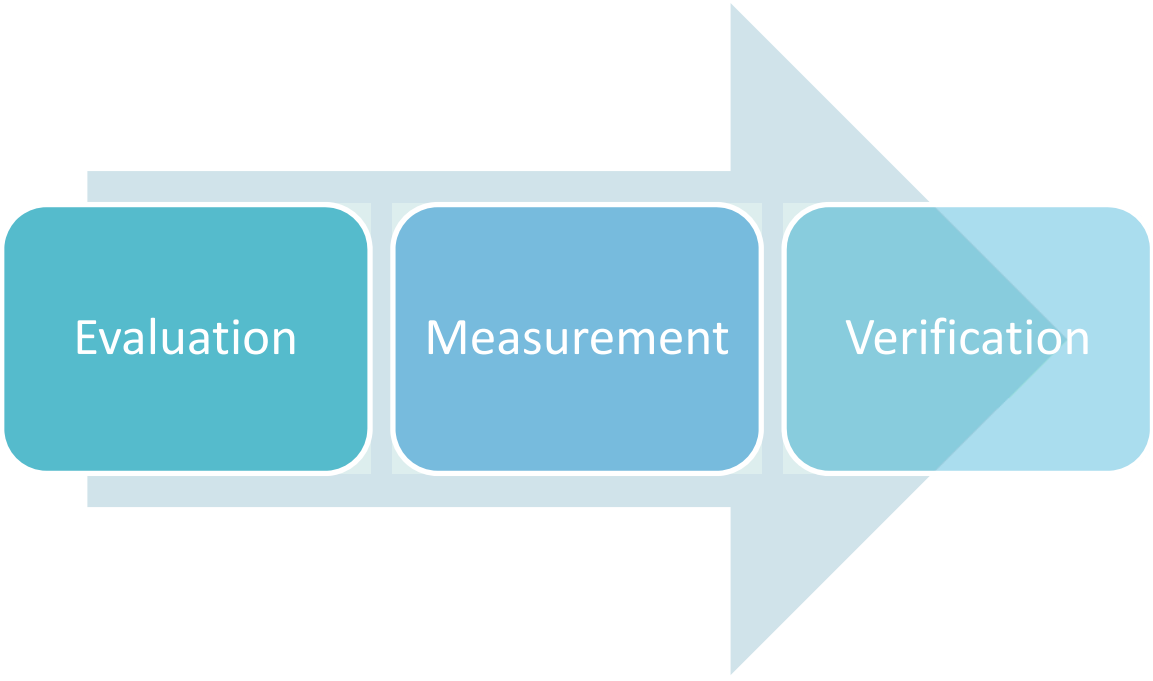
AVISTA UTILITIES

2016



FRAMEWORK

April 2016

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OVERVIEW

This Framework is the overarching document that defines the methods that Avista will use to perform Evaluation, Measurement, and Verification (EM&V) activities for its Demand Side Management (DSM) programs. This Framework adopts industry standard definitions of terms, principles of operation, standard best practices, and a Technical Reference Manual (TRM) that will be utilized by Avista and external evaluators to evaluate, verify, and document the savings acquired through its efficiency programs and the processes used to acquire those savings. The intended audience for the Framework is Avista management, Avista staff, the Idaho Public Utilities Commission and Washington Utilities and Transportation Commission, and external evaluators who will perform evaluations as well as other interested parties. The Framework guides development of annual EM&V plans and the research plans for specific evaluation activities.

Multiple documents exist that can be provided upon request. Each year Avista will develop an Annual EM&V Plan which will contain evaluation schedules and budgets for the upcoming year and contemplated evaluation activities up to two more years toward the future where appropriate. Another resource is the Avista Annual DSM Business Plan, which describes the relationship between DSM program implementation and portfolio, program and measure evaluation. This Business Plan and associated Annual EM&V Plan will be provided annually to Avista's Advisory Board.

DEFINITIONS

Adjusted Market Baseline: Based on the RTF Guidelines, represents a measurement between the energy efficient measure and the standard efficiency case that is characterized by current market practice or the minimum requirements of applicable codes or standards, whichever is more efficient. When applying an Adjust Market Baseline, no net-to-gross factor would be applied since the resultant unit energy savings amount would represent the applicable savings to the grid.

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

Baseline: Conditions, including energy consumption, which would have occurred without implementation of the subject energy efficiency activity. Baseline conditions are sometimes referred to as "business-as-usual" conditions.

Deemed savings: Primarily referenced as unit energy savings, an estimate of an energy savings 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.

Effective useful life (EUL): Sometimes referred to as measure life and often used to describe persistence. EUL is an estimate of the duration of savings from a measure.

Evaluation: The performance of a wide range of assessment studies and activities aimed at determining the effects of a program (and/or portfolio) and understanding or documenting program performance, program or program-related markets and market operations, program-induced changes in energy efficiency markets, levels of demand or energy savings, or program cost-effectiveness. Market assessment, monitoring and evaluation, and verification are aspects of evaluation.

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 activities. EM&V is distinguishable from Measurement and Verification (M&V) defined below.

> Impact evaluation: Determination of the program-specific, directly or indirectly induced changes (e.g., energy and/or demand usage) attributable to an energy efficiency program.
>
> Market effect evaluation: An evaluation of the change in the structure or functioning of a market, or the behavior of participants in a market, that results from one or more program efforts. Typically, the resultant market or behavior change leads to an increase in the adoption of energy-efficient products, services, or practices.

Process evaluation: A systematic assessment of an energy efficiency program or program component for the purposes of documenting 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.

Ex-ante savings estimate –Forecasted savings value used for program planning or savings estimates for a measure; from Latin for "beforehand

Ex-post evaluated estimated savings - Savings estimates reported by an independent, third-party 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."

Reported savings: Savings estimates reported by Avista for an annual (calendar) period. These savings will be based on best available information.

External Evaluators: Independent professional efficiency person or entity retained to conduct EM&V activities. 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 common 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-riders can be total, partial, or deferred. See definition below for "non-net participants."

Gross savings: The change in energy consumption and/or demand that results from energy efficiency programs, codes and standards, and naturally-occurring adoption which have a long-lasting savings effect, regardless of why they participated.

Implementation Team: Avista employees whose responsibilities are directly related to operations and administration of DSM programs and activities, and who may have energy savings targets as part of their employee goals or incentives.

International Performance Measurement and Verification Protocol: A guidance document with a framework and definitions describing the four M&V approaches; a product of the Energy Valuation Organization (www.evo-world.org).

Measure (also Energy Efficiency Measure or "EEM"): Installation of a single piece of equipment, subsystem or system, or single modification of equipment, subsystem, system, or operation at an end-use energy consumer facility, 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)*

Measurement and Verification (M&V): A subset of program impact evaluation that is associated with the documentation of energy savings at individual sites or project, using one or

more methods that can involve measurements, engineering calculations, statistical analyses, and/or computer simulation modeling. M&V approaches are defined in the International Performance Measurement and Verification Protocol (IPMVP - available at www.evo-world.org).

Net savings: The change in energy consumption and/or demand that is attributable to an energy efficiency program. This change in energy use and/or demand may include, implicitly or explicitly, consideration of factors such as free drivers, non-net participants (free riders), participant and non-participant spillover, and induced market effects. These factors may be considered in how a baseline is defined and/or in adjustments to gross savings values.

Non-Net Participant: Indication of energy savings associated with program participants who would have implemented the program measure or practice in the absence of the program. Non-net participants can be total, partial, or deferred.

Portfolio: Collection of all programs conducted by an organization. In the case of Avista, portfolio includes electric and natural gas programs in all customer segments. Portfolio can also be used to refer to a collection of similar programs addressing the market. In this sense of the definition, Avista has an electric portfolio and a natural gas portfolio with programs addressing the various customer segments.

Program: An activity, strategy or course of action undertaken by an implementer. Each program is defined by a unique combination of program strategy, market segment, marketing approach and energy efficiency measure(s) included. Examples are a program to install energy-efficient lighting in commercial buildings and residential weatherization program.

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

Realization rate: Ratio of *ex-ante* reported savings to *ex-post* evaluated estimated savings. When realization rates are reported, they are labeled to indicate whether they refer to comparisons of 1) *ex-ante* gross reported savings to *ex-post* gross evaluated savings, or 2) *ex-ante* net reported savings to *ex-post* net evaluated savings.

Reliability: When used in energy efficiency evaluation, the quality of a measurement process that would produce similar results on (a) repeated observations of the same condition or event, or (b) multiple observations of the same condition or event by different observers. Reliability refers to the likelihood that the observations can be replicated.

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, i.e., reliable.

Spillover: Reductions in energy consumption and/or demand caused by the presence of an energy efficiency program, beyond the program-related gross savings of the participants and without direct financial or technical assistance from the program. There can be participant and/or non-participant spillover (sometimes referred to as “Free Drivers”). *Participant spillover* is the additional energy savings that occur as a result of the program’s influence when

a program participant independently installs incremental energy efficiency measures or applies energy-saving practices after having participated in the energy efficiency program. *Non-participant spillover* refers to energy savings that occur when a program non-participant installs energy efficiency measures or applies energy savings practices as a result of a program's influence.

Technical Reference Manual: An Avista-prepared resource document that contains Avista's (*ex-ante*) savings estimates, assumptions, sources for those assumptions, guidelines, and relevant supporting documentation for its natural gas and electricity energy efficiency prescriptive measures which is populated and vetted by the RTF and 3rd party evaluators.

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: An assessment that the program or project has been implemented per the program design. For example, the objectives of measure installation verification are to confirm (a) the installation rate, (b) that the installation meets reasonable quality standards, and (c) that the measures are operating correctly and have the potential to generate the predicted savings. Verification activities are generally conducted during on-site surveys of a sample of projects. Project site inspections, participant phone and mail surveys, and/or implementer and consumer documentation review are typical activities association with verification. Verification may include one-time or multiple activities over the estimated life of the measures. It may include review of commissioning or retro-commissioning documentation. Verification can also include review and confirmation of evaluation methods used, samples drawn and calculations used to estimate program savings. Project verification may be performed by the implementation team, but program verification is a function of the 3rd party evaluator.

ACRONYMS

Advisory Group – formerly the Triple E or the External Energy Efficiency Board

IPMVP - International Performance Measurement and Verification Protocol

IPUC – Idaho Public Utilities Commission

IRP – Integrated Resource Plan

IRP TAC – Integrated Resource Plan Technical Advisory Committee

kWh – kilowatt hour

M&V – Measurement and Verification

MOU – Memorandum of Understanding

RCW – Revised Code of Washington

RFP – Request for Proposal

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

Schedules 90 and 190 – Rate Schedules that show Demand Side Management programs

Schedules 91 and 191 – Rate Schedules that are used to fund Demand Side Management

TRM – Technical Reference Manual

UES – Unit Estimated Savings

UTC – Washington Utilities and Transportation Commission

WAC – Washington Administrative Code

EXECUTIVE SUMMARY

The purpose of this document is to describe the process or framework by which Avista Energy Solutions Department ("Avista" or "the Company") will conduct or contract evaluation, measurement and verification (EM&V) activities to determine energy savings and other metrics associated with its local[1] demand side management (DSM) activities. The Framework addresses DSM activities funded by Washington and Idaho Schedules 91 and 191 cost-recovery mechanisms approved by the Washington Utilities and Transportation Commission (UTC) and the Idaho Public Utilities Commission (IPUC).

This Framework is intended to outline a comprehensive EM&V process that results in transparent and accessible documentation of Avista's energy efficiency program activities. Thus, the Framework provides an overarching approach to EM&V; principles, objectives, metrics, methods and reporting activities. The Framework and related documents are structured

[1] Savings acquisition through Northwest Energy Efficiency Alliance (NEEA) are not evaluated by Avista's independent evaluators and therefore and not subject to this EM&V framework.

in a modular fashion in order 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 version of the Framework is very much a "living document" that may require modifications over time.

Overview of Avista's EM&V Processes

This document describes Avista's approach to evaluations of DSM energy efficiency measures, programs, and portfolio funded by Washington and Idaho Schedules 91 and 191.

a. Evaluations will be planned, conducted and reported in a transparent manner, affording opportunities for Commission and stakeholder review through the Advisory Group mechanism.

   i. An Annual EM&V Plan establishing priorities for evaluation activities, including budgets and schedules, will be prepared each year as part of Avista's Annual DSM Business Plan and filed with the Commissions as noted in Table 1 and Table 3. These plans will include a summary of each scheduled evaluation activity, whether the activity will be performed by an external evaluator 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. Avista will present the scope of the annual EM&V Plan to its Advisory Group to provide opportunity for input.

b. All evaluations will be conducted using best-practices approach and techniques including those outlined in the State and Local Energy Efficiency Action Networks "*2012 Energy Efficiency Program Impact Evaluation Guide*."[2]

[2] State and Local Energy Efficiency Action Network. 2012. *Energy Efficiency Program Impact Evaluation Guide. Prepared by Steven R. Schilling , Inc., www.seeaction.energy.gov which supersedes the* National Action

c. All evaluations will consider and apply the Department of Energy's Uniform Methods Project's framework and protocols for determining energy savings when applicable.

d. Avista will develop and maintain a Technical Reference Manual (TRM) in which energy savings assumptions and the sources for those assumptions are documented. Avista will update the TRM annually or more often if needed based on findings from impact evaluations or RTF updates. The TRM incorporates deemed UES from the RTF where applicable to Avista's delivery methods.

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

i. Avista's implementation team will estimate energy savings, document installations and prepare savings estimates per measure, project and program, consistent with the TRM.

ii. Avista's independent external evaluators will conduct evaluations as outlined in the annual EM&V plan.

(a) External evaluators will be retained to conduct independent impact evaluations of Avista's savings claims. Impact evaluation results developed by an external evaluator will be used to develop realization rates and will apply them to Avista's reported annual savings. Typically realization rates will be developed separately for the gas and electric portfolios, for residential and non-residential portfolios, and as appropriate by program and/or key measures for each calendar year for purposes of program management. The evaluated savings estimates, including a description of the methods used to develop those estimates, will be reported as specified in Table 2, on page 37.

Plan for Energy Efficiency (2007). Model Energy Efficiency Program Impact Evaluation Guide was prepared by Steven R. Schiller, Schiller Consulting, Inc. www.epa.gov/eeactionplan

e. Additional evaluation including impact, process, market, and planning activities will be conducted by Avista's external evaluators, according to priorities established with stakeholder input and presented in Avista's Annual EM&V Plan.

f. Reports from EM&V activities including evaluation of energy and demand savings and cost-effectiveness will be provided as part of the Energy Efficiency Annual Report to the Advisory Group, and the Washington and Idaho Commissions.

BACKGROUND

Avista Utilities aspires to energy efficiency best practices in all aspects of program offerings and design, program management and delivery, customer outreach, and evaluation. Avista provides a financial incentive to most kWh and/or therm saving measures that have a simple payback under fifteen years, for commercial and industrial customers. Similar offerings, through standard offer programs, are available to residential customers. Approximately two-thirds of the DSM budget is provided directly to customers through cash rebates and incentives. An additional portion of the budget provides technical assistance to customers in the form of engineering analyses. Customers use rebates and incentives to install energy efficiency equipment and measures, often provided through an extensive network of trade allies. Approximately 300 measures and 30 energy efficiency programs are offered to Avista customers. Every Avista 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.

Avista maintains and uses an external advisory group of stakeholders, the Advisory Group, formerly the External Energy Efficiency Board or (Triple E Board) to advise the Company on, among other items; 1) development and modification of protocols to evaluate,

measure, and verify energy savings from Avista's programs, and 2) methodologies and policies related to cost-effectiveness. The Advisory Group meets several times each year and represents the non-binding external oversight of Avista's DSM activities.

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 a wide range of assessment studies and activities aimed at determining the effects of a program and understanding or documenting program performance, program or program-related markets and market operations, program-induced changes in energy efficiency markets, levels of demand or energy savings, or program cost-effectiveness.[3] Measurement and verification is a subset of program impact evaluation that is associated with the documentation of energy savings at individual sites or projects using one or more methods that can involve measurements, engineering calculations, statistical analyses, and/or computer simulation modeling."[4]

There are three key objectives of evaluations:

1. To document the benefits of a program and determine whether it met its goals.[5]
2. To identify ways to improve current and future programs through determining why program-induced impacts occur.

[3] State and Local Energy Efficiency Action Network. 2012. *Energy Efficiency Program Impact Evaluation Guide. Prepared by Steven R. Schilling , Inc.*, www.seeaction.energy.gov

[4] Id.
[5] Id.

3. To support energy demand forecasting and resource planning by understanding the historical and future resource contributions of energy efficiency as compared with other resources.[6]

Energy efficiency evaluations should develop retrospective estimates of energy savings attributable to a program in a manner that is defensible in regulatory proceedings and 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.[7]

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

There are three different types of evaluations:

1. **Impact evaluations** determine the program-specific, directly or indirectly induced changes (e.g., energy and demand savings) attributable to an energy efficiency program. Impact evaluations also support cost-effectiveness analyses aimed at identifying relative program costs and benefits.
2. **Process evaluations** assess a program or program component for the purposes of documenting operations at the time of the examination, and identifying and recommending improvements to increase the program's efficiency and/or effectiveness for acquiring energy resources while maintaining high levels of participant satisfaction.
3. **Market effects evaluations** estimate the change in structure or functioning of a market, or the behavior of participants in a market, that results from one or more program efforts. Typically, the resultant market or behavior change leads to an increase in the adoption of energy efficient products, services or practices.[8]

This Framework, and the industry as a whole, focuses on impact 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

[6] Id.
[7] Id.
[8] Id.

typically an extension of impact evaluation. Process and market effects evaluations are very important, both for prudent management and to assess prudency, and will be performed as necessary to create best practice portfolio planning, implementation, and evaluations.

Transparency

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

As a means of facilitating transparency in its internal processes, Avista developed and maintains thorough documentation of its processes and related activities. Avista also follows the International Performance Measurement and Verification Protocol (IPMVP) Protocol[9] for site-specific analyses.

Budget

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

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

A full report on EM&V expenditures and activities for the prior year will be part of the Energy Efficiency Annual Report. This information will include a description of the EM&V studies completed 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.

In Washington State Initiative 937 (I-937), the Energy Independence Act, the Commission, in Docket No. UE-132045 Order No. 1, provides, provides the following guidance related to EM&V budget:

> Avista Corporation must spend a reasonable amount of its conservation budget on evaluation, measurement, and verification (EM&V), including a reasonable proportion on independent, third-party EM&V.

The budget in Idaho will be determined based on reasonable and prudent evaluation needs.

Goals

The goal of evaluation planning is to spend the least money necessary in order to adequately ascertain the highest 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. Avista intends to prioritize EM&V resources based on consideration of the following issues:

a. Size of the project or program: (based on external, independent evaluators professional judgment based on distribution of savings or uncertainty);
b. Uncertainty regarding the results: Proven UES or deemed savings from the RTF or 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 kWh reduction effect but may be low for the hours of operation variable;

c. 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;

d. 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;

e. Timing: Information that would have value in improving an ongoing program would have higher precedence;

f. 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,

g. 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 be retained to perform impact evaluations. These evaluations will be performed at a minimum of every two years for each fuel for the entire portfolio, or as directed by the Commissions. External consultants may be retained to evaluate Avista's processes and market conditions or conduct additional impact analyses where warranted.

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

a. Leverage secondary research as appropriate with modifications as deemed necessary and useful;
b. Expert review of evaluation design throughout the planning and implementation of these activities;
c. All key assumptions used by program planners will be documented and eventually verified in evaluations;
d. The procurement process used to select evaluation contractors is timely, flexible and transparent;
e. Prioritize evaluation dollars and efforts on areas of largest savings and/or greatest uncertainty; and,
f. 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 that are recoded and are to be evaluated are as follows:

a. Measure characteristics energy acquisition kWh and therms as well as interactive effects, to include, where possible and necessary, customer coincident kW, measure life, non-energy benefits, existing conditions, etc.;
b. Costs and benefit data for cost-effectiveness analyses including total project cost, incremental project cost, etc.; and,
c. Other metrics or combinations as requested by Commissions, such as:
    i. 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,

ii. Other information necessary for portfolio management such as technology assessments, measure persistence, lost opportunities, geographic equity, customer class equity, number of customers served, and information useful for system planning.

Evaluation Cycle

As described in this EM&V Framework, Avista will perform portfolio evaluation annually (could be reported biennially e.g. electric verified savings) and other related EM&V on a multi-year schedule of selected programs such that all major programs are covered appropriately over time.

The following is the hierarchy of documents outlining planning steps for each evaluation cycle.

a. EM&V Framework – This document is designed to remain in place until superseded by regulatory modifications or changed by the Advisory Group processes.

b. DSM Annual Business Plan – This document will be prepared annually, providing operational plans, budgeting, staffing, etc., for individual programs within various customer segments. The Annual DSM Business Plan will include an Annual EM&V Plan indicating which major evaluation activities (e.g., updating baselines, updating deemed savings values and describing planned program evaluations) will be conducted during the year, including the specific budget and allocation between programs/measures/segments/jurisdictions as applicable.

c. The annual EM&V Plan (embedded in the Annual Business Plan) will include summaries of each scheduled evaluation activity, whether the activity will be performed by an external evaluator or Avista's 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. Avista will present the evaluation scope to the Advisory Group.

Table 1: HIERARCHY OF EM&V PLANNING CYCLES/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 Avista's Annual DSM Business Plan	• TRM • Energy Savings Estimate Models • Work scopes • Key issues requiring oversight • Draft and/or Final Reports
Contents	The overarching 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 summary description of each major scheduled activity detailing the scale, scope and anticipated approach to determine savings • EM&V-based program changes -- summary • Budgets • Schedule	Details regarding specific EM&V projects or activities including impact, process, market and planning studies. The TRM will be a resource document, containing all savings estimates and assumptions for all prescriptive DSM measures.
Schedule	The Framework remains in place indefinitely, but is a "living document" that can be updated as needed.	Prepared annually, submitted with the Business Plan by November 1 of each year.	Prepared for each significant program and/or prepared as a resource document.
Reviewers**	Advisory Group	Advisory Group	Advisory Group
Filed with Commission	Yes	Yes	No

*This document.

**See Table 3, page 37 for more details on roles and responsibilities.

Impact Evaluation Methods and Key Assumptions

Ex-Ante versus Ex-Post

Impact evaluations focus on determining the amount of energy and demand savings the program actually creates. Estimates of actual savings are ex-post 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, 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. 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. Avista's specific evaluation methods will be founded on industry best practice, based on applicable industry reference documents (e.g., Energy Efficiency Program Impact Evaluation Guide, IPMVP). Avista will observe the following principles in its oversight of impact evaluations:

i. Evaluators should be impartial in their work and not have their compensation tied to evaluation results.

ii. 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.)[10]

iii. Transparent methods to estimate savings and impacts will be reviewed in various forums to increase quality and reliability. These include: Advisory Group, Integrated Resource Planning Technical Advisory Committee (IRP TAC), RTF, and similar forums which will be used to review methods.

iv. All key assumptions used by program planners are eventually verified in evaluations.

v. Majority of evaluation dollars and efforts are in areas of greatest importance or uncertainty.

Approaches for Determining Savings

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

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

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

c. UES or deemed 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 the Avista TRM). This approach is only valid for projects with fixed operating conditions and proven history of substantiated evaluations. Avista looks first to the Regional Technical Forum for UES. These saving calculation methodologies may be updated with measured factors relative to Avista's service territory. If no UES exists with the RTF, Avista then references its TRM or other industry sources.

[10] American Evaluation Association (AEA), Guiding Principles for Evaluators, http://www.eval.org.

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

Energy savings are determined 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 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 determining the savings achieved. Evaluators will use or determine baselines based on common practice, or codes and standards. Baselines can be defined as follows:

i. 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.

ii. Performance Standard Baseline: defined to avoid project specific determinations, and thus avoid most non-net participant issues, 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.[11]

iii. In its TRM, Avista will include baseline information in the detailed impact evaluation research plans as well as for deemed savings values, e.g., for certain prescriptive 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.[12] 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, program targeting and improvement, and overarching planning. The level of investment put towards the evaluation process usually has a direct correlation to the amount of certainty achieved. One of the trade offs in impact evaluations is thus between the costs expended and the uncertainty level. Results from an impact evaluation will be reported with the level of uncertainly or error rate defined and explained. There are two types of errors reported, systematic and random, which can include the following:

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

   a. Measurement errors, arising from meter inaccuracy or errors in recording an evaluator's observations;

[11] Schiller Consulting
[12] Id

b. Non-coverage errors, which occur when the evaluator's choice of a sampling frame excludes part of the population;

c. Non-response errors, which occur when some refuse to participate in the data collection effort; and,

d. 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.

ii. Random or Sampling errors[13], 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[14]) for the portfolio. The Evaluation report will discuss all aspects of uncertainty and the decision process that determined sample size and confidence/precision level achieved.

Persistence

Persistence is how long the energy savings are expected to last once an energy efficiency activity has taken place.[15] 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

[13] Id

[14] 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.

[15] Id

performance degradation, codes or standards, and "market progression."[16] Effective Useful Life (EUL) 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.[17]

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 necessary, Avista 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

Program influence will be measured periodically as necessary. Both non-net participants(free riders) and participant and non-participant spillover will usually be considered. Non-net participants, often referred to as "free riders," are those who would have implemented the same or similar efficiency projects, or a portion of the projects without the program now or in the near future. Thus non-net participants can be full, partial or deferred.

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

[16]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

[17] State and Local Energy Efficiency Action Network. 2012. Energy Efficiency Program Impact Evaluation Guide. Prepared by Steven R. Schilling, Inc. *www.seeaction.energy.gov*

influence of the program. 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.

When using an UES from the Regional Technical Forum, no net-to-gross adjustment is necessary. However, when required, net savings may be determined using one or more of the following approaches:

- Self-reporting surveys in which information is reported by participants and non-participants without external verification or review
- 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
- Stipulated net-to-gross ratios (ratios that are multiplied by the gross savings to obtain an estimate of net savings) that are based on historic studies of similar programs

Cost Effectiveness

Avista'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 management determine retaining, revising, or eliminating program elements. The methodologies and definitions contained in the California Standard Practice Manual (SPM) are utilized for

determining cost-effectiveness by Avista. A primary test for the UTC is the Total Resource Cost (TRC) test as modified for electric programs by the Northwest Power & Conservation Council[18]and the gross Utility Cost Test for natural gas. The TRC test measures the ratio of benefits and costs of a demand-side management program as a resource option based on the total costs of the program, including both the participants' and the utility's non-incentive costs. 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 net total resource costs. Avista 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. Avista also calculates the Program Administrator Cost test (also known as the Utility Cost test), Participant cost test, Non-Participant test or Rate Impact Measure test.

Process Evaluations

Process evaluations of Avista 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), third-party implementers (including contractors, subcontractors, and field staff), and key policy makers. Other elements of a process evaluation can include workflow and productivity

[18] The Northwest Power and Conservation Council modifies the TRC by including a 10% conservation adder as well as any quantifiable non-energy benefits.

measurements, reviews, assessments, and testing of records, databases, program-related materials, and tools.

Market Effects Evaluations

Market effect evaluations are systematic assessments of changes in the structure or functionality 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 effects evaluations will usually consist of surveys, reviews of market data, and analysis of the survey results and related data.

Technical Reference Manual (TRM)

Avista will develop and maintain a publicly-available TRM documenting the energy savings assumptions, and the sources for those assumptions, for prescriptive measures. The TRM should include energy savings models or calculations as applicable for non-residential measures. The TRM will be maintained and updated annually, or more frequently as needed, with opportunities for Advisory Group review.

The TRM will contain two general categories of information:

- Specific predetermined *ex-ante* savings estimates - predetermined energy savings values and calculation assumptions for specific natural gas and electricity efficiency prescriptive measures and, when such values can be defined with sufficient certainty, including applicability conditions. For example, this approach would be used for Avista's prescriptive residential furnace program.
- Guidelines for calculation of custom *ex-ante* savings estimates - custom measure protocols consisting of standard engineering calculations and/or other methods that are used for determining energy savings estimates and/or peak demand reductions for natural gas and electricity efficiency measures which do not have

applicable predetermined savings values. For example, this approach would be used for a custom project.

For the two general categories outlined above, the TRM will include:

i. Descriptions of the base and more efficient technologies (or systems), including engineering and/or calibrated engineering assumptions and applicability conditions;

ii. kWh, and/or therm savings;

iii. Hours of operation;

iv. Measure life;

v. Information required for cost-effectiveness tests including incremental measure costs, Descriptions of estimation approaches and applicability conditions for the UES or deemed savings values and calculations.

External evaluators will review the TRM during the initial evaluation cycle covered by this EM&V Framework, and periodically thereafter as determined by EM&V priorities outlined in Avista's Annual EM&V Plans.

Predetermined *ex-ante* savings estimates and custom calculated *ex-ante* savings estimates will be documented and employed as follows.

i. Where appropriate, i.e., verifiably applicable, Avista will use the Avista TRM's or the Regional Technical Forum's (RTF) Proven UES or deemed savings and deemed calculated savings values for natural gas and electricity measures. Deemed savings or UES which are categorized Planning or Provisional from the RTF may require additional EM&V. The RTF maintains a Web site at http://www.nwcouncil.org/energy/rtf/.

ii. If Avista utilizes UES or deemed savings values for prescriptive or custom program measures that have not been established in the Avista TRM or by the RTF, such

estimates must be based on a documented modification of existing estimates using reliable primary or secondary sources and/or rigorous Avista impact evaluation results. An example of another possible reliable resource is the Database for Energy Efficient Resources (DEER), jointly sponsored by the California Energy Commission and California Public Utilities Commission (CPUC) and designed to provide well-documented estimates of energy and peak demand savings values, measure costs, and effective useful life (EUL) all with one data source. (http://www.energy.ca.gov/deer/)

Roles and Responsibilities for Conducting and Managing EM&V

EM&V will be conducted both by internal Avista staff and external evaluators. External work is defined as work performed by entities outside of Avista. The implementation group is defined as anyone at Avista who has acquisition of energy efficiency targets incorporated into their performance appraisal or goals.

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

a. Avista Implementation Team
    i. Ex-ante or claimed savings estimates
    ii. Process improvement tracking
    iii. Data management
    iv. Redacting customer information from reporting
    v. Verification of supporting documentation for purposes of incentive payments or program reporting
    vi. Installation verification per Standard Operating Procedures manuals
    vii. Distribute RFP's for external evaluation
b. Avista Engineering Team

i. Project and field verification *activit*ies per Standard Operating Procedures manuals

ii. Create EM&V plans for pilot and new programs

iii. Review of third-party EM&V plans

iv. Internal measurement and verification activities

c. External Evaluators

i. Impact evaluations (to include verification activities) to determine ex-post verified savings; determine and report realization rates

ii. External process and market evaluations

iii. Review of internal analysis and evaluations

iv. Portfolio level energy savings verifications

v. Review of TRM and TRM updates annually.

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

i. Review of Evaluation methodologies as necessary

ii. Review of M&V Plans as necessary

iii. Review of TRM and TRM updates as needed.

Management of External Evaluators

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

a. External evaluators may be chosen by the Avista Evaluation Team with input from the Advisory Group.

b. Avista's Evaluation staff will serve as the day-to-day project management for external evaluators.

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

d. External evaluator reports will be delivered to the Advisory Group filed as part of the Annual Report on Energy Efficiency Acquisition.

Data Management

There are three data repositories used to keep customer-related participation data for Avista. All of the Avista DSM databases are managed with standard information systems security and redundancy in multiple locations and versions.

a. Avista's CC&B database – customer care and billing system; residential and low income program participation is tracked within this database.

b. Avista's Customer Solutions SalesLogix database – For contacts and historical nonresidential project information.

c. Avista's Tracker system for real-time project and workflow tracking.

Avista also maintains two other tools with supporting data.

a. Avista Technical Reference Manual – a spreadsheet/database with predetermined *ex-ante* savings estimates and guidelines regarding calculation of *ex-ante* savings estimates for custom measures with associated background information, assumptions, and source documentation.

b. Avista's DSM files – files of current and past business plans, reports, EM&V plans, annual change summaries, budget documents and performance reports.

Reporting Cycles and Schedule

The program implementation cycle operates on a calendar year basis, from January 1-December 31 each year. EM&V reporting cycles vary by fuel, by year and are different for the Washington and Idaho Commissions. Table 2 on the following page provides a reporting schedule.

Table 2: EM&V Reporting Schedule

Report	Description	Distribution Date	Distribution List
DSM Business Plan (includes Annual EM&V Plan)	Forward looking. Program-level expected savings, adjustments, major changes (Avista *ex-ante* forecast), and EM&V plans to evaluate past program year (backward looking)	November 1st	Advisory Group, UTC, IPUC
Energy Efficiency Annual Report	Backward looking. Preliminary Reported Program level savings, adjustment, changes, comprehensive report on EM&V activities of the prior year (Avista *ex-post* reported savings)	June 1st	Advisory Group, UTC, IPUC
Tariff Changes	Request any Schedule 91 and 191Tariff changes with an effective date of July 1st	May 1st	Advisory Group, UTC, IPUC
Decoupling Evaluation Report	Independent verification of natural gas savings for the previous calendar year	September 1st	Advisory Group, UTC, IPUC
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.	November 1st	Advisory Group, UTC, IPUC, Washington Dept of Commerce
Biennial Acquisition Report	A report on conservation program achievement by June 1, filed every two years starting in 2012.	June 1st	Advisory Group, UTC, IPUC, Washington Dept of Commerce

Application of EM&V Results

Washington EM&V activities will be reported on the basis of savings consistent with Council methodology and will be used to understand program targeting and design. Gross savings and net savings will be reported for Idaho. The granularity of the results will be determined in the portfolio, program, measure, and project specific EM&V research plans.

Transmission and Distribution line loss savings (i.e. busbar savings) due to the effects of the DSM program may be counted toward goal. This Framework and Annual EM&V Plans do not include Avista owned non-metered T&D efficiency projects.

As currently structured, following the close of each program year, Avista provides an annual report of program and portfolio accomplishments based on verified savings on June 1 of each year, per the schedule presented in Table 2. Realization rates based on external EM&V will be developed for the Decoupling Audit Report (Washington natural gas) or the Biennial Conservation Report (electricity).

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

External Review and Oversight

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

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

b. Guidance to Avista regarding methodology inputs and calculations for updating cost-effectiveness.

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

d. Review appropriate level of and planning for:

    i. Marketing conservation programs.

    ii. Incentives to customers for measures and services.

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

f. Comparing program achievement results with annual and biennial targets.

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

The Advisory Group will meet quarterly at a minimum. Any member may request an additional meeting of the Group with reasonable notice. The Advisory Group may make recommendations to Avista concerning Avista's specific EM&V plans, custom and prescriptive efficiency programs, including confidence and precision levels, sampling plans, timeline, and overall approach. The Advisory Group will review and advise Avista on Avista's UES or deemed savings estimates and/or parameters and calculation methodologies included in the TRM, and may review and comment upon savings claims and other EM&V results prepared by Avista and/or external evaluators.

Approval/Authorization

Table 3: Evaluation, Measurement and Verification (EM&V), Data Tracking and Reporting Activities: Roles and Responsibilities for Avista Staff, Advisory Group, External Evaluators, Idaho Public Utilities Commission, Washington Utilities and Transportation Commission, and Peer Reviewers

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

Task and/or Deliverable	Avista	Advisory Group	External EM&V Evaluators	Peers (e.g., PSE, PacifiCorp, Idaho Power, NEEA, ETO, etc.)
EM&V Framework				
Prepare Initial EM&V Framework (with Collaborative)	X			
Review Initial EM&V Framework (w/Collaborative)		X	X	O
Update EM&V Framework, as needed	X			
Review Updates to EM&V Framework, as needed		X	O	
File EM&V Framework with Commission (IPUC & WUTC)	X			
EM&V Plans (Overall Budget, Overall Schedule, Individual Evaluation Approach Summary (what, why, who, when, how much))				
Prepare EM&V Annual Plans	X		O	
Review EM&V Annual Plans		X		
File EM&V Annual Plans with Commission (IPUC & UTC)	X			
Technical Reference Manual				
Update TRM, as needed	X		O	
Review Initial TRM		X	X	O
Review Updated TRM		X	O	O
Protocols				
Update Protocols, as needed	X			
Review Updated Protocols		X		O
EM&V Reports				
Process/Market/Impact Evaluation Reports	X		X	
Review Summary Reports		X		
File Annual DSM Summary Report with Commission (IPUC & UTC)	X			
EM&V Planning				
Individual Evaluation Plans (Internal to Programs)	X			
Impact, Process, Market and Planning Evaluation review (Internal)	?	X		O
Impact Evaluation Conducted by External Evaluators			X	
Annual Due-Diligence Impact Evaluation			X	
Additional Process and Market Evaluations (external)			X	