Field-Level Analysis of California Assembly Bill 802 "Energy Efficiency"

Summary

In 2015 the California Assembly passed Assembly Bill 802 (AB 802). Under AB 802, owners of commercial buildings and multifamily properties can access whole building utility information. An in-depth look at the needs of the consumer and contractor is essential before the hoped-for energy savings required by AB 802 will be realized. This document identifies, at the field level, obstacles and solutions for engaging HVAC consumers and their contractors with the requirements of AB 802.

Additionally, the document covers how the principles of Field Data Specification can be used to create an individual system baseline measured before and after system upgrades to provide a preliminary energy savings estimate and enable an initial incentive payment.

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Use of this document

This document was developed to provide policy makers, utility program developers, and others with an awareness of issues that must be addressed before AB 802 can succeed in the field, and to offer possible solutions.

It is based on an official WHPA Work Product of November 15, 2017 titled "Taking AB 802 into the Field." This Work Product was developed by the WHPA Commercial Quality Installation Committee.

Background

On September 11, 2015, the California Legislature passed Assembly Bill 802 (AB 802), "Energy Efficiency". The bill is aimed at increasing the availability of building-wide energy use data and will fundamentally change how energy savings/efficiency is gauged. The WHPA published a paper about AB 802.

Work Product

INTRODUCTION

Goal Three of the WHPA Commercial Installation Committee during 2017 is to provide a work paper identifying obstacles and solutions for engaging HVAC consumers and their contractors with the requirements of AB 802 at the field level. Additionally, how the principles of the Field Data Specification can be used to create an individual system baseline measured before and after system upgrades to provide a preliminary energy savings estimate and enable an initial incentive payment.

California Assembly Bill 802 calls for a change in the way energy savings can be claimed in utility programs. Energy savings earned in the future can be claimed relative to the existing baseline energy use shown by the utility meter. This is opposed to the commonly used historical approach of deemed or custom savings estimates relative to a code-level baseline.

The impact of this bill on the HVAC industry has yet to be seen. To date, the efforts to implement it have been focused at the policy level, and little experience has been gained on how the bill will be operationalized in the field between a consumer and contractor.

The point of sale for every HVAC energy upgrade occurs at a table. In the residential market, decisions are made at the kitchen table. In the commercial market, decisions are made at the conference room table. Legislators, regulators, utilities, manufacturers, implementers, aggregators, and special interest groups are absent when decisions are made concerning energy upgrades.

The criteria affecting the decision to purchase energy upgrades is made primarily based on the knowledge conveyed to the consumer by the representatives of the contracting company. Consumers report their decision to buy is based on trust, perceived benefits, the scope of work for the project, and the cost.

As newly proposed *Pay for Performance* HVAC utility programs are being developed, the hard work of connecting AB 802 to the consumer at the point of sale is at hand.

An in-depth look at the needs of the consumer and contractor is essential before the hoped-for energy savings required by AB 802 will be realized. To quote a common HVAC sales person's slogan, *"Nothing happens 'til somebody buys something."*

OBSTACLES TO OPERATIONALIZING AB 802

The following obstacles and needs facing consumers and contractors that may impede the implementation of AB 802 are described below. Each obstacle is followed by a proposed solution to that obstacle. The purpose of the white paper is to bring awareness and to pose solutions that must be addressed before AB 802 can succeed in the field.

SUPPORTING CONTRACTOR IMPLEMENTATION

When compared with deemed programs of the past, meter-based savings enabled by AB-802 will create both opportunities and challenges for contractors implementing programs. Potential opportunities will

include leveraging available data and analysis for lead generation and the ability of programs to more accurately estimate savings at a specific site. These tools will allow a contractor to more effectively target and sell energy upgrades, but training will be needed to allow them to make the best use of this data. On the other hand, claiming savings at the meter may come with requirements to pay incentives based on the same. This could create a timing and risk issue that contractors have not had to deal with in the past. Lastly, even though metered data offers many benefits, it does not overcome the need for contractors to perform their own measurement and diagnostics on individual systems. This section discusses these and other issues in further detail.

Contractor Leads for Customers Needing Energy Upgrades

Issue – Contractors do the actual work of energy efficiency programs. Getting qualified leads into the hands of trained and able contractors is a primary attraction for contractors to participate in utility energy efficiency programs.

Proposed Solution – By effectively analyzing smart meter and weather data, excessive consumption by the HVAC system can be pinpointed. Qualified sales leads are the key reason contractors participate in utility programs.

Determining Which Upgrades are Needed

Issue – While the meter can provide evidence of excess energy consumption in a building, the meter cannot detect the actual cause of a poorly performing HVAC system. In the past, utility programs have been based on pre-set measures that have failed to deliver expected savings at the meter. Specifically, how will the contractor determine which upgrades to recommend to their customers to assure savings will be delivered at the meter?

Proposed Solution – AB 802 creates a demand for a custom set of improvements for each HVAC system or building that will improve the performance of the HVAC system as well as the entire building.

Only through an inspection, testing, and a diagnostics process can the most valuable upgrades be identified and their future impact on the meter be assessed. In the absence of a list of approved measures, the consumer must select and agree to pay for each specific custom upgrade.

Also, how each upgrade affects the performance of the system varies greatly. Upgrading a control system may improve performance a full 50% on one system, while the same treatment may only improve performance on another system by 5%.

An effective program will include provisions for multiple trades to correlate efforts to assure that whole building improvements are executed well to achieve the expected result. Should the insulation portion of the project not perform as expected, the load of the building will miss the mark, the HVAC system will not perform as expected, and the expected savings will not materialize.

Customer Education a Critical Component of the Decision

Issue – Marketing can provide general awareness but is unable to deliver the full information needed before a buying decision can be made. Buyers need specific information related to their HVAC and

building systems before they can make an informed buying decision. Without being educated about the needed improvements, how can the consumer make a confident buying decision?

Proposed Solution – The buying process is based on the trust between a consumer and the contractor. That trust is best built through a testing and diagnostic process where the customer is enabled to make an educated buying decision about which specific upgrades to purchase based on his or her own knowledge. This sales process is most effective when a contracting company representative engages consumers in field inspection and testing. This provides an unparalleled learning experience for the consumer essential to a customer upgrade sale.

In-Field Creation of the Project Scope of Work

Issue – Energy upgrades are typically a bundled group of improvements. Since the meter is unable to identify the cause of inefficiency and pinpoint which repairs to make, how will a scope of work be determined? Furthermore, how will the impact of the upgrades be evaluated to determine the energy savings on which the incentive will be paid. This will affect the decision-making ability of the consumer. This gap in implementing an energy savings program has not previously needed to be addressed at the street level because were deemed.

Proposed Solution – Only by testing and diagnosing the operating efficiency of an installed operating HVAC system can a custom scope of work with a predetermined outcome be created. The principles contained in ASHRAE 221P offer a field evaluation and test method satisfactory to enable a customized scope of work. Using this test method before and after improvements are made allows for a pre-assessment of savings that will be verified at the meter.

EDUCATION AND TRAINING

Education and training are critical to the implementation of a utility program and associated WE&T. This is especially true as pay-for-performance programs, enabled under AB 802, will require custom field diagnostics and the need for contracting company representatives to develop detailed scopes of work and estimate project savings in advance. Without training to develop this new skill set, sales transactions will rarely occur. As stated throughout this paper, unless field personnel are trained and supported to deliver these services, there will be little chance of implementing the types of programs envisioned by AB 802 in the field.

Training the Workforce

Issue – Previous utility programs provided training focused on several predetermined repairs, which were specific to the program and for which a predetermined incentive was paid. The AB 802 approach, requiring verification of savings at the meter, necessitates custom upgrades that are specific to each system or building depending on defects causing the poor performance.

A new breed of WE&T and utility program training will be essential to aptly prepare the workforce to be successful in the field. The training will need to marry the technical capacity and capability with the ability to also communicate with and educate the customer throughout the process.

Proposed Solution – Needed custom upgrades can only be identified by measuring the performance of each system, evaluating the data, and prescribing custom upgrades for each system. Then the workforce must be trained to make custom repairs that produce the outcome sold to the customer. Such accountability is foreign to utility programs of the past.

New training technologies and new bundles of training will be required to bring the workforce to the levels of performance required by AB 802. Contractors and implementers, assuming technicians and salespeople have these skills to apply the training principles mentioned throughout this paper, are bound to fail. Future development of WE&T and utility program training must address the new whys and hows needed for AB 802 compliant programs to succeed in the field.

Training aimed towards salespeople must enable consumers to understand what is being offered in the project and why, how to engage consumers in the testing and scope of work for the project, estimated savings and potential incentives, and how different trades will work together on their project. These skills are different than what is required in previous deemed savings projects. With awareness, consumers will understand and pay for far greater energy savings than ever before.

UTILITY PROGRAM DESIGN AND SAVINGS ESTIMATES

This section focuses on issues pertaining to utility program design and evaluation aspects. There are many potential issues that arise due to the intent expressed in AB 802 to recognize savings at the meter and due to the regulatory response to and implementation of that intent. Topics discussed include methods for estimating savings up front, minimizing variability between those estimates and results at the meter, issues related to savings too small to show up at the meter, incentive timing and program influence, and Energy Measurement and Verification (EM&V) approaches.

How Will Expected Savings be Estimated

Issue – Energy savings confirms a consumer's decision to purchase energy upgrades. Especially when a utility program is involved, an estimate of savings is required. Understanding the impact of each upgrade produces a variable amount of savings on each system and building, and that savings must actually be verified by the meter. This places a new demand on the contractor and utility. How will savings based on performance be estimated and represented both prior to and at the completion of a job to the consumer?

Proposed Solution – By measuring and scoring the operating performance of the installed HVAC system in the field before and after energy upgrades, the improvement in the performance of the system can be documented. Additionally, operational data such as temperature setpoints, occupancy schedules, ventilation rates, and economizer operation must be documented if any of those variables will change between the baseline and post period. Using this data, an effective estimate of savings can be predicted. A conservative estimate can then be used to inform the customer's decision and for utility program forecasting.

New technology has identified that the actual savings eared by an energy savings treatment on one system may deliver a 30% energy savings. However, that same treatment on a similar system may only yield a 2% energy savings. The requirements of AB 802 that savings will be verified at the meter will require a custom scope of work for each project.

Variance Between Savings Forecasts and Meter-Based Savings

Issue – Approaches used to evaluate energy savings at the meter are typically different from approaches used to estimate savings prior to and at the time of installation. Additionally, neither approach has the ability to precisely predict or determine energy savings with zero uncertainty. This will likely result in forecast savings not matching actual savings. At a minimum, this is an issue for programs if metered savings differ significantly from forecasts. It can also be an issue for contractors and customers if incentives are dependent on metered savings.

Proposed Solution – A continuous calibration process should be built into the tool that estimates savings prior to and at the time of installation. This calibration should use meter-based savings results as the calibration target. Additionally, meter-based savings estimates should use both performance and operational data as inputs. These inputs could improve the ability of meter-based methods to accurately disaggregate HVAC energy use from other building loads and could potentially help to assign savings to broad categories such as capacity improvement, efficiency improvement, schedule change, permanent load reduction, or setpoint change.

Savings Too Small to be Discernable at the Meter

Issue – AB 802 is written in a way that implies that programs with utility meter impacts should be authorized, but many measures produce savings that are undetectable at the building meter. Both the magnitude of the savings and the predictability of building energy consumption can be factors in the ability of the utility meter analysis to detect savings.

Proposed Solution – CPUC recognizes that submetering can be more appropriate for projects whose savings may not be discernable at the building meter. Low cost submetering approaches using data from smart thermostats and building management systems should be explored. Another approach could be to evaluate projects with small savings as a group, taking advantage of a larger sample size to lower the minimum threshold for savings detection. More EM&V research is likely needed to determine viability and limitation of each of these solutions.

Another potential approach is to screen candidate projects and set minimum eligibility criteria. Those criteria may include suitability of baseline energy use for regression analysis, magnitude of forecasted savings relative to building energy use, or proxy requirements for savings relative to energy use. Proxy requirements may include thresholds for baseline, post-improvement performance scores, and percentage of total system capacity on a building that must be improved. The preferred method for screening would be to compare forecasted savings magnitude to the uncertainty of the meter-based analysis of baseline energy consumption rather than using proxies for savings relative to usage.

From a program scale perspective, it may be preferable to find ways for smaller-saving projects to participate rather than screening them out. Program designers should think carefully about the costs and benefits of inclusive designs that may result in some projects with savings that are too small versus an exclusive design that only accepts projects with high savings. At a portfolio level, it will likely be best to offer a mix of performance-based and deemed programs to provide many pathways to participation for a wider variety of programs.

Incentive Payment Timing and Program Influence

Issue – Contractors want to get paid when they deliver the work. Results from metered savings program are not available until a year after the project has been completed. How can we mitigate cashflow and other financial planning concerns that result from the delay imposed by meter-based savings? Additionally, future projections of incentive payments that are at risk pending savings evaluation are likely to be heavily discounted by program participants. This may diminish the impact that incentives have on the decision to implement a project, negatively impacting the program's net-to-gross ratio.

Proposed Solution – A potential solution is proposed in Southern California Edison's Comprehensive Value Chain HVAC (CVC-HVAC) High Opportunity Projects and Programs (HOPPs) Advice Letter[1]. The proposed program provides a fixed ($/ton) customer payment up front which is not subject to adjustment based on savings. Additionally, there is a contractor incentive that is initially based on forecasted savings and is partially paid up front. Final incentive amounts are adjusted based on evaluated meter-based savings. Final incentive amounts are constrained so they may not vary by more than a certain amount from the initial forecast limiting both upside and downside risks for both the contractor and utility.

The up-front incentive payments in this model may help to some degree with the program's ability to influence customers, but a significant portion of the total incentive is required to be paid based on metered savings under HOPP regulatory rules. To demonstrate program influence, even when a significant portion of the incentives are to be withheld until after savings can be evaluated, programs should plan to provide significant technical assistance that is unavailable outside of the program. Technical assistance may include qualified lead generation using meter data, meter-data informed baseline consumption and savings estimates, and technical tools and training for contractors that enable them to identify opportunities that the customer may not have otherwise been aware of.

Finally, EM&V plans must recognize the customer decision influence barrier presented by regulatory requirements to delay incentive payments. When evaluating the NTG of programs that provide significant technical assistance, focus on this question: *Would the customer have known about, been able to, and been willing to pursue this savings opportunity without program assistance?*

Disaggregation of Energy Savings for Each Measure

Issue – AB 802 calls for energy savings at the meter; and without any modeling or sub-metering, it is not possible to disaggregate savings from individual measures. This poses a problem for utility programs since measures must still abide by the DEER EULs when savings are claimed.

Proposed Solution – After energy savings at the meter is calculated, use existing workpapers to disaggregate energy savings. Additionally, consider more conservative EULs, only where it makes sense, to combine two or more measures into one so that disaggregation of savings is not necessary. As analytic techniques advance, it may become possible to disaggregate savings into broader categories to

[1] Advice 3463-E-B https://www.sce.com/wps/portal/home/regulatory/advice-letters/pending/!ut/p/b1/jY7JCsIwFEW_SN7rQIvLYCRNtGodMGYjwcYaqGmpoQu_3ipuHe7uwrkDKJCgnO5tpb1tnK6fXiVHwSkJWBxylgqKZEVTulsnQTwLBuAwAPhBBH_lxR8DYZdP8gpUq_1lZN25AanL3p7MqDbem-4GsjWutK6CPahX4ZjhNBNL5GxbRMijAhcbQiLE5A18edxe5X2eoX0A-ZcQzA!!/dl4/d5/L2dBISEvZ0FBIS9nQSEh/?from=/AboutSCE/Regulatory/adviceletters/pending.htm

which EULs could be assigned. This could be informed through detailed analysis of time-of-use load shapes and/or energy signatures for the baseline and post period.