EXHIBIT NO. ___(WRG-3)
DOCKET NOS. UE-111048/UG-111049
2011 PSE GENERAL RATE CASE
WITNESS: WAYNE R. GOULD

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PUGET SOUND ENERGY, INC.,** **Respondent.**	**Docket No. UE-111048** **Docket No. UG-111049**

SECOND EXHIBIT (NONCONFIDENTIAL) TO THE PREFILED REBUTTAL TESTIMONY OF WAYNE R. GOULD ON BEHALF OF PUGET SOUND ENERGY, INC.

JANUARY 17, 2012

Puget Sound Energy

Evaluation, Measurement & Verification (EM&V) Framework

In response to the September 28, 2010
Washington Utilities and Transportation Commission
DOCKETS UE-011570, UG-011571,
and UE-100177, Consolidated

August 19, 2011

PUGET SOUND ENERGY
The Energy To Do Great Things

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Acknowledgements

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Definitions

Unless otherwise noted in a specific Conservation Schedule Tariff Sheet, the following commonly-used terms, used throughout and applicable only to this document have the below noted meanings. Definitions or glossaries contained in other EES documents, policies or guidelines referring to specific processes or unique functions shall have the meanings noted in those documents, policies or guidelines. Several definitions below are taken directly from the National Action Plan for Energy Efficiency (2007). Model Energy Efficiency Program Impact Evaluation Guide, Appendix B. Prepared by Steven R. Schiller, Schiller Consulting, Inc. www.epa.gov/eeactionplan.

Baseline: Conditions, including energy consumption and related emissions, that would have occurred without implementation of the subject project or program. Baseline conditions are sometimes referred to as "business-as-usual" conditions. Baselines are defined as either project-specific baselines or performance standard baselines.

Baseline period: The period of time selected as representative of facility operations before the energy efficiency activity takes place.

Bias: The extent to which a measurement or a sampling or analytic method systematically underestimates or overestimates a value

Calculated savings: An estimate of savings based on a standardized procedure for data collection and analysis that is applicable to many different end use sites. Standardization of data collection reduces cost by eliminating or minimizing the need for site-specific measurement planning. This method is appropriate when savings from a measure are widely varying but can be reliably estimated by a standardized protocol.

Confidence: An indication of how close a value is to the true value of the quantity in question. Confidence is the likelihood that the evaluation has captured the true value impacts of a program within a certain range of values.

Custom savings: Savings for measures that require site-specific data collection and analysis in order to develop a reliable estimate of savings. Highly skilled and experienced practitioners are required to design and implement custom protocols. Custom protocols require site-specific documentation of the data collected and how that data is used in estimating savings.

Deemed (UES) savings: An estimate of an energy savings or energy-demand gross savings outcome for a single unit of an installed energy efficiency measure that (a) has been developed from data sources and analytical methods that are widely considered acceptable for the measure and purpose and (b) is applicable to the situation being evaluated. Also known as Unit Energy Savings (UES).

Effective useful life (EUL): A term sometimes referred to as measure life and used to describe persistence. EUL is an estimate of the median number of years that the measures installed under a program are still in place and operable.

Energy Conservation Measure (ECM): See Measure.

Energy Efficiency Services: The department within Puget Sound Energy that administers the utility's energy efficiency programs.

Evaluation: The performance of studies and activities aimed at determining the effects of a program (and/or portfolio); any of a wide range of assessment activities associated with understanding or documenting program performance, assessing program or program-related markets and market operations; any of a wide range of evaluative

efforts including assessing program-induced changes in energy efficiency markets, levels of demand or energy savings, and program cost-effectiveness.

Evaluation, Measurement and Verification (EM&V): Catch-all term for evaluation activities at the measure, project, program and/or portfolio level; can include impact, process, market and/or planning evaluation. . EM&V is distinguishable from Measurement and Verification (M&V) defined below.

Evaluation Report Response (ERR): This report, prepared by designated program managers, documents pertinent adjustments in program metrics or processes, subsequent to an evaluation study, and is attached to the completed evaluation report.

Ex-ante savings estimate: Forecasted savings used for program planning; from Latin for "beforehand."

Ex-post evaluated estimated savings: Savings estimates reported by an evaluator after the energy impact evaluation has been completed. If only the term "ex-post savings" is used, it will be assumed that it is referring to the ex-post evaluation estimate, the most common usage; from Latin for "from something done afterward."

External Evaluators: Independent professional efficiency evaluators retained to conduct EM&V. Consideration will be made for those that are Certified Measurement and Verification Professionals (CMVPs) through the Association of Energy Engineers (AEE) and the Efficiency Evaluation Organization (EVO).

Free Rider: A term in the energy efficiency industry meaning a program participant who would have installed the efficient product or changed a behavior regardless of any program incentive or education received.

Free Driver: A non-participant who has adopted a particular efficiency measure or practice as a result of the evaluated program.

Gross savings: The change in energy consumption and/or demand that results directly from program- related actions taken by participants in an efficiency program, regardless of why they participated.

Implementation Team: Puget Sound Energy, EES employees who operate and work within the DSM program, whose responsibilities are directly related to implementation and administration of DSM programs, and who may have energy savings targets as part of their employee goals or incentives.

Impact Evaluation: A study to determine the impacts, energy or demand, and co-benefits such as avoided emissions, health benefits, job creation, energy security, transmission/distribution benefits and water savings, that directly result from a program.

Internal Evaluation Team: Puget Sound Energy, EES employees who perform analysis and reporting in Energy Efficiency Services but do not have energy savings targets as part of their goals or incentive structure.

Market Effect Evaluation: An evaluation of the change in the structure or functioning of the market, or the behavior of participants in a market, that results from one or more program efforts.

Market Evaluation: A study designed to assess ECM baselines, measure costs, market actor needs and preferences, free-ridership and spillover.

Measure (also Energy Conservation Measure or "ECM"): Installation of a single piece of equipment, subsystem or system, or single modification of equipment, subsystem,

system, or operation on the customer side of the meter, for the purpose of reducing energy and/or demand (and, hence, energy and/or demand costs) at a comparable level of service.

Measure Life: See Effective Useful Life (EUL)

Measure Metrics Database: Unique to PSE, an Access database and system network drive folders that allow Energy Efficiency Services (EES) to manage its entire suite of prescriptive (or Deemed (UES)) and some calculated ECMs. The system tracks the development, implementation, life cycle, sunset and retirement of these ECMs. Measure Metrics is the foundation of EES prescriptive ECM savings claims. It is EES's means of documentation for energy savings justifications for prescriptive ECMs. It also tracks an ECM's cost, life and history of revisions. One important distinction is that the system does not track cumulative savings and program costs; only the basis for prescriptive and some calculated measures.1

Measurement and Verification (M&V): Data collection, monitoring, and analysis associated with the calculation of gross energy and demand savings from individual measures or projects. M&V can be a subset of program impact evaluation. M&V is defined in the International Performance Measurement and Verification Protocol (IPMVP - available at http://www.evo-world.org).

Net Savings: The total change in load that is attributable to an energy efficiency program. This change in load may include, implicitly or explicitly, the effects of Free Drivers, Free Riders , energy efficiency standards, changes in the level of energy service, and other causes of changes in energy consumption or demand.

Net-to-Gross Ratio: An industry term for the adjustment factor to determine net savings from a gross savings estimate. The net-to-gross ratio for Puget Sound Energy is set to 1.0 for all cost effectiveness tests.

Precision: The indication of the closeness of the agreement among repeated measurements of the same physical quantity.

Portfolio: Collection of similar programs addressing the same market or the entire market.

Process Evaluation: A study to assess program delivery, from design to implementation, in order to identify bottlenecks, efficiencies, what worked, what did not work, constraints, and potential improvements.

Program: A group of projects, with similar characteristics and installed in similar applications. Examples are a program to install energy-efficient lighting in commercial buildings and residential energy efficiency weatherization program. Each program is defined by a unique combination of program strategy, market segment, marketing approach and energy efficiency measure(s) included.

Project: An activity or course of action involving one or multiple energy efficiency measures, at a single facility or site.

Protocol: A written procedural method for implementing processes. Protocols often include information on the calculation of results and reporting standards.

[1] See Attachments 5 – 8 for documents pertaining to Measure Metrics processes and standards.

Realization rate: Ratio of ex-post reported savings to ex-post evaluated estimated savings. When realization rates are reported, they are comparing ex-post gross reported savings to ex-post gross evaluated savings.

Reliability: When used in energy efficiency evaluation, this refers to the likelihood that the observations can be replicated.

Reported savings: Savings estimates reported by Puget Sound Energy for an annual period. These savings will be based on best available information.

Rigor: The level of expected Confidence and Precision. The higher the level of rigor, the more confident one is that the results of the evaluation are both accurate and precise.

Spillover: Reductions in energy consumption and/or demand caused by the presence of the energy efficiency program, beyond the program-related gross savings of the participants. There can be participant and/or non-participant spillover.

Unit Energy Savings (UES): An energy savings value for measures whose unitized savings, e.g., savings per lamp or motor, is stable (both the mean and variance) and can be reliably forecast through the period defined by the measure's sunset criteria.

Uncertainty: The range or interval of doubt surrounding a measured or calculated value within which the true value is expected to fall within some degree of confidence.

Verification: A component of overall evaluation efforts aimed at verifying installations of energy efficient measures and associated documentation through review of documentation, surveys and/or onsite inspections. It does not include primary research (e.g., billing analysis, metering) for the purpose of determining the energy use/savings of the installed measures. PSE also engages in programmatic Verification activities, including inspections, quality assurance reviews, and tracking checks and balances as part of routine program implementation.

Acronyms

CRAG – Conservation and Resource Advisory Group

ECM – Energy Conservation Measure

EES – Energy Efficiency Services, a department within Puget Sound Energy

EME – Energy Management Engineer

EM&V – Evaluation, Measurement & Verification

ERR – Evaluation Report Response

EUL – Effective Useful Life

IPMVP - International Performance Measurement and Verification Protocol

IRP – Integrated Resource Plan

kWh – Kilowatt hour

M&V – Measurement and Verification

M:M – Measure Metrics

NEEA – Northwest Energy Efficiency Association

NWRG – Northwest Research Group

PACT – Program Administrator Cost Test (also known as UC)

PCT – Participant Cost Test

RCW – Revised Code of Washington

RFP – Request for Proposal

RIM – Ratepayer Impact Measure Test

RTF – Regional Technical Forum of the Northwest Power and Conservation Council

TRC – Total Resource Cost Test

UC – Utility Cost Test (also known as PACT)

UES – Unit Energy Savings2

UTC – Washington Utilities and Transportation Commission

[2] UES (Unit Energy Savings) is now a termed used by the Regional Technical Forum in place of "Deemed" when referring to measures.

Executive Summary

The purpose of this document is to meet the interests and intentions of the September 2010 Conditions Agreement regarding EM&V interests. It describes the framework by which Puget Sound Energy ("PSE" or "the Company") will conduct evaluation, measurement and verification (EM&V) activities to estimate energy savings and other metrics associated with its Energy Efficiency Services (EES) programs. The Framework addresses PSE's EES programs funded by Schedules 120 and/or the current cost-recovery mechanisms approved by the Washington Utilities and Transportation Commission (UTC). Evaluations will be performed by independent, external evaluators and PSE's internal evaluation team to prospectively improve program delivery and program energy savings estimates derived from the Company's EES portfolio.

This framework document adopts industry best practices definitions of terms, principles of operation, and protocols that will be utilized by PSE or external evaluators to evaluate, verify and document the savings acquired from its efficiency programs and the processes used to acquire those savings. The intended audience for this Framework is the Company's management, PSE's EES staff, and external evaluators who will perform evaluations, the UTC, and interested parties. The framework guides development of annual EM&V plans for specific evaluation activities. It also provides a mechanism for the UTC and interested parties to understand and comment on The Company's overall program evaluation approach.

Multiple documents exist that can be provided upon request. Each year the Company will develop an Annual EM&V Plan, in consultation with the CRAG, which will contain evaluation schedule, budgets, and evaluation summaries for the upcoming year. In addition, contemplated evaluation activities up to three more years in the future will be included. Another resource is PSE's Annual Conservation Plan, which describes the relationship between Energy Efficiency Services program implementation, and portfolio, program and measure evaluation. PSE will provide the CRAG with an opportunity to review and advise the Company on the Annual Conservation Plan and the associated Annual EM&V Plan per the Conditions Agreement.

This EM&V Framework is intended to outline a comprehensive EM&V process that results in transparent and accessible documentation and reporting of PSE's energy efficiency program activities. Thus, the Framework provides an overarching approach to EM&V; principles, objectives, metrics, methods and reporting. It is anticipated that PSE will need to allow flexibility for evolving EM&V needs and requirements over time, and to allow stakeholder review of overarching EM&V processes, annual EM&V plans, and specific EM&V activities at appropriate junctures. Thus, this initial version of the Framework is very much a "living document" that may require modifications over time. See Figure 1, page 9.

Attachments to this Framework describe more detailed Processes and Protocols around planning, operational, programmatic M&V, and data management functions. As most of these documents are written as guidelines for day to day operations, and may be updated at unspecified intervals, they are not intended for incorporation in the body of the Framework.

Overview of Puget Sound Energy's EM&V Processes

This document describes PSE's approach to evaluations of DSM energy efficiency measures, programs, and portfolio funded by Schedule 120 as approved by the Washington Utilities and Transportation Commission (UTC).

Evaluations will be planned, conducted and reported in a transparent manner, affording opportunities for Commission and stakeholder review through the CRAG and reported to the UTC.

> An Annual EM&V Plan establishing priorities for evaluation activities, including budgets and schedules, will be prepared each year as part of PSE's Annual Conservation Plan and filed with the UTC as noted in Table 1 and Table 3. PSE will work with the RTF, NEEA and other regional parties that are conducting EM&V activities to assess the potential for coordination and collaboration in the preparation of the Annual EM&V Plan. These plans will include a summary of each scheduled evaluation activity, whether the activity will be performed by an external evaluator or the Company's internal evaluation team. They will also include details regarding the evaluation goals, scope, level of effort, and budgets, as well as the general approaches to be utilized for conducting impact, process, market and cost-effectiveness evaluations. The Company will work closely with the CRAG on the development of this annual EM&V Plan.
>
> Other documents including project scopes, requests for proposals, detailed research plans and draft and final reports will be prepared for each major EM&V activity. Any or all of these documents will be available for review by the CRAG, as desired. The detailed research plans will define and address issues related to evaluation metrics and the level of effort, budget, baselines, approaches, sample designs, and certainty and reporting expectations associated with individual evaluation activities.

All evaluations will be conducted using best-practice approaches and techniques including those outlined in the National Action Plan for Energy Efficiency (NAPEE) Program Impact Evaluation guide.[3]

PSE developed the Measure Metrics archival system in 2008 in order to have available all relevant measure information for deemed (UES) and calculated measures. Information includes, but is not limited to measure life and cost, engineering assumptions, incentive amount, calculation type and savings value. The system also archives historical information about that measure, enabling revision history queries. PSE maintains well-documented processes for measure creation and revision. The Measure Metrics system is routinely updated throughout the year. The system is specifically not used to track cumulative annual savings.[4]

For ECMs that are not prescriptive, PSE will use standard engineering protocols for ex-ante estimation of savings. See page 21 for a description of protocols used for Custom Measures.

Through the EM&V activities, key DSM impact metrics will be determined as follows:

[3] National Action Plan for Energy Efficiency (2007). Model Energy Efficiency Program Impact Evaluation Guide. Prepared by Steven R. Schiller, Schiller Consulting, Inc. www.epa.gov/eeactionplan

[4] Guidelines for how and when the Measure Metrics Database is updated may be found in Attachments 4 through 7.

- PSE's implementation team will estimate energy and demand savings, document installations and prepare ex-ante savings estimates per measure, project and program, consistent with Measure Metrics and standard engineering protocols.
- PSE's implementation team will also conduct QA/QC activities and follow tracking checks and balances as programmatic M&V.[5]
- PSE's internal evaluation team and independent external evaluators will conduct evaluations as outlined in the annual EM&V plan.

EM&V activities, including impact, process, market, and cost-effectiveness analysis will be conducted by PSE's evaluation team or external evaluators, according to priorities established with stakeholder input and presented in PSE's Annual Conservation Plan and PSE's Annual EM&V Plan.

Reports from EM&V activities including evaluation of energy and demand savings and cost-effectiveness will be available to the CRAG, and the UTC, consistent with the reporting schedules required by the UTC.

[5] PSE will provide detailed descriptions of its programmatic M&V policies, protocols, guidelines and processes in accordance with Conditions Agreement K6 (f) (ii).

Background

The Company serves customers with broad energy efficiency services and aspires to best practices in all aspects of program offerings, customer outreach, and evaluation. PSE provides a financial incentive for most kWh and/or therm saving ECMs that have a simple payback of over one year for commercial and industrial customers. Similar offerings, through standard offer programs, are available to residential customers. Customers use the rebates and incentives to purchase energy efficiency equipment and weatherization, often provided through an extensive network of trade allies. Over 350 measures are offered to PSE customers though multiple electric and natural gas energy efficiency schedules, authorized by the UTC. Every PSE qualifying measure and program must have an objective analysis to describe how the kWh and therm savings are expected to be cost-effective, how they will be achieved, and how the expectations will be substantiated after installation.

The Company utilizes an external advisory group of stakeholders, the Conservation and Resource Advisory Group (CRAG) to advise the Company on, among other items; 1) development and modification of protocols to evaluate, measure, and verify energy and demand savings in PSE's EES programs, and 2) guidance to PSE regarding methodology inputs and calculations for updating cost-effectiveness. Consistent with condition K(3)(b), the CRAG meets four times per year (two in person) at a minimum and represents the non-binding external oversight of PSE's EM&V activities.

This document, the "EM&V Framework," was developed in response to the UTC Order No. 5 and Stipulation Agreement dated September 3, 2010, and is intended to provide overall guidelines including principles, objectives, responsibilities, methods and reporting requirements to direct PSE's energy efficiency EM&V activities. The roles for PSE, CRAG, External Evaluators, and Washington Utilities and Transportation Commission are listed in Figure 4, Page 29.

Evaluation Principles, Objectives and Metrics

Evaluation, Measurement and Verification (EM&V) is a catch-all term used in energy efficiency literature to represent the determination of both program and project impacts. Evaluation includes the performance of studies and activities aimed at determining the effects and improvement of a program.[6]

Measurement and verification refers to "Data collection, monitoring, and analysis associated with the calculation of gross energy and demand savings from individual sites or projects. This function resides in PSE's EES program delivery and tracking activities. M&V can also be a subset of program evaluations.[7]

There are two key objectives of evaluations[8]:

- To document and measure the effects of a program and determine whether it met its goals with respect to being a reliable energy resource.
- To help understand why those effects occurred and identify ways to improve or discontinue current programs, and develop future programs.

Energy efficiency evaluations will develop prospective estimates of energy savings attributable to a program in a manner that is defensible in regulatory proceedings that are conducted to ensure that funds are properly and effectively spent. In addition, evaluation should go beyond documenting savings to actually improving programs and providing a basis for future savings estimates.[9]

Thorough evaluations result in programs that are more cost-effective and better managed.

There are two basic categories of evaluations, Outcome and Formative. The Outcome category includes Impact Evaluation, Cost Effectiveness Analysis and Market Effects Evaluation. The Formative category includes Process Evaluation, and Market Evaluation as defined below:

- **Impact Evaluations** determine the impacts (e.g., energy and demand savings) and co-benefits (e.g., avoided emissions, health benefits, job creation, energy security, transmission/distribution benefits, and water savings) that directly result from a program. Impact evaluations also support cost-effectiveness analyses aimed at identifying relative program costs and benefits.
- **Cost Effectiveness Analysis** is the exercise to determine the cost effectiveness of programs and measures from various viewpoints including Utility Cost, Total Resource Cost, Ratepayer Impact Measure and Participant Cost.
- **Process Evaluations** assess program delivery, from design to implementation, in order to identify bottlenecks, efficiencies, what worked, what did not work, constraints, and potential improvements. Timeliness in identifying opportunities for improvement is essential to making corrections along the way.

[6] National Action Plan for Energy Efficiency (2007). Model Energy Efficiency Program Impact Evaluation Guide, Appendix B: Glossary. Prepared by Steven R. Schiller, Schiller Consulting, Inc. www.epa.gov/eeactionplan
[7] Id.
[8] National Action Plan for Energy Efficiency (2007). Model Energy Efficiency Program Impact Evaluation Guide, page 2-1. Prepared by Steven R. Schiller, Schiller Consulting, Inc.
[9] Id.

- **Market Evaluations** are studies designed to assess ECM baselines and costs, market actor needs and preferences, free-ridership and spillover.
- **Market Effects Evaluations** assess transformation, or estimate a program's influence on encouraging future energy efficiency projects because of changes in the energy marketplace.

This Framework, and the industry as a whole, focuses on evaluations and the measurement and verification of demand and energy savings associated with specific programs. The results of impact evaluations will follow through to cost-effective analysis which is typically an extension of evaluation activities. Process and market evaluations are very important for prudent program management and will be performed to create best practice portfolio planning, and implementation. Process and market evaluations will accompany impact evaluations in all cases where such studies add pertinent value. Program evaluations will be planned on a four year schedule or cycle. Occasionally, special evaluation projects that may arise from regional or other interests will be interspersed within the four year cycle. The CRAG will be consulted on the development of this four year plan.

Transparency

Sound evaluation of energy efficiency programs requires transparency and independence. This results in high quality information on which business/policy decisions can be made. Within customer confidentiality constraints, output from any EM&V activity is available to PSE's external stakeholders.

As a means of facilitating transparency in its internal processes, the Company develops and maintains thorough documentation of its processes and related activities. PSE also follows the International Performance Measurement and Verification Protocol (IPMVP)[10] for program evaluations.

Budget

The EM&V budget includes reasonable costs for market, process, and impact evaluations including evaluations conducted both by internal PSE staff and by external evaluators. Allocation of annual EM&V budgets between market, process and impact analyses (and internal and external activities) will be described in each year's Annual EM&V Plan.

A full report on EM&V expenditures and activities for the prior year will be part of the Annual Report on Energy Efficiency Acquisition. This information will include a description of the EM&V studies completed and/or underway during the reporting cycle with reporting of the type of evaluations, whether they were conducted by internal staff or external evaluators, the program or programs studied, and the evaluation budgets and scopes.

Initiative 937 (I-937), the Energy Independence Act, and subsequent Commission Order in Docket No. UE-100177 call for budget requirements for evaluation of programs. PSE is committed to evaluation spending consistent with condition K(6)(f)(i).

[10] The International Performance Measurement and Verification Protocol, Volume 1 is available at: http://www.evo-world.org/ .

PSE is also committed to Condition Agreement K(6)(f)(ii) in documenting Programmatic M&V activities regarding policies, protocols, guidelines, processes, costs and consistency with regional peers.[11]

Goals, Priorities and Guiding Principles

PSE has committed to evaluate all major programs over a multiple year cycle. Program evaluations are expected to follow in that prescribed schedule. There may be deviations from this schedule as a result of new or changing programs or regional influences such a code changes or the advent of new technologies that may need evaluation support in any given year. PSE will keep the CRAG informed of upcoming evaluation projects as changes to the schedule arise.

The goal of evaluation planning is to spend the least money necessary in order to adequately ascertain the best value savings estimates and mitigate the risk of either under or over-reporting savings. Evaluation planning identifies the types of evaluation information that is crucial to different stakeholders. The Company intends to prioritize EM&V resources based on consideration of the following issues:

- Size of the project or program: (e.g. a site-specific project with an incentive payment over $50,000.00 or a prescriptive program that provides more than 25% of the savings for a particular sector would increase the EM&V prioritization);
- Uncertainty regarding the results: Resource characteristics that are known within relatively tight confidence intervals are less of a priority for EM&V efforts than those that are relatively uncertain. For instance the certainty of a hard wired measure change may be high for the kW reduction effect but may be low for the hours of operation variable;
- Criticality of the resource characteristic: The sensitivity (or insensitivity) of a resource characteristic to particular factors like load, operating hours, operating time, weather, or seasonality of operation can be important considerations;
- Impact upon regulatory processes or regulatory oversight: Information necessary for regulatory oversight will receive a higher EM&V priority than information that is not necessary for that purpose, all else being equal;
- Timing: Information that would have value in improving an ongoing program would have higher precedence;
- Cost of measurement: Cost of EM&V should be optimized. Alternative approaches should be considered when the value of incrementally better data is less than the cost of that data; and,
- Timeliness is an important consideration for planning evaluations. EM&V should be undertaken in a manner that is designed to provide important information in a timely fashion for regulatory reporting, program planning and/or improvement, and other needs.

External evaluators will often be retained to perform impact evaluations. These evaluations will be performed such that, over a four year EM&V cycle, all major programs are covered as stipulated in Condition. K. 6 (f). External consultants may also be retained to evaluate PSE's EES program processes and market conditions.

[11] See Attachment 2: Energy Efficiency Services M&V Structure

In addition, when choosing and planning evaluations the following guiding principles will be taken into consideration:

- Leverage secondary research as appropriate with modifications as deemed (UES) necessary and useful;
- Expert review of evaluation design throughout the planning and implementation of these activities;
- All key assumptions used by program planners will be documented and eventually verified in evaluations;
- The procurement process used to select evaluation contractors is timely, flexible and transparent;
- Prioritize evaluation dollars and efforts on areas of largest savings and/or greatest uncertainty; and,
- Over time, evaluations are used to refine input assumptions used in savings estimation and resource analysis in order to improve program delivery.

Captured Data/Metrics

Critical portfolio metrics to be evaluated are as follows:

Annual energy acquisition, gross kWh and therms, to include, where possible and necessary, load shape, system and customer capacity, system coincident kW, measure life, non-energy benefits, energy savings degradation, existing conditions;

Costs and benefit data for cost-effectiveness analyses including total ECM cost, incremental ECM cost; and,

Other metrics or combinations as requested by the UTC, such as:

- Market characterization and transformation attributes for measures and programs that may include, but are not limited to, product price and availability, trade ally assessments, market saturation, customer satisfaction, customer participation, incremental costs, and the effects of codes, standards and prices; and,
- Other information necessary for portfolio management including technology assessments, measure persistence, lost opportunities, geographic equity, customer class equity, budget targets, targets per customer class, number of customers served, and information useful for system planning.

Evaluation Cycle

As described in this EM&V Framework, PSE will perform EM&V annually on a four year schedule of selected programs such that all major programs are covered appropriately over time, in accordance with condition K. 6 (f). Following on page 9 is the hierarchy of documents outlining planning steps for each evaluation cycle (see Figure 1, page 9).

- EM&V Framework – This document is designed to remain in place until superseded by regulatory modifications or changed by CRAG processes.

- The Annual Conservation Plan will include an "annual EM&V Plan" section[12] indicating which major evaluation activities (e.g., updating baselines, updating deemed (UES) savings values and describing planned program evaluations) will be conducted during the year, including the specific budget and allocation between programs, measures, segments, and jurisdictions as applicable, and a current 4-year evaluation schedule (See Appendix 1, the draft 2012 EM&V plan).
- The Annual EM&V Plan will include where feasible input from other regional parties such the RTF, NEEA and others that are conducting EM&V activities to coordinate and collaborate in evaluation activities.
- The annual EM&V Plan[13] ("Exhibit 6" in the Annual Conservation Plan) will include summaries of each scheduled evaluation activity, whether the activity will be performed by an external evaluator or PSE's internal evaluation team, and details regarding the evaluation goals, scope, level of effort, budgets as well as the general approaches to be utilized for conducting impact, process, market and cost-effectiveness evaluations. PSE will work closely with the CRAG on the development of the annual EM&V plan.
- Research Plans – Also referred to as Scopes of Work will be created for each EM&V project planned in a given cycle (impact, process and market effects evaluations). New DSM programs will include a research strategy at launch of the program. The research strategies will address issues related to evaluation metrics and the level of effort, budget, baselines, approaches, sample designs, certainty and reporting expectations associated with individual evaluation activities.

Figure 1 on the following page illustrates EM&V planning cycles and documents.

[12] In even-numbered years, the Evaluation Plan included with the Annual Conservation Plan will focus on a complete two-year cycle, with the addition of annual budgets. In odd-numbered years, the Annual Evaluation Plan will be a separate document and cover only the odd-numbered year, as evaluation priorities and needs are updated over time.

[13] The 2011 Annual Conservation Plan provided only the 2011 Evaluation Plan, as the EM&V Framework was in development at the time of the filing.

Figure 1: EM&V Planning Cycles and Documents

	EM&V Framework*	Annual EM&V Plan	Planning and Oversight Documents for Specific EM&V Activities
Document(s)	EM&V Framework	Included as a section in PSE's Annual Conservation Plan	Program Performance Reports Measure Metrics Database Work scopes Research Plans Key issues requiring oversight Draft and Final Reports EM&V Protocols
Contents	The overall structure and process for EM&V Objectives and Principles Baseline Definition Evaluation Approaches Certainty External Evaluation	EM&V activities proposed for a given cycle: High level description of each major scheduled activity summarizing: Scale Scope Methodology Budgets Schedule Summary of EM&V-based program changes	Details regarding specific EM&V projects or activities including impact, process, market and planning studies. Measure Metrics will provide current and historical savings, measure costs and measure life values. Custom and the majority of calculated measure values will be individually calculated at a project-level basis and will be referenced as applicable.
Schedule	The Framework remains in place indefinitely, but may be updated as needed	Prepared annually, submitted with the Annual Conservation Plan by November 1 of each year.	Prepared for each significant EM&V activity and/or prepared as a resource document
Reviewers[14]	CRAG	CRAG	CRAG
Filed with Commission[15]	Yes	Yes	No

[14] of the above listed document
[15] See Figure 4 on page 25 for more details on roles and responsibilities

Impact Evaluation Methods and Key Assumptions

An Impact Evaluation is designed to measure the directly induced changes in energy and/or demand usage attributable to an energy efficiency program. This section describes PSE's considerations when planning and conducting an impact evaluation.

Ex-Ante versus Ex-Post

Impact evaluations focus on estimating the amount of energy and demand savings the program actually creates. Estimates of actual savings are ex-post[16] savings, program savings that can be documented after program implementation. The initial design and review of prospective programs will be based upon ex-ante savings[17], the savings that are *expected* to be delivered by the program. After implementation of the program, annual savings are based on ex-post evaluations, the estimated energy savings that are actually caused by the program. These savings may change over time. Ex-post savings, documented via an impact evaluation, can vary significantly from projected ex-ante savings.

To capture ex-post savings estimates in the most consistent and informative way, PSE seeks to assess ex-post savings estimates based on conditions at the time of ex-ante savings calculations, as well as observed at the time of the evaluation. This methodology allows for best assessment of various factors affecting measure persistence. Over time, impact evaluations will help refine ex-ante savings estimates to improve their accuracy.

Evaluation Standards

The primary purpose of impact evaluations is to obtain the most accurate and unbiased estimate of energy and demand savings due to a program. The Company's specific evaluation methods will be founded on industry best practice, based on applicable industry reference documents (e.g., NAPEE Guide, IPMVP). PSE will observe the following principles in its oversight of impact evaluations:

- Evaluators should be impartial in their work and not have their compensation tied to evaluation results.
- Evaluators are expected to follow ethical guidelines (as documented in the American Evaluation Association's Guiding Principles for Evaluators, which call for: systematic inquiry, competence, integrity and honesty, respect for people, and responsibility for general and public welfare.)[18]
- Transparent methods to estimate savings and impacts will be reviewed in various forums to increase quality and reliability. These include: CRAG, RTF, NWRG, and similar forums which will be used to review methods and results.
- All key assumptions used by program planners are eventually verified in evaluations.
- Majority of evaluation dollars and efforts are in areas of greatest importance or uncertainty.

[16] ***Ex-post* evaluation estimated savings:** Savings estimates reported by an evaluator after the energy impact evaluation has been completed. (From Definitions section)
[17] ***Ex-ante* savings estimate:** Forecasted savings used for program and portfolio planning purposes. (From Definitions section)
[18] American Evaluation Association (AEA), Guiding Principles for Evaluators, http://www.eval.org.

Approaches for Estimating Savings

Impact savings will be estimated using one of the following approaches:

Measurement and verification (M&V) - Four IPMVP options, A, B, C and D are used to estimate savings from selected projects and the resulting savings may be applied to an entire population or program using statistical analyses.

Statistical analyses of large volumes of metered energy usage data. (e.g., billing analyses)

Deemed (UES) Savings – use of an estimate of savings developed by data sources and analytical methods that are widely considered acceptable in the industry (as documented for example by the Regional Technical Forum or in PSE's Measure Metrics Database. This approach is only valid for measures with fixed operating conditions and proven history of substantiated evaluations.

Irrespective of which of the above approaches are utilized for EM&V, all measures will be available for inspection by external evaluators to confirm their installation. In some cases measures will be inspected to confirm that they were not only installed, but also installed per specification and that they are properly operating. Also, in some cases, such as large-scale custom measures/projects, baseline inspections will also be conducted.

Baseline

Baseline is a reference to existing energy use conditions that would have occurred without implementation of an energy efficient project or program. This may include standard practice, business-as-usual or code conditions. Baseline energy use values are key to a reasonable quantification of energy savings during a particular period as both codes and standard practices evolve over time.

Gross savings are estimated by comparing energy use and demand after a program is implemented (the reporting period) with what would have occurred had the program not been implemented, i.e. the baseline. A common set of conditions (e.g., weather, operating hours, building occupancy) are used for estimating gross energy savings. These conditions are then adjusted so that only program effects are considered when determining savings.

Considerable care needs to be taken in determining the baseline used for impact evaluations. The baseline is key to estimating the savings achieved. Evaluators will use or determine baselines based on common practice, or codes and standards. Baselines can be defined as follows:

- Project-Specific Baseline: defined by specific technology or practice that would have been pursued, at the site of individual projects if the program had not been implemented which tends to be existing equipment for early replacement programs.
- Performance Standard Baseline: defined to avoid project specific determinations, and tends to be codes, standards, or common practice instead of trying to ensure the overall addition of quantified energy and demand savings, and/or avoided emissions.[19]

[19] Schiller Consulting

- PSE will include baseline information in the detailed impact evaluation research plans as well as for deemed (UES) savings values for prescriptive measures.
- PSE will follow the methodology outlined in the Guidelines for the Development and Maintenance of RTF-Approved Measure Savings Estimates as it relates to baseline for Deemed (UES) and Standard Protocol Measures.

Uncertainty

Uncertainty is defined for our purposes as the range or interval of doubt surrounding a measured or calculated value within which the true value is expected to fall within some degree of confidence.[20] EM&V resources will be deployed in a manner that provides the best value in terms of information that is required for oversight, market assessment, and program targeting, improvement, and planning. The level of investment put towards evaluation usually has a direct correlation to the amount of certainty achieved. One of the trade offs in evaluations is thus between the costs expended and the uncertainty level. Results from an evaluation will be reported with the level of uncertainly or error rate defined and explained. There are two types of errors, systematic and random, which are described below:

Systematic errors are those that are subject to decisions and procedures developed by the evaluator and are not subject to "chance." These include:

- Measurement errors, arising from meter inaccuracy or errors in recording an evaluator's observations;
- Non-coverage errors, which occur when the evaluator's choice of a sampling frame excludes part of the population;
- Non-response errors, which occur when some refuse to participate in the data collection effort; and,
- Modeling errors, due to the evaluator's selection of models and adjustments to the data to take into account differences between the baseline and the test period.

Random or Sampling errors[21], those occurring by chance, arise due to sampling rather than taking a census of the population. In other words, even if the systematic errors are all negligible, the fact that only a portion of the population is measured will lead to some amount of error. Random errors are sometimes called sampling errors.

Evaluators are expected to control for systematic error through best practices and control random error by striving for a 90/10 confidence and precision level (using a two-tailed test[22]) and requiring an 80/20 confidence level if sampling requirements can be shown to be unrealistic. Deviations from these specifications may be permitted with justification and review by the CRAG. The Evaluation report will discuss all aspects of uncertainty and the decision process that determined sample size and confidence/precision level achieved.

[20] Id
[21] Id
[22] Two-tailed tests require larger sample sizes than one-tailed tests as assessing two directions at the same time requires a greater investment. A one-tail test can be used only when there is strong proof that it is appropriate to do so, e.g., only ensuring that values of concern are not over estimated, versus under-estimated, is important.

Persistence

Persistence is how long the energy savings are expected to last once an energy efficiency activity has taken place.[23] A component of an impact evaluation should consider whether the savings from the project change over time. These changes can be attributable to retention and performance degradation.[24] Effective useful life (EUL) or Measure Life is a term often used to describe persistence. EUL is an estimate of the median number of years that the measures installed under a program are still in place and operable.[25]

In most cases, persistence of savings will be determined using historical and documented persistence data, such as manufacturer's studies or values contained in the Regional Technical Forum database. However, if deemed (UES) necessary, PSE may also utilize laboratory and field testing of the performance of energy-efficient and baseline equipment, field inspections over multiple years, and/or other various methods such as telephone surveys and interviews, analysis of consumption data, or use of other data (e.g., data from a facility's energy management system).

Net Savings

Net Savings is recognized in the industry as Gross Savings minus free-riders plus spillover. Free-riders are customers who would have installed the efficient measure or changed a behavior regardless of a program's incentive. Spillover is reduction of energy consumption caused by the presence of an energy efficiency program, beyond the program-related gross savings of participants influenced by incentives. There can be participant spillover and non-participant spillover. Non-participant spillover is defined as savings from efficiency projects implemented by those who did not directly participate in a program, but which nonetheless occurred due to the influence of the program. Non-participant spillover may be prohibitively costly to estimate. Participant spillover is defined as additional energy efficiency actions taken by program participants as a result of program influence, but actions that go beyond those directly subsidized or required by the program. Though spillover is a positive influence of a program, high levels of free-ridership in a program may not be desirable if incentives are not applied equitably.[26]

Consistent with condition K(10)(c), PSE does not estimate net savings for a program or portfolio since the Net-to-Gross ratio is set at 1.0 for cost effectiveness analysis. However, the Company will examine program spillover and free-ridership when it is feasible to do so, for program design purposes.

Free-ridership and spillover may be determined using one or more of the following approaches:

[23] Model Energy Efficiency Program Impact Evaluation Guide. Prepared by Steven R. Schiller, Schiller Consulting, Inc. www.epa.gov/eeactionplan

[24] Market progression is when the rate of naturally occurring investment in efficiency increases and can be considered to erode the persistence of earlier first year savings. An example of a cause of market progression is energy price effects—higher energy costs resulting in higher levels of efficiency. Model Energy Efficiency Program Impact Evaluation Guide. Prepared by Steven R. Schiller, Schiller Consulting, Inc. www.epa.gov/eeactionplan

[25] Model Energy Efficiency Program Impact Evaluation Guide. Prepared by Steven R. Schiller, Schiller Consulting, Inc. www.epa.gov/eeactionplan

[26] There may be cases were a high rate of free-ridership may be warranted if the case can be made that the program is having a positive effect in transforming the market.

- Self-reporting surveys in which information is reported by participants or non-participants without external verification or review[27]
- Enhanced self-reporting surveys in which self-reporting surveys are combined with interviews and documentation review and analysis
- Statistical models that compare participants' and non-participants' energy and demand patterns
- Customer adoption models applied to specific markets

[27] Self-reporting surveys have been shown to be inaccurate in identifying Free-Ridership. Enhanced Self-Reporting Surveys are preferred.

Cost Effectiveness

PSE's cost-effectiveness evaluations compare program (and portfolio) benefits and costs, showing the relationship between the value of a program's outcomes and the costs incurred to achieve those benefits. The findings are used to help program manager's judge whether to retain, revise, or eliminate program elements and provide feedback on whether efficiency is a wise investment as compared to energy generation and/or procurement options. PSE cost-effectiveness calculations are consistent with conditions K(10)(a) and K(10)(b), including methodologies and definitions contained in the NAPEE document Understanding Cost Effectiveness of Energy Efficiency Programs[28].

A primary test for the UTC is the Total Resource Cost (TRC) test as modified for electric programs by the Northwest Power & Conservation Council. The TRC test measures the net costs of an EES program as a resource option based on the total costs of the program, including incremental measure cost[29] and the utility's non-incentive costs to deliver the program. The TRC ratio equals the benefits of the program, in terms of value of energy and demand saved plus non-energy benefits, divided by the costs to obtain the energy or demand savings. The Company calculates the ratio on a life-cycle basis considering savings and costs that accrue over the estimated lifetime of installed energy efficiency equipment and systems. PSE also calculates the Program Administrator Cost test (PACT), also known as the Utility Cost (UC) test, Participant Cost (PCT) test, and Ratepayer Impact Measure (RIM) test. The four tests are illustrated on the following page in Figure 2 with their costs and benefits listed.

[28] National Action Plan for Energy Efficiency (2008). Understanding Cost-Effectiveness of Energy Efficiency Programs: Best Practices, Technical Methods, and Emerging Issues for Policy-Makers. Energy and Environmental Economics, Inc. and Regulatory Assistance Project.
[29] Other costs such as tax credits are transfer costs as are incentives, and not included the TRC test.

Figure 2: Cost-Effectiveness Tests

	TRC	PACT or UC	PCT	RIM
Avoided Costs	Benefit	Benefit		Benefit
Customer Bill Savings			Benefit	Cost
10% Power Act Credit	Benefit			
Quantified Non-Energy Benefits	Benefit			
Un-quantified Non-Energy Benefits	Benefit (some cases)			
Incremental Measure Cost	Cost		Cost	
Program Overhead Cost	Cost	Cost		Cost
Incentive Cost		Cost	Benefit	Cost

Source: NAPEE (2008), Understanding Cost-Effectiveness of Energy Efficiency Programs, Table 3-2, with addition of Power Act Credit for TRC

Process, Market and Market Effects Evaluations

Process, Market, and to a lesser extent Market Effects Evaluations may encompass all rider or tracker-funded programs and activities whether PSE claims energy savings or not. For example informational programs may need examination to determine and guide overall effectiveness, and ensure customer value and satisfaction.

Process Evaluations

Process evaluations of the Company's EES programs will involve systematic assessments of programs or internal operations for the purposes of documenting program operations at the time of the examination, and identifying and recommending improvements to increase the program's efficiency or effectiveness for acquiring energy resources while maintaining high levels of participant satisfaction. The primary mechanisms used for process evaluations are data collection via surveys, questionnaires, and interviews to gather information and feedback from administrators, designers, participants (e.g., facility operators or residential customers), implementation staff (including contractors, subcontractors, and field staff), and key policy makers. Other elements of a process evaluation can include creation or updating program theory and logic models, process mapping, workflow and productivity measurements, reviews, assessments, and testing of records, databases, program-related materials, and tools.

Market Evaluations

Market evaluations are systematic assessments of changes in the structure or functioning of a market, or the behavior of participants in a market, that result from one or more program efforts or due to other factors. Market evaluations will usually consist of surveys, reviews of market data, and analysis of the survey results and related data. These studies may focus on estimation of measure costs, assessment of baselines and market potentials, and requirements of market actors that are key to program delivery.

Market Effects Evaluations

Market Effects Evaluations are designed to assess market transformation, or estimate a program's influence on encouraging future energy efficiency projects because of changes in the energy marketplace. These studies may rely on surveys and interviews with upstream market actors, or track sales or retail stocking practices.

Deemed (UES) Measures

PSE developed the Measure Metrics archival system in 2008 in order to have available all relevant measure information for prescriptive or deemed (UES) and calculated measures in a central, easily-accessible location. Archived information includes, but is not limited to measure life and cost, engineering assumptions, incentive amount, calculation type and savings value. The system allows authorized EES staff to view a single measure's detail, a program's portfolio of measures, measures by fuel type or a complete list of EES prescriptive measures, also referred to as deemed (UES) measures.

The UES method is appropriate for measures whose unitized savings, e.g., savings per lamp or motor, is stable (both the mean and variance) and can be reliably forecast through the period defined by the measure's sunset criteria. The UES method reduces program delivery cost by simplifying the data that must be collected. Programs are only required to collect a verified count of delivered units, plus the information needed to assign a specific application of the measure, e.g., single family residence with forced air furnace west of the Cascades, to the correct UES. Delivery is defined by the specification of each measure and its specific applications. Total savings is the UES multiplied by the number of delivered units.[30]

There are clearly defined protocols for revising deemed (UES) measures, creating new deemed (UES) measures and retiring deemed (UES) measures. Each deemed (UES) measure must be accompanied by a business case, a source of savings outline, a complete analysis or substantiation of its savings value, its measure cost, and estimated life.[31]

Whether reviewing its electronic or hard-copy version, authorized staff will have access to the same set of information. When a user is viewing electronic files, the most up-to-date data is displayed. Hard copy files contain all information, going back as far as possible for the measure's existence.

Measure Metrics will contain two general categories of information:

- RTF Deemed (UES); prescriptive savings whose values have been evaluated and deemed (UES) by the Regional Technical Forum
- PSE Deemed (UES); Prescriptive savings who values may be based on:
    - RTF values and adjusted for specific PSE service territory characteristics based upon reliable data sources.
    - Engineering studies and impact evaluations
    - PSE impact evaluations

Specific predetermined ex-ante savings estimates – When such values can be defined with sufficient certainty, energy savings and demand reductions values and calculation assumptions for specific natural gas and electricity efficiency measures. Examples would be PSE's prescriptive residential gas furnace program or residential CFL indoor

[30] Guidelines for Development and Maintenance of RTF Savings Estimation Methods, Regional Technical Forum, June 1, 2011.
[31] See Attachments 4 through 7 for documents pertaining to Measure Metrics processes and standards. These attachments describe who is authorized and how the Measure Metrics Database is updated.

lamps. This category is further divided into RTF Deemed (UES) and PSE Deemed (UES) measures.

- RTF deemed (UES) measures are those that are substantiated by RTF calculations. Where applicable, PSE will utilize this measure category as the default for prescriptive measures.
- PSE deemed (UES) measures are those that are substantiated by Impact evaluation studies or engineering calculations that meet generally accepted industry standards. PSE deemed (UES) measures may have some basis in RTF deemed (UES) measure calculations. For instance, installation rates for showerheads, as determined through customer surveys, may be different in PSE's Service territory[32] than in other northwest states. Therefore, as appropriate PSE may elect to adjust an RTF value in order to develop a PSE deemed (UES) savings, based on an impact evaluation study or engineering calculation.
- Provisional status of a measure is recognized by the RTF to denote a measure for which the energy savings, though highly likely, is not known with confidence. PSE will recognize such measures and comply with RTF Guidelines regarding the qualification and requirements of provisional status.

Evaluation documents that support PSE assumptions. Documents include:

- Evaluation studies; either conducted by PSE evaluation staff or external evaluators.
- Evaluation Report Responses, which are used to ensure that evaluation studies result in some Measure Metrics notation; either an energy savings, incentive or delivery adjustment, or no adjustment at all.[33]

Measure data included in the Measure Metrics system may consist of:

- Descriptions of the base efficiencies, which may include engineering and/or industry-level engineering assumptions and applicability conditions;
- kWh or therm savings;
- Hours of operation;
- Measure life;
- Incentive level (as applicable) for which eligible customers may qualify;
- The measure's description as it appears in PSE's Exhibit 4; The EES List of Measures, Incentives and Eligibility;
- Information required for cost-effectiveness tests including incremental measure costs, simple payback period, etc.

External evaluators may review the data in the Measure Metrics system during the initial evaluation cycle covered by this EM&V Framework, and periodically thereafter as determined by EM&V priorities outlined in PSE's Annual EM&V Plans.

[32] "2008 Shower Head Installation Rate Report," Bobette Wilhelm, author.
[33] See Attachment 4: Guidelines for Evaluation Study Follow-up, Version 2.0

Standard Protocol Measures

A standard protocol method is appropriate when savings from a measure are widely varying but can be determined by a standardized procedure for data collection and analysis that is applicable to many different end-use sites. Standardization of data collection reduces cost by eliminating or minimizing the need for site-specific measurement planning. Standardization of the analysis procedure also reduces the planning burden and ensures uniform quality in the analysis product.

Standard protocols support estimation of savings for a measure at specific end user sites. The extent of data collection and analysis required by the protocol is the minimum level needed for reliable savings estimation. Standardization of data collection reduces cost by eliminating or minimizing the need for site-specific measurement planning. Standardization of the analysis procedure also reduces the planning burden and ensures uniform quality in the analysis product. Standardization reduces the skill level needed to reliably estimate savings.[34]

Provisional Measures

There is a fourth measure category referred to by the RTF as Provisional[35]. Rather than a measure category, it is more a transitory condition of a measure likely to become an active Deemed (UES) Measure or a Standard Protocol Measure. Provisional savings estimation methods are those which PSE approves with special conditions requiring the collection of data from all or a sample of specific measure applications. These data are used by PSE to improve the reliability of the savings estimation method. PSE may or may not claim savings from a measure under provisional conditions.

[34] Guidelines for Development and Maintenance of RTF Savings Estimation Methods, Regional Technical Forum, June 1, 2011.
[35] Id.

Custom Measures

Custom measures are those which do not fit the "deemed (UES)" or "calculated" measure categories. Ex-Ante savings estimates are based on rigorous engineering protocols. Custom measures are not currently documented in Measure Metrics.

Characteristics of Custom Measures

Custom protocols are appropriate for measures that require site-specific data collection and analysis in order to develop a reliable estimate of savings.[36] Site-specific conditions are unique to each site, and highly variable from site to site. Often Custom Measures are complex (e.g. includes multiple components of a system; a project may include multiple systems or may interact with other systems; a project may save both electricity and gas; etc.)

Developing a Site-Specific Business Case for Custom Measures (Project Scope)

The Project Description typically includes:

- General site information and background sufficient to put project into context
- Detailed proposal from customer and/or contractor
- Initial site inspection or audit collects relevant baseline data and/or verifies existing conditions represented by contractor and/or customer (e.g. observations, short-term measurements of loads, run-time, trend logs, sketches & photos, etc)
- Clear description of Baseline condition and Proposed Measure(s)
- Relevant discussions: e.g. custom calculation approach, Energy Code requirements, unique site-specific considerations, etc.
- Summary of key results and metrics (savings, incentive amount, measure life, load shape, measure cost, TRC, baseline energy use, % savings, payback)

Custom Ex-Ante (forecasted) Energy Calculations must use generally accepted engineering protocols. Project Cost is typically based on the contractor's bid. The business case must also include an incentive calculation and cost effectiveness discussion, and a custom M&V Plan. A QC Review by a senior-level engineer is required for all custom measures.

Available Documentation

Available documentation of Custom Measures and Projects includes:

- Scope of work (i.e. Business Case)
- Customer SYstem solutions (CSY) (or service provider equivalent) log sheet
- Incentive calculation
- Detailed energy calculations

[36] Guidelines for Development and Maintenance of RTF Savings Estimation Methods, Regional Technical Forum, June 1, 2011.

- Measure cost documentation
- Measure details (detailed contractor proposal, product specifications, etc.)
- Customer billing history
- Post construction verification of the installed measure, including re-calculated savings if actual project or equipment-related conditions are different than previous ex-ante savings assumptions
- Project invoices and payment request

Data Management[37]

EES employs a combination of proprietary and licensed software applications to accumulate, validate and report financial and energy savings figures with a high degree of integrity and accuracy. Some are used strictly for Residential Sector reporting, others are primarily Business Sector focused. The EES Residential tracking database also maintains information on some Business measures, used by multifamily projects. Corporate systems, such as SAP, are used for all financial activity within the department. All come into play, though, when EES presents data to its stakeholders.

The descriptions provided below and the diagram, Figure 3 on the page 25, provide background on what the systems do, how they assemble data and how the data is processed to the resulting reports. It is important to note that many business tools; spreadsheets, flowcharts, checklists, etc., utilized by individual programs or EES staff members which feed some of those listed here are not outlined in this document.

SAP (Systems, Applications, and Products in Data Processing) – SAP is a large multinational software development and consulting corporation located in Germany. The PSE SAP system is used mainly for HR, Contracting, inventory control and General Accounting. EES interacts with the system thru timesheets, contract/invoicing, and by assigning costs against order numbers. Program costs are tracked and reported from SAP.

CLX (Customer LinX) – A proprietary system used for managing customer billing information, meter data (meter readings, ID numbers, structure history, etc.) and tracking outages. The CLX data is saved in a business data warehouse to allow for information transfer to other systems. CSY and CMS pull customer usage data and basic account information (name, address, account number) from the data warehouse. CLX is the source for energy consumption data that is often used for evaluation of program energy savings.

CSY (Customer SYstems solutions) – A PSE-created system with two distinct functional areas: Custom Grant Programs and Customer Rebate Programs. The system is used to track the status of Custom Grant Projects (from initial estimates, Grant Agreement and Final Payment), and to send payment request information to SAP. Payment information includes custom grants and rebates; both prescriptive and calculated for both EES sectors (Residential and Business). Inherent in CSY are metrics such as project and measure energy savings claimed, measure costs and measure lives. Reports from CSY quantify energy savings, measures costs and measure lives of installed measures by program. Most of the commercial measures are tracked in CSY. Some residential measure rebates are tracked in CSY.

CMS (Customer Management System) – EES Customer Management System is the primary interface for fulfilling and tracking customers' interactions with EES residential programs and services. Modules include: Literature & Rebate Fulfillment, Contractor Referrals, Rebate qualifying and processing and EES Inventory Management. CMS is used to track and report the bulk of residential measures rebated by program as well as some commercial measures.

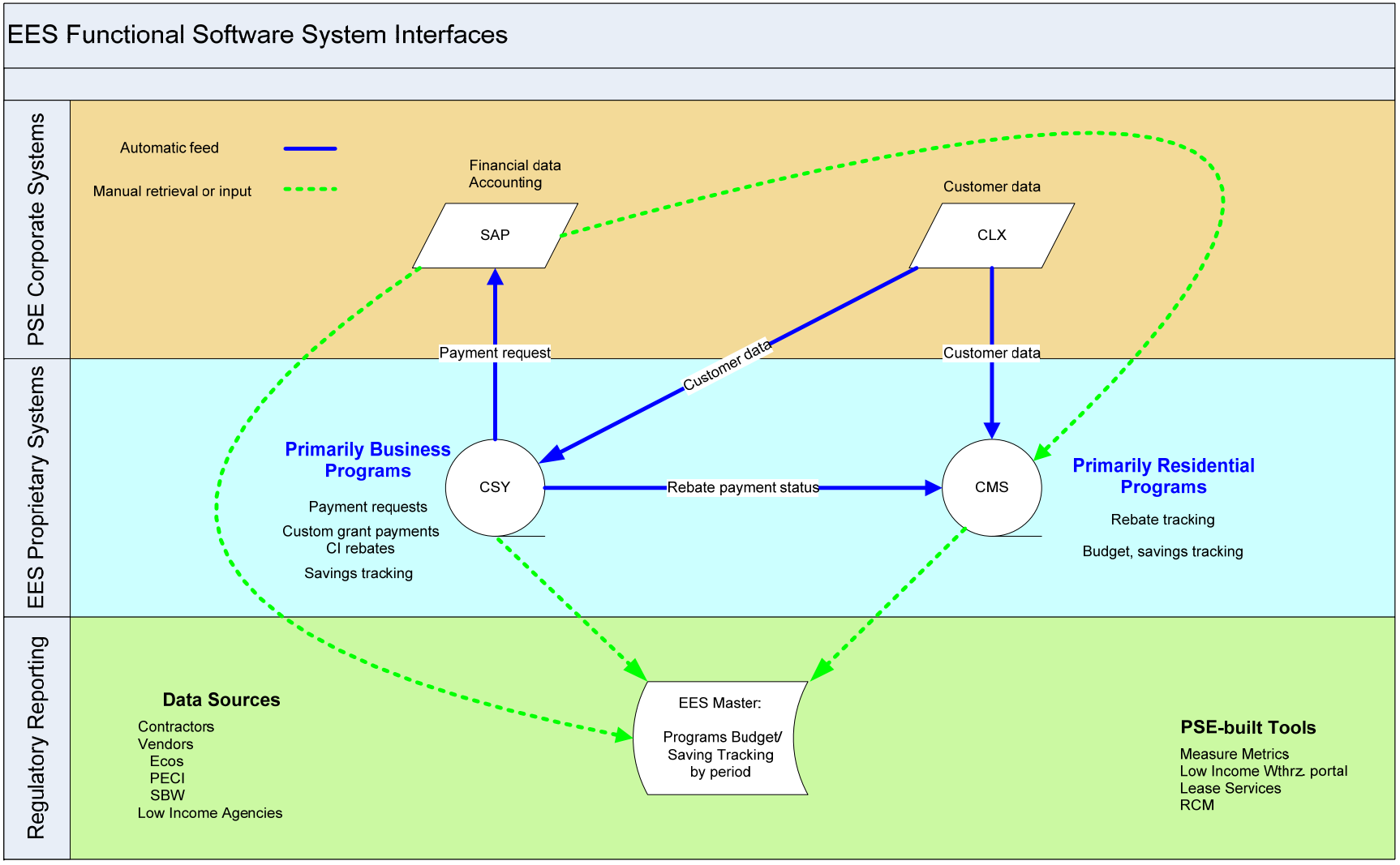
[37] For Guidelines for Ensuring the Accuracy of Electric and Gas Savings Claims see Attachment 8.

EES Master – Compiles all savings and all financial data relative to EES operations in both sectors (Residential and Business). It generates all periodic reports; internal and regulatory.

Measure Metrics Database – This database tracks the development, implementation, life cycle, sunset and retirement of Energy Conservation Measures (ECM). Measure Metrics is the foundation of EES Deemed (UES) ECM savings claims. It is EES's means of documentation for energy savings justifications for Deemed (UES) ECMs. It also tracks an ECM's cost, life and history of revisions. One important distinction is that the system does not track cumulative savings and program costs; only the basis for prescriptive and calculated measures.[38]

[38] See Attachments 4 – 7 for documents pertaining to Measure Metrics processes and standards.

Figure 3: EES Tracking and Reporting Interface



Roles and Responsibilities for Conducting and Managing EM&V

Overall EM&V work will be conducted both by the internal PSE evaluation team and external evaluators. External work is defined as work performed by entities outside of PSE. The implementation team is defined as anyone at PSE who has acquisition of energy efficiency targets incorporated into their performance appraisal or goals. The PSE evaluation team does not have the achievement of energy savings goals as part of their performance goals. The PSE evaluation team will normally engage external evaluators to perform program evaluations. Evaluation projects often involve scopes of work beyond what the Internal PSE evaluation team can reasonably perform in a timely manner. External evaluators may also provide specialized skills required to complete a project. Further, external evaluators may help alleviate perceived bias in assessing program performance.

Roles of External and PSE Evaluators, and PSE Implementation Staff

In general, work done for PSE EM&V falls into three categories:

PSE Implementation Team

- Ex-ante savings site estimates
- Reported savings estimates
- Process tracking
- Data management
- Redacting customer information from reporting
- Verification for purposes of incentive payments or program reporting
- Assessment of evaluation findings and documentation of resulting program changes in an Evaluation Report Response document that is attached to the evaluation report[39]

PSE Evaluation Team

- Impact evaluations to determine ex-post evaluated savings and prepare cost effectiveness analysis; determine realization rates
- Verification activities
- Review of EM&V plans
- Design of RFP's for external evaluators
- Preparation of evaluation reporting
- Internal process and market evaluations
- Project management of external evaluators
- Initiation of the Evaluation Report Response process at the completion of the evaluation report.[40]

[39] See Attachment 3 for Guidelines for Evaluation Study Follow-up.

External Evaluators

- Impact evaluations to determine ex-post evaluated savings and prepare cost effectiveness analysis; determine realization rates
- Verification activities
- External process and market evaluations
- Review of internal analysis and evaluations
- Program or Portfolio level energy savings verifications
- Establish and report realization rates
- Review of Measure Metrics (M:M) database and M:M updates as needed.

Optional Peer Review – Selected Regional Utilities, NEEA, RTF, ETO, NWRG, etc.

- Review of Evaluation methodologies
- Review of M&V Plans as necessary
- Review of RFP plans as necessary
- Review of M:M and M:M updates as needed.

Management of External Evaluators

The following processes will be used to select and manage external evaluators:

External evaluators may be chosen by the PSE Evaluation Team.

PSE's Evaluation Team may serve as the day-to-day project manager for external evaluators.

Members of the CRAG may express interest in decisions regarding particular EM&V projects, or may elect to receive updates at regular CRAG meetings. Members seeking involvement with certain EM&V activities must provide timely review and feedback in accordance with EM&V schedules and timelines.

Completed evaluation reports and their completed Evaluation Report Reponses (ERRs) will be available to the CRAG at any time. Evaluation Reports and ERR completed in each calendar year will be attached to the Annual Report for that year.

External Review and Oversight

External review serves to ensure that the EM&V process is thorough, transparent, and conducted according to the proper standards. PSE relies on the CRAG for external review, and will seek additional review from the RTF, Northwest Energy Efficiency Alliance (NEEA), the Northwest Research Group and other peer reviewers as appropriate. PSE's CRAG will advise the Company on the topics described below.

Development and modification of protocols to evaluate, measure, and verify energy savings in PSE's programs.

Guidance to PSE regarding savings estimates in the M:M, including methodology inputs and calculations for updating cost-effectiveness.

[40] See Attachment 3 for Guidelines for Evaluation Study Follow-up.

Consideration of the need for tariff modifications or mid-course program corrections.

Review appropriate level of and planning for:

- Marketing conservation programs.
- Incentives to customers for measures and services.

Consideration of issues related to conservation programs for customers with limited income.

Comparing program achievement results with annual and biennial targets.

Review of energy efficiency program budgets and review of actual expenditures compared to budgets.

The CRAG will meet “in-person” twice annually, and four times annually overall. Any member may request an additional meeting of the CRAG with reasonable notice. The CRAG will make recommendations to PSE concerning the Company’s specific EM&V plans, custom and prescriptive efficiency programs, including confidence and precision levels, sampling plans, timeline, and overall approach. The CRAG will review and advise PSE on deemed (UES) savings estimates and/or parameters and calculation methodologies included in Measure Metrics, and may review and comment upon savings claims and other EM&V results prepared by PSE and/or external evaluators..

Figure 4; Roles and Responsibilities

Roles and Responsibilities for PSE Staff, CRAG, External Evaluators, Washington Utilities and Transportation Commission, and Peer Reviewers

X - Responsible for party to do O – Optional for party to do per PSE request

Task and/or Deliverable	Puget Sound Energy	CRAG	External EM&V Evaluator	Peers (e.g. Avista, PacificCorp, Idaho Power, NEEA, ETO, NWRG, RTF)
EM&V Framework				
Prepare initial EM&V Framework	x			
Review initial EM&V Framework	x	x	x	o
Update EM&V Framework as needed	x			
Review updates to EM&V Framework as needed			o	
File EM&V Framework with WUTC	x			
EM&V Plans				
Prepare EM&V Annual Plan	x		o	
Review EM&V Annual Plan	x	x		
File EM&V Annual Plan with WUTC	x			
Measure Metrics Database				
Prepare initial extract of Measure Metrics data	x			
Review Measure Metrics as needed	x	x	x	o
Update Measure Metrics	x		o	
Review updated Measure Metrics data	x	x	o	o
EM&V Reports				
Process, Market & Impact reports	x		x	o
Review Summary Reports	x	x	x	
File Annual Conservation Report with WUTC	x			
EM&V Planning				
Internal Program Evaluation Scopes of Work	x	x		o
Process, Market, & Impact evaluations	x		x	o
Process, Market & Impact review	x	x		o

Reporting Cycles and Schedule

The program implementation cycle operates on a calendar year basis, from January 1-December 31 each year. Figure 5, below, indicates a preliminary reporting schedule. A final schedule with contents of each report will be reviewed with the CRAG as part of their review of the Annual Plan.

Figure 5: EM&V Reporting Schedule (as of August 9, 2011)

Report	Description	Distribution Date	Distribution List
Annual Conservation Action Plan	Forward looking. Program-level expected savings, adjustments, major changes, EM&V (PSE *ex-ante* forecast)	November 1: CRAG presentation December 1: UTC filing	CRAG, UTC,
Annual Conservation Report	Backward looking. Reported Program level savings, adjustments, changes, comprehensive report on EM&V activities of the prior year (PSE *ex-post* reported savings)	February 15: Filing	CRAG, UTC,
Tariff Changes	Request any Cost Recovery Tariff changes with an effective date of May 1st	March 1: Filing	CRAG, UTC
Semi-annual Conservation Acquisition Report	Midyear acquisition report comparing actual to budgeted savings values	August 15: Filing	CRAG, UTC
Biennial Conservation Plan	A Biennial Conservation Plan including revised program details and program tariffs, together with identification of the 10 year achievable conservation potential, by November 1, starting in 2011, requesting effective date of January 1, the following year.	August 1: 10-year potential, 2-year target, September 1: Program details & budgets, October 1: Draft tariffs, November 1: Filing Package draft	CRAG, UTC, Washington Dept of Commerce
Biennial Conservation Report	A report on conservation program achievement by June 1, filed every two years starting in 2012.	June 1	CRAG, UTC, Washington Dept of Commerce

Application of EM&V Results

Performance in EM&V activities will be reported on the basis of gross savings, and free-ridership and spillover will be used to understand program targeting and design. The granularity of the results will be determined in the portfolio, program, measure, and project specific EM&V or M&V research plans. Transmission and Distribution savings due to the effects of the DSM program may be counted toward goal. This Framework and the Annual EM&V Plan do not include T&D efficiency projects that are not retail metered.

As currently structured, following the close of each program year, PSE provides an annual report of program and portfolio accomplishments on February 15, per the schedule presented in Figure 5.

EM&V efforts that result in changes to predetermined *ex-ante* savings estimates, *ex-ante* savings calculations (for custom measures), and/or algorithms used to calculate savings for custom measures will in most cases be applied prospectively, taking effect in subsequent program implementation cycles (beginning January 1), as appropriate. Such changes will be documented as changes in the Measure Metrics database system.

Attachments

Attachment 1 – 2012-2013 Annual EM&V Plan

Attachment 2 – Energy Efficiency Portfolio M&V Structure

Attachment 3 – Guidelines for Evaluation Study Follow-up, Version 2.0

Attachment 4 – Guidelines for Ensuring the Accuracy of Electric and Gas Savings Claims, Version 4.5

Attachment 5 – Guidelines for Measure Revisions, Version 4.0

Attachment 6 – Guidelines for Measure Creation, Version 2.0

Attachment 7 – Guidelines for Retiring Measures, Version 2.5

Attachment 8 – NAPEE Model Energy Efficiency Program Impact Evaluation Guide Comparison to EM&V Framework