solutions that are targeted to their unique customers, and to develop energy savings calculations and EM&V protocols that strike an appropriate balance between absolute accuracy and efficient program delivery. This results in far greater levels of creativity and innovative program delivery models in utilities whose regulators don't script every detail of program delivery.

Innovative Culture – By virtue of the regulatory environment described above, the organizational culture within SMUD is progressive and genuinely supportive of new ideas. Innovation is part of SMUD's identity[7] and the utility is willing to try new approaches, take calculated risks, and experiment with new delivery methods. This appetite for improvement is what drove SMUD to radically alter its existing direct install program and pilot new methods to meet ambitious comprehensiveness goals. From the start, SMUD designed CES to include elements that were completely new, including a graduated incentive structure, a sophisticated measure list, and a customer co-pay requirement. The new program also marked the transfer of administration to a third party program implementer, a calculated risk the utility mitigated through a pay-for-performance contract structure.

Focus on Customer Satisfaction - As a municipally-owned utility, SMUD places a higher focus on serving their customers and community. The SMUD Board of Directors hold meetings that are open to the public, giving customers a strong voice in determining how they are treated. This has created a profound focus on customer service and satisfaction within SMUD, motivating the utility to balance cost-effectiveness against the need to ensure exemplary customer service throughout their EE portfolio. Straightforwardly, SMUD is not looking for the absolute lowest cost program. Alternately, as long as programs remain cost effective, SMUD is willing to support high quality equipment and careful program management to ensure satisfied customers. Installing comprehensive retrofits using emerging technologies costs more than focusing exclusively on the lowest cost retrofits. Having a utility willing to balance cost effectiveness against enhanced program delivery is critical to achieving a comprehensive program.

[7] "Discover SMUD's History of Innovation." Sacramento Municipal Utilities District https://www.smud.org/en/about-smud/company-information/innovation/innovation-history.htm

III. Key Delivery Tactics

The program elements that SMUD designed provide the foundation for a strong, turnkey, direct install energy efficiency program. A number of programs across the country also offer some or many of these elements. The delivery of the CES program model provides additional elements that further strengthen program performance and customer experience. The elements below describe what we're doing in the field to deliver this program to the highest level of performance.

Careful Management of Program Contractors – The installation model for the CES program employs independent local contractors to perform all installations. Ecology Action carefully selects, trains, and manages a small corps of independent installation contractors to ensure they maintain the highest standards of quality, professionalism, and customer service. To confirm contractor behavior, Ecology Action staff performs inspections of 100% of projects before and after installation to verify proper equipment installation and function, and to interview customers about their overall satisfaction with their project. This careful training and oversight of contractors has eradicated fraud from the program while delivering high levels of customer satisfaction

Contactor-Enabled Lead Generation - After proving themselves as exceptional organizations, two preferred contractors were selected to pilot a hybrid lead generation model. The fundamental goal is to reduce the cost of sales. The idea is to provide training, tools, and extensive oversight of qualified contractors who are allowed to assume greater responsibility for project development and sales. Enabling contractors in this way expands the program's ability to reach more customers without increasing program costs, while enhancing program savings volume and cost-effectiveness. To date, this pilot has been a success. However, a word of caution: The success of this idea relies on exemplary contractor skill and honesty complemented by vigilant oversight by the program implementer, and should only be pursued carefully.

Hybrid Savings Calculations Methodology – Rather than rely on Deemed energy savings estimates, for many measures the CES program uses a hybrid energy savings calculation approach that combines elements of both Deemed and Calculated approaches. This hybrid approach uses site-specific operating hours and the actual wattage difference between old and new equipment, combined with pre-determined values for interactive effects, to quickly establish reasonably accurate savings estimates. Calculating site-specific energy savings estimates for each project provides customers and financing entities accurate payback and ROI information upon which to make informed purchase decisions. Furthermore, using site-specific calculations rather than generic average savings values rewards customers and program implementers who pursue opportunities with the greatest real savings.[8]

Focus on Sales Methods – The comprehensive and more costly projects being offered through the CES program require excellent sales abilities in order to convince customers to participate. This is a significant change from earlier generations of direct install programs where most retrofits were free to customers. Ecology Action employs staff that function as both technical experts as well as experienced sales professionals, because it takes this combination of talents to motivate people facing a significant customer copayment. The benefit of this emphasis

[8] Description of hybrid savings methodology: http://aceee.org/files/proceedings/2014/data/papers/4-1046.pdf

on sales is that despite customers having to pay an average of 29% of their project cost, 52% of customers who received an audit from Ecology Action's team chose to move forward. This high close rate allows staff to spend more time working with and educating customers while simultaneously reducing program costs.

MEASUREMENT AND VERIFICATION (M&V)

The goals of describing the EM&V methodology and results that follows are twofold. First, this paper makes bold claims about program achievements. This section covers in detail the methods and analysis that were used to provide readers' confidence in these values and conclusions. Second, the M&V methods and outcomes are a critical part of the program credibility and increase the likelihood of adoption of this program model in other regions. This M&V methodology is designed to be low cost and easily replicated so that utilities and regulators who want to measure the performance of their own programs can employ these methods.

Objectives of M&V - The technical goal for the SMART Scale program is to measure and estimate average energy savings for the 365 evaluable retrofits (those performed at least one year before analysis) and to demonstrate the M&V approach for national rollout. The energy savings goal of the SMART Scale program is to achieve an average of 20% electric energy savings. Due to the nature of whole-facility analysis, and because of general variability in measure feasibility, persistence, etc., it was anticipated that individual buildings will achieve more or less than 20% energy savings, but program portfolio as a whole should meet the 20% goal.

Methodology - The SMART Scale M&V method utilizes the International Performance Measurement and Verification Protocol[9] (IPMVP) Option C (Whole Facility) to meet a 90% confidence level and a 10% confidence interval (90/10), which would result in analysis of 57 of the 365 projects. This analysis utilized NBI's FirstView®[10] building simulation software package that uses 12 months of monthly energy consumption data, ambient outdoor temperature, and basic building information such as square footage and primary building type to derive an energy signature. The actual energy use can be fit to the energy signature to provide a weather-independent representation of whole building energy use over time. Additionally, the program-level impacts (all projects combined) were analyzed. Each of these methods are described below.

IPMVP Option C (Whole Facility) - For all projects with complete and quality assured energy use data (n = 46) energy savings impacts were determined by a Normalized Annual Consumption (NAC) method using pre- and post-retrofit energy consumption normalized for weather. The 46 analyzed projects represent a 90% confidence level with a confidence interval of 11.4%. Further analysis is currently underway to reach a 90/10 sample size. Twelve months pre-retrofit and twelve months post-retrofit monthly billing data from all available utility sources (electricity, gas and other sources as relevant) were painstakingly obtained and assessed. Weather normalization was done using the FirstView software tool and the absolute (kWh and

[9] Full IPMVP content is available online through the Efficiency Valuation Organization (EVO).
[10] More information on FirstView is available at: http://newbuildings.org/product/firstview.

therms) and relative (%) savings are represented. These in turn are compared to the estimated savings calculation done in the retrofit assessment.

Program-Level Impacts - In addition to the per-project analysis above the overall energy savings were analyzed to determine the impacts of the program as a whole. The NAC analysis results were rolled up to summarize impacts across all projects. Results from this program-level analysis are used for overall reporting and for high-level review and discussion of program impacts both internally (within Ecology Action and New Buildings Institute) and externally (e.g., with utilities in other locations, as representation to the National Roll-Out Plan and with DOE).

Measure-level vs. Whole-Facility M&V Method - Ecology Action's building retrofit programs have historically used a combination of deemed and calculated measure-level savings. The M&V approach described above for the SMART Scale program uses a whole-facility approach and warrants a short explanation of why this approach was selected compared with measure-level analysis. First, the deemed measure-level savings values come from the California Database for Energy Efficient Resources (DEER), a publicly available database with measure-level estimates of energy and peak demand savings, measure costs, and effective useful life. DEER has been designated by the CPUC as its source for deemed and impact costs for program planning. Performing additional M&V on measure-level impacts already reviewed by DEER would be an inefficient use of limited M&V time and money. Second, the purpose of this M&V effort is to determine performance of the program as a whole and to verify that each project completed by the program achieves its savings goals and contributes to the overall program accomplishments. Whole-facility M&V is most appropriate for determining results for this broader level of outcomes. Finally, interactive effects may be significant when implementing a package of measures within a facility. Interactive effects are considered in DEER, but using a whole-facility approach inherently ensures that interactive effects are included. Individual measure metering cannot account for interactive effects to this extent.

Data Requirements and Sources - The performance of the M&V tasks described in this protocol relies on the collection of the appropriate data for each site. Ecology Action's field auditor data collection form includes energy usage data for all energy meters for each site, and a check box reminding the field auditor to walk the perimeter of each site to check for additional energy meters. The SMART Scale team collects other key items such as occupancy and operational hours, which support future data review and contribute to other efficiency research. In particular, if a building is unoccupied for some of the year or is partially vacant, the field auditor flags this information to inform the analysis.

In reality, the energy consumption data was rarely available directly to the auditor and was pursued separately with the owner or manager or utility for electricity and directly with the utility for the gas consumption data. Access to energy use data continues to be one of the problematic areas of energy savings assessment in building retrofit. Obtaining actual energy consumption data from utilities, while required for the analysis, was very time-consuming and far from straightforward. Each utility has unique requirements for handling sensitive data such as customer usage records. It is important to make it clear to the program participants that provision of energy usage data is a requirement for participation in the program. Utilities need to play a role in simplifying the processes by which they grant access to energy data for M&V purposes.

Designing M&V for Lower Cost

The M&V approach for the SMART Scale program has been designed to be low-cost. This is important because as the program expands and shifts to other regions, the M&V component of the project has the potential to become significantly more burdensome. In general, 90/10 sampling is considered to constitute standard and acceptable precision for utility-scale energy efficiency M&V efforts, so costs can be kept low by only reviewing the minimum number of projects required to attain significant results. Another streamlining and cost reduction method for scaling M&V is automation. Once utility billing data, other energy usage data, and building characteristics are collected for a site and input into a database, the first-level M&V process can be partially automated by batch processing of pre/post billing analysis.

The great majority of the time and effort (and therefore expense) associated with M&V for the SMART Scale program has been associated with gathering the requisite data both from utility partners and from field staff. This can be streamlined by making sure that all field staff are collecting all key data inputs at the beginning of the project. Additionally, it is important to begin the utility data collection process early in order to obtain the pre-retrofit energy data in a timely manner. The M&V process should be used to improve and streamline program delivery by providing periodic feedback during program delivery rather than Ex Post.

ENERGY SAVINGS RESULTS AND ANALYSIS

Savings Results

The SMART Scale program aspired to achieve and did accomplish aggressive energy savings goals in a difficult-to-serve market. The program's savings achievements are summarized in **Table 2**.

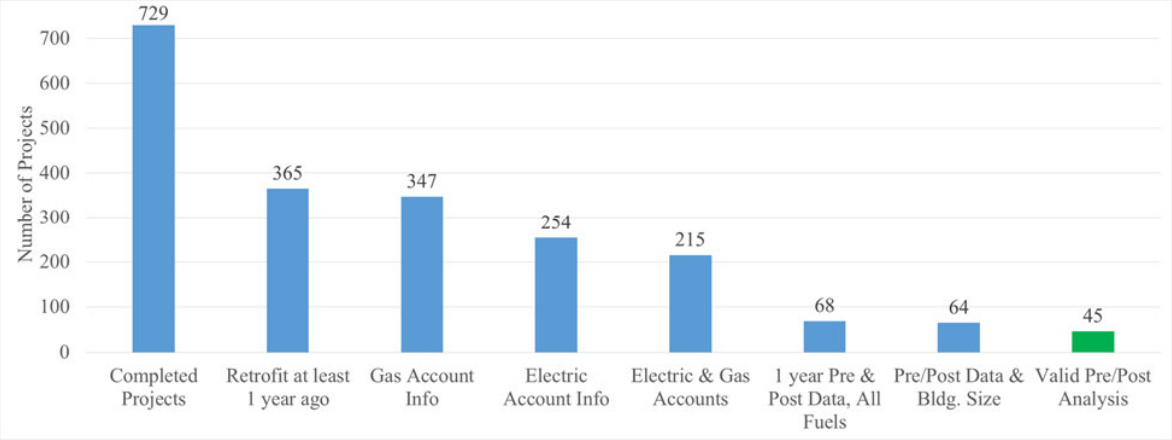
Table 2: SMART Scale Program Achievements

	Results
Number of Participants 2013-15	701
Electricity Savings	20 GWh/yr
Cost of Energy Savings (Lifetime)	$0.0346/kWh
Total Resource Cost Ratio	3.1
Valid Pre/Post Analyses	45
Pre/Post Sampling Validity	90/11.4
Electricity Savings Over Baseline	19%

Data availability proved to be a major hurdle in completing program-level M&V. Figure 2 shows the factors contributing to the final evaluation sample size. Although 701 projects were completed by the close of Q1 2016, only 365 projects had been completed by Q1 2015. The pre/post NAC methodology relies on 12 months of pre-retrofit and 12 months of post-retrofit data, so the evaluable population was reduced by this simple fact. Gathering electricity and gas monthly consumption data was very difficult and required consistent communication efforts with both the electric utility (SMUD) and the gas utility (PG&E). A total of 215 projects were

completed by Q1 2015 and had both electric and gas account information available. Of those 215, only 68 projects had the requisite year of both pre- and post-retrofit energy data available. The size of the building was one input into the NAC method, and a small number of buildings were excluded from analysis due to this factor. Finally, some buildings exhibited unrealistic or unreliable energy usage data and were excluded from the analysis. In the end, a valid pre/post NAC analysis was achieved for 45 projects.

Figure 2. Factors Contributing to Final Evaluation Sample Size.



APPLICATION TOOLKIT

Ecology Action has developed a collection of tools that can be used by other entities to begin or fortify program delivery using this model. This resource brings together the best practices and lessons learned from Ecology Action's direct installation program implementation experience and refinements from the SMART Scale pilot program. Resources include an implementation guide and best practices manual, a contractor's auditing tool, a hybrid energy savings calculation tool, and energy efficiency measure lists, among others. Upon completion in summer 2016, Ecology Action will maintain a website that will host these resources for download by interested parties[11].

CONCLUSIONS

Delivering cost-effective and comprehensive energy efficiency savings to the small and medium business community is at hand. SMUD's Complete Energy Solutions program demonstrates that with the right program design, regulatory environment, and delivery methods, unprecedented levels of comprehensive energy savings can be produced cost-effectively even in this challenging market sector. The program produced an average energy savings of 19% from baseline while delivering over 20 Million kWh in a single year. The CES program also shows

[11] Link to resource page will be available by summer 2016 via www.ecoact.org

that comprehensiveness – both the proportion of energy savings coming from different end use types, as well as addressing multiple use types at each site – can be consistently achieved. Finally, because these results can be realized cost-effectively, the CES program provides a replicable model for how similar results could be achieved elsewhere.