



Customer Solutions

Energy Efficiency

Attachment 6

Resource Conservation Manager
Whole-Building Savings Methodology

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PUGET SOUND ENERGY
The Energy To Do Great Things

Attachment 6

PSE's RCM Savings Methodology

Introduction

PSE's energy savings analysis methodology has evolved over more than a decade of program operation. It provides reasonable savings estimates and requires a reasonable effort by PSE program staff and the customer's RCM. This is critically important for a program that includes hundreds of sites and thousands of meters.

The Resource Conservation Manager (RCM) Program uses monthly billing data for each site in a customer's portfolio, adjusted for known factors, to determine savings from RCM activities. As emphasized by SBW Consulting, Inc.'s (SBW or SBW's) final evaluation report, "*Independent Third-Party Review of PSE's 2010-2011 Electric Conservation Energy Savings*", "... there likely are a multitude of other environmental or societal factors at play that affect energy use in a building."¹ The efficiency strategy of the customer's Resource Conservation Manager is only one of those factors. Therefore, it is a significant challenge to use a billing analysis approach to isolate the impact of RCM activities from other factors that impact the monthly consumption. PSE's objective has been to achieve reasonable savings estimates with a practical approach that is cost effective and easily understood. We believe PSE's billing analysis approach achieves that objective. Furthermore, PSE believes its billing analysis approach is conservative; that is, it underestimates savings.

Adjustments for Weather

The first step in the approach is to determine whether there is a significant correlation between monthly consumption and external factors such as weather (for example, heating degree-days). If there is a significant and causal correlation, then the baseline is adjusted using a linear regression model to reflect expected consumption based on the comparison year weather. In some cases, weather may be co-related to other variables; for example, daylight hours, or a building occupancy schedule that varies by season. In these cases, the magnitude of consumption is not caused by, or dependent on weather, per se, so it is not appropriate to make weather-dependent adjustments. When considering whether to make a correction, it is important to understand the conventional dictum: "correlation does not imply causation." These judgments are made by our RCM program managers and the RCM customers we support on a site-by-site basis.

¹ Section B. Billing analysis approach may overstate savings attributable to program. Page 46, ¶ 1.

Adjustments for Known Events

PSE also makes adjustments for known events unrelated to the RCM's efforts, such as the implementation of measures under another PSE program, facility closures, occupancy changes, etc. Sometimes the most practical approach is to exclude a site or exclude the monthly savings for the period affected by an abnormal event. It may be too challenging and time consuming to calculate an appropriate adjustment. For example, if usage goes up due to a control system failure, and replacement parts were on back order, the increased usage is out of the control of the RCM. In this situation the most practical approach may be to exclude the affected months, rather than try to calculate the impact of the control system failure. PSE requires documentation to substantiate these adjustments or exclusions.

Dealing With “Naturally-Occurring Variations” or “Noise”

Following the adjustments for weather and known events, the next step is to determine whether there are other factors that so significantly influence a site's consumption that they mask the savings from RCM efforts. These factors are typically not understood, or not quantifiable; otherwise their influence would be addressed in the “adjustments” described above.

These other factors are conceptually described in Table 5, “RCM Savings Diagram” of SBW's final evaluation report. The Table shows how “Naturally-occurring variation in occupant behavior and operation” results in increases and decreases in facility electricity use that would occur in the absence of the RCM.

PSE expects that an RCM can typically influence energy savings by approximately 5 percent in a year. It is a reasonable target that most RCMs can achieve, if they set up and follow through with their Facility Action Plans. Some RCMs achieve considerably more savings. If “Naturally-occurring variations” exceed 5 percent, then it is likely that there is something else going on at the site with more influence on energy use than the typical RCM efforts, and these variations would mask the RCM savings. When there are unexplained variations that influence consumption by more than +/- 5 percent, RCMs and PSE program staff take a close look at the site to understand the change. Sometimes a reason can be identified; sometimes not.

Here's how it works: applying naturally-occurring variations of +/- 5 percent to the expected 5 percent reduction would result in an expected change in consumption in the range of -10 percent to 0 percent. (-5 percent for RCM Efforts, +/- 5 percent naturally-occurring variation). If the change in consumption falls outside of this range (savings exceed 10 percent or consumption goes up), and if the change cannot be reasonably attributed to documented RCM program efforts or adjusted for as described above, then the site is zeroed out, because something has masked the efforts of the RCM, making it difficult or impossible to determine RCM savings.

If the “naturally-occurring variations” are relatively small, on the order of 5 percent or less, PSE believes that the increases and decreases will cancel each other out over the customer’s portfolio of sites. For those sites that are zeroed out due to unexpected or unexplained variations, PSE does not claim any savings for RCM efforts. As long as the RCM had an active Facility Action Plan for these sites and can verify that conservation measures were implemented, it is likely that some level of savings did occur due to the RCM’s efforts. RCMs do not intentionally increase consumption. If there is no documentable action for a site or portfolio of facilities, then PSE does not claim savings, regardless of the percent change in consumption.

PSE believes that its billing analysis approach described in this Attachment yields reasonably accurate savings calculations, and that the savings claimed are conservative. Furthermore, it is the only approach PSE has identified to date that can be applied cost effectively in a program with hundreds of sites and thousands of individual meters.

Evolution of PSE’s RCM Savings Methodology

In the early days of the RCM program, we attempted to train RCMs to calculate savings for each action or “measure” they implemented. These calculations were intended to supplement and/or support the billing analysis. This approach was found to be impractical, due to the time required, and the expertise required by the RCMs. It is relatively easy to understand how to save energy, but it takes far more understanding and skill to calculate the savings.² For this reason, PSE developed rules-of-thumb to estimate savings potential; for example, a full-time RCM with a \$1.5 million resource budget and 1.5 million square feet of space could expect to achieve 5 percent savings. PSE did random billing analyses to check savings because it was too time-consuming to do for all sites. However, in its 2007 evaluation report, KEMA recommended that this billing analysis should be done for every participant for each year.³ PSE hired additional staff and obtained improved tools which allowed us to quickly analyze each site in more detail. At that point, we moved to the site-specific billing analysis described above. We believe it to be a more robust approach, and one which requires a reasonable level of effort on the part of PSE’s program staff and the customer’s RCM in order to document measure implementation.

² A simple schedule change to reduce operating hours is very likely to save energy used by fans, pumps, lights, heating and cooling. Calculating the savings, however, requires detailed information about fan and pump horsepower, connected lighting loads and control sequences. To determine the reduction in heating and cooling energy may require a building simulation model. In the end, this calculation would only yield a rough approximation. While most people would agree that this simple measure saves energy, calculating the magnitude of the savings is no simple task. It is most easily determined by analyzing the change in the site’s metered energy consumption. PSE’s RCM program uses revenue-grade utility meters for this purpose and also employs the use of interval data, when available and applicable, for measure implementation validation.

³ “*Resource Conservation Management Program Evaluation*”; KEMA; October 15, 2007; Section 6.1, pg 6-2. This report contains specific customer information and must not be released to the public or made a part of any public record.