

Evaluation Work Plan for 2014-2015

Demand Side Management Programs

Submitted to Avista Corporation

Submitted by Nexant

In partnership with: Research Into Action

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# Introduction and Key Issues

1. Nexant, Inc. (Nexant) and its partner, Research Into Action (collectively, the evaluation team) have been retained by Avista Corporation (Avista) to evaluate the 2014-2015 demand side management (DSM) programs offered in Washington and Idaho. This project includes process and impact evaluations, to be completed and delivered with final evaluation results by April, 2016. The main deliverables for this evaluation include:

* **Deliverable 1: Evaluation Work Plan**: Develop an Evaluation Work Plan (the document entailed herein) outlining all evaluation activities to be conducted for the evaluation of Avista’s 2014-2015 DSM programs in WA and ID, along with the presentation to Avista’s DSM Advisory Group.
* **Deliverable 2: Natural Gas Impact Evaluation**: Perform the Washington Natural Gas Portfolio Measurement and Verification Impact Evaluation for program years 2014 and 2015.
* **Deliverable 3: Electric Impact Evaluation**: Perform the Washington and Idaho Electric Portfolio Measurement and Verification Impact Evaluation for program years 2014 and 2015.
* **Deliverable 4: Process Evaluation Report**: Perform a process evaluation of the Washington and Idaho programs for years 2014 and 2015.
* **Deliverable 5: Annual Reports with Cost Effectiveness Analysis**: In both 2014 and 2015, and for the combined years, perform a cost-effectiveness analysis for each of Avista’s programs and portfolio of programs in Washington and Idaho.

1. The evaluation team will perform a process evaluation that focuses on program design and theory, implementation and delivery, and market feedback. The programs will be evaluated through interviews with pertinent program actors including Avista and third-party implementation staff, contractors, trade allies, retailers, participants, and non-participants. The evaluation team will develop a unique survey instrument for each population to ensure that responses produce comparable data and allow the evaluation team to draw meaningful conclusions. Section 3 of this plan provides an overview of the process evaluation.
2. For the impact evaluation, the net and gross program energy impacts will be evaluated through a combination of documentation audits, telephone surveys, and engineering analysis and site inspections of completed program projects. Because it is not cost-effective to complete analysis and site inspection on a census of the implemented program projects, energy savings will only be verified for a representative sample of projects to draw statistically measurable results. Additionally, a subset of the residential portfolio programs will be evaluated through billing analysis. The program-reported savings will be adjusted based on the findings from the gross-verified evaluation activities conducted on the sample population. The net savings, which are an estimation of the savings directly attributable to the program and which account market effects and customer influence, will be calculated by applying net-to-gross scaling factors to the gross program-reported savings. In order to estimate net-to-gross factors, the evaluation team will employ participant surveys to quantify the actual impact of the programs.
3. The primary goal of evaluation efforts is assurance that programs are cost-effectively addressing the hurdles customers face when it comes to implementing energy efficiency measures in their home or business. The primary findings from evaluation efforts, in turn, help utilities plan for future program offerings. Several factors must be included and thoroughly outlined prior to any evaluation activity to ensure that evaluation budgets are spent wisely and that the results of the evaluation efforts are statistically valid.
4. The evaluation team reviewed available material for each of Avista’s 2014-2015 DSM programs to develop prioritization criteria for allocating the project’s finite evaluation resources. The issues that we took into account when developing this work plan include:

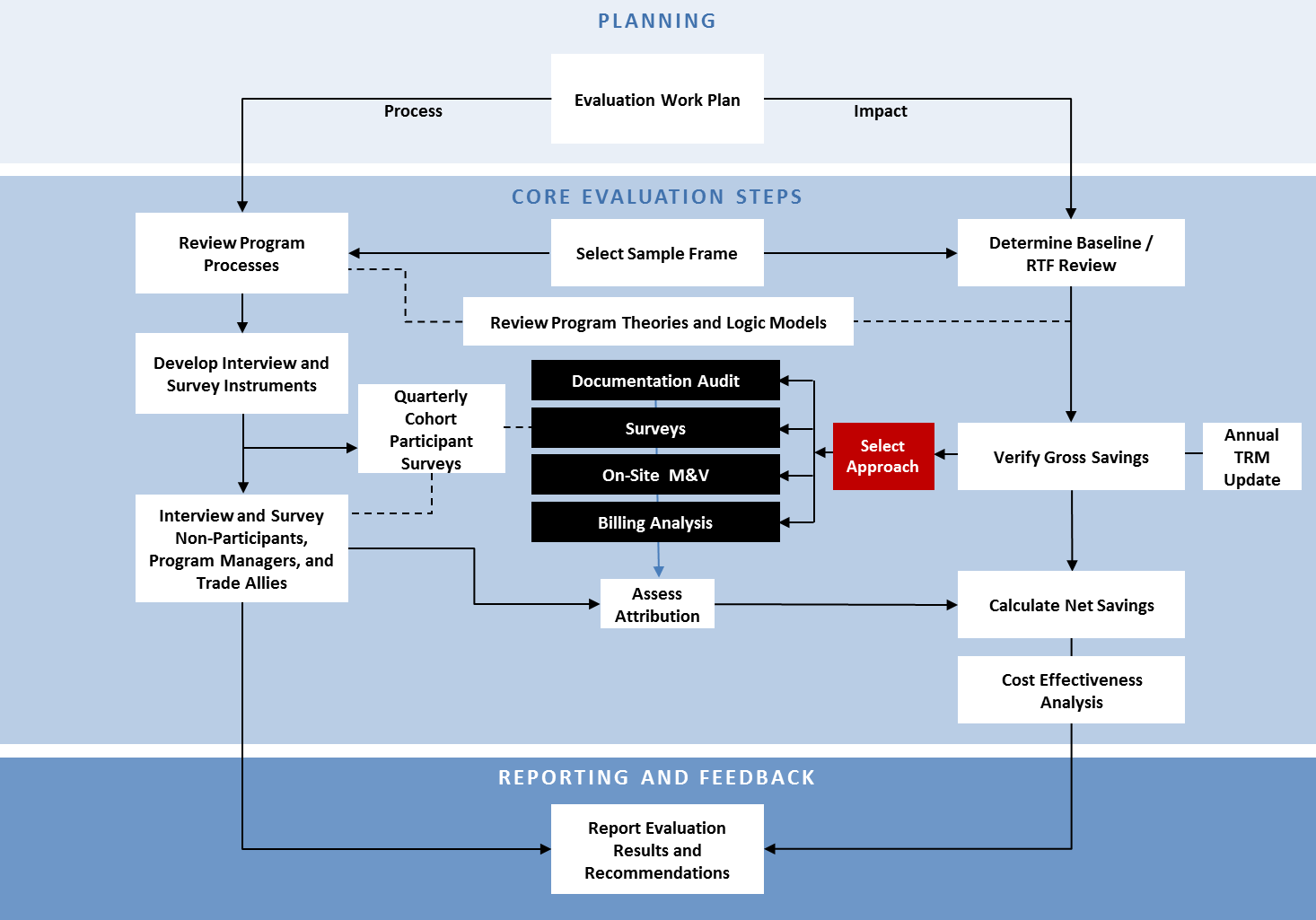
* A program’s estimated savings (kWh and therms) contribution to the sector and DSM portfolio (actual to-date information through October 2014 and planned values for 2015).
* A program’s budget allocation relative to the sector and DSM portfolio (as outlined in Avista’s 2014 and 2015 DSM Business Plan).
* The expected degree of uncertainty in a program’s savings.
* The status of measure UES values currently listed in the RTF.
* Findings and recommendations made during the prior evaluation cycle.
* Whether any special features of a program require extraordinary evaluation effort.

1. In the following sections of this work plan, the evaluation team presents a proven approach and the methodologies for developing accurate and defensible results on the portfolio evaluation of Avista’s 2014-2015 DSM programs, which meet the understood regulatory requirements in Washington and Idaho.

## Approach and Methodology

1. Techniques that we will use to conduct our EM&V activities and to meet the goals stated for this evaluation include site inspections, telephone surveys, document audits, billing analysis, best practice review, and interviews with implementation staff, trade allies, program participants and nonparticipants.
2. The primary determinants of evaluation costs are the sample size and the level of rigor employed in collecting measurable data for the impact and process analysis. The accuracy of the study findings is in turn dependent on these parameters. Avista’s stated preference is to achieve 10%/90% statistical precision and confidence at the portfolio level at a minimum. This work plan balances cost and rigor using a value of information approach that starts with a determination of those programs that require a higher level of evaluation due to uncertainty in the program. We then assess the level of uncertainty in a program with the estimated value of the program in order to determine the most cost-effective and accurate evaluation approach.
3. Figure 1‑1demonstrates the principal evaluation team steps organized through planning, core evaluation activities, and final reporting.

Figure ‑: Outline of Evaluation Approach and Activities

1. 

## Evaluation Goals and Objectives

1. Over-arching project goals will follow the definition of impact evaluation established in the “Model Energy-Efficiency Program Impact Evaluation Guide – A Resource of the National Action Plan for Energy Efficiency,” November 2007:
2. *Evaluation is the process of determining and documenting the results, benefits, and lessons learned from an energy-efficiency program. Evaluation results can be used in planning future programs and determining the value and potential of a portfolio of energy-efficiency programs in an integrated resource planning process. It can also be used in retrospectively determining the performance (and resulting payments, incentives, or penalties) of contractors and administrators responsible for implementing efficiency programs.*
3. *Evaluation has two key objectives:*
4. *To document and measure the effects of a program and determine whether it met its goals with respect to being a reliable energy resource.*
5. *To help understand why those effects occurred and identify ways to improve.*
6. Avista has identified the following objectives for the evaluation:

* Independently verify, measure and document energy savings impacts from Avista’s electric and natural gas energy efficiency programs, or for program categories representing consolidated small scale program offerings, by Avista in 2014 and 2015
* Analytically substantiate the measurement of those savings
* Calculate the cost effectiveness of the portfolio and component programs
* Identify program improvements, if any, and
* Identify possible future programs.

## Evaluation Management

1. The evaluation team has developed this general work plan to identify and outline the activities to evaluate the successes, weaknesses and market barriers for the implemented programs and assess veracity of the reported energy benefits and program cost-effectiveness. However, because this plan has been developed in the middle of the program cycle, there are areas of uncertainty and unknown key parameters. Consequently, this plan may only outline a general methodology or process until more certainty and specific data is available.
2. Documentation of final sampling summaries, change of management memorandums, and survey instruments will be provided to Avista. In addition, quality control/assurance on-site verification activities are used to confirm measures are installed and performing as expected beyond the quality assurance activities that the program implementation team conducts. EM&V findings will be documented in the final evaluation report issued to Avista.

### Project Management

1. In order to ensure on-going quality control, the evaluation team will adhere to professional project management procedures based on planning, monitoring, and control, as well as consistent communication with Avista. Project administration will be predicated on effective work planning, schedule and program controls, coordination of tasks, and internal reviews of work. This is accomplished in the following way:

* Closely adhering to the established processes and procedures as documented in project work plan, administrative procedures and project schedules;
* Consistently communicating with the client and other project participants via oral and written channels;
* Prioritizing and scheduling projects/tasks to best suit the needs of the client and other stakeholders; and
* Providing internal reviews of work prior to interface with customers or submission to agency clients.

1. The evaluation team will provide regular progress reporting to the Avista evaluation team in relation to the status and preliminary findings of the process and impact evaluation project.

## Summary of Program Evaluation Activities

1. Table 1‑1 summarizes the major survey, interview, measurement and verification (M&V), and analysis activities for the process and impact evaluation of Avista’s programs. Quantities identified are targets and could be modified by actual program participation and market actor quantities.

Table 1‑1: Summary of Program Evaluation Activities

| 1. Evaluation Audience/Program | 1. Impact | 1. Process | 1. Survey Quantity |
| --- | --- | --- | --- |
| 1. **Residential – Washington/Idaho Electric Portfolio** | | | |
| 1. Program & Implementation Staff Interviews |  | 1. **√** | 1. **~5** |
| 1. Participating Installers |  | 1. **√** | 1. **~23** |
| 1. Appliance Recycling | 1. **√** | 1. **√** | 1. **70** |
| 1. Water Heater Program | 1. **√** | 1. **√** | 1. **11** |
| 1. ENERGY STAR Homes | 1. **√** | 1. **√** | 1. **15** |
| 1. HVAC Program | 1. **√** | 1. **√** | 1. **67** |
| 1. Shell Program | 1. **√** | 1. **√** | 1. **24** |
| 1. Fuel Efficiency | 1. **√** | 1. **√** | 1. **24** |
| 1. Opower | 1. **√** | 1. **√** | 1. **N/A** |
| 1. Low Income | 1. **√** |  | 1. **24** |
| 1. **Residential – Washington Natural Gas Portfolio** | | | |
| 1. Program & Implementation Staff Interviews |  | 1. **√** | 1. **~5** |
| 1. Participating Installers |  | 1. **√** | 1. **~22** |
| 1. Water Heat Program | 1. **√** | 1. **√** | 1. **11** |
| 1. ENERGY STAR Homes | 1. **√** | 1. **√** | 1. **13** |
| HVAC Program | 1. **√** | 1. **√** | 1. **68** |
| 1. Shell Program | 1. **√** | 1. **√** | 1. **24** |
| 1. Low Income | 1. **√** |  | 1. **24** |
| 1. **Residential - General** | | | |
| 1. Nonparticipants |  | 1. **√** | 1. **34** |
| 1. **Nonresidential – Washington/Idaho Electric Portfolio** | | | |
| 1. Program & Implementation Staff Interviews |  | 1. **√** | 1. **~5** |
| 1. Participating Installers |  | 1. **√** | 1. **~15** |
| 1. Buy-down Retailers |  | 1. **√** | 1. **30-50** |
| 1. Prescriptive Non-lighting | 1. **√** | 1. **√** | 1. **68** |
| Prescriptive Lighting | 1. **√** | 1. **√** | 1. **68** |
| Site Specific | 1. **√** | 1. **√** | 1. **84** |
| Cascade Energy Pilot | 1. **√** | 1. **√** | 1. **5** |
| 1. **Nonresidential – Washington Natural Gas Portfolio** | | | |
| 1. Program & Implementation Staff Interviews |  | 1. **√** | 1. **~5** |
| 1. Participating Installers |  | 1. **√** | 1. **~15** |
| 1. Prescriptive (Appliance) | 1. **√** | 1. **√** | 1. **11** |
| 1. Prescriptive (Shell) | 1. **√** | 1. **√** | 1. **24** |
| 1. HVAC | 1. **√** | 1. **√** | 1. **24** |
| 1. Food Service | 1. **√** | 1. **√** | 1. **11** |
| 1. Site Specific | 1. **√** | 1. **√** | 1. **43** |
| 1. **Nonresidential - General** | | | |
| 1. Nonparticipants |  | 1. **√** | 1. **34** |

The process and impact evaluation activities will be choreographed in a manner to maximize project efficiency and minimize customer fatigue caused by multiple interactions with the evaluation team and other Avista surveys of customers. Our approach will provide continuous feedback throughout the evaluation cycle via a quarterly cohort sample frame, which provides faster, more accurate feedback with participants being interviewed closer to the time of their program participation.

1. Table 1‑2 and Table 1‑3 summarize the target sample sizes for each level of rigor in total for the electric and gas portfolios.

Table ‑: Sampling and Evaluation Rigor for WA/ID Electric Portfolio

|  |  |  |  |
| --- | --- | --- | --- |
| WA/ID Electric Sector | Document Audit | Surveys | Onsite Inspections |
| Residential | 165 | 211 | 70 |
| Nonresidential | 225 | 129 | 124 |
| **TOTAL** | **390** | **340** | **194** |

Table ‑: Sampling and Evaluation Rigor for WA Natural Gas Portfolio

|  |  |  |  |
| --- | --- | --- | --- |
| WA Natural Gas Sector | Document Audit | Surveys | Onsite Inspections |
| Residential | 140 | 116 | 0 |
| Nonresidential | 113 | 35 | 35 |
| **TOTAL** | **253** | **151** | **35** |

## Areas Of Research Emphasis

1. The evaluation team has developed an evaluation approach that targets programs and measures of high-impact and uncertainty, while balancing overall evaluation costs. In addition, the evaluation team intends to consider and build from findings and recommendations from the prior evaluations completed for Avista. Specifically, this evaluation includes the following highlights:

* Rapid Market Feedback: We will provide Avista with quarterly feedback on participant satisfaction and other key metrics, so that Avista can quickly assess how the market is responding to its actions to continually improve program delivery. Program participants will be contacted when they have easy recall of their recent experiences.
* Investigation into Declining Participation Rates: We will estimate the proportion of peak participation attributable to fewer incentivized measures and lower incentives. Having accounted for these two factors, we will have an estimate of the amount of decline in participation owing to other factors that Avista may be able to recoup through program design changes. For a measure of Avista’s choosing we will explore one of the factors we found important to Energy Trust’s declining refrigeration program participation (limited availability of qualifying models at lower price points) to assess its significance for Avista.
* Investigation into the behavioral changes taken by Opower Behavioral Program participants to better understand the role of rebated measures in the savings found for this program.
* Estimation of the proportion of markdown lighting measures attributed to the residential program, but installed in the nonresidential sector through two separate investigations; one through retailer surveys, and the other based on responses to non-participant surveys. In addition, if Avista pursues the optional residential lighting customer intercept survey, we will use data collected through this exercise and will triangulate the results of these three investigations.

# Impact Evaluation Overview

1. Impact evaluations seek to quantify the energy, demand, and possible non-energy impacts that have resulted from DSM program operations. These impacts may be expressed as all changes resulting from the program (gross savings), or only those changes that would not have occurred absent the program (net savings).
2. The following sections outline our general approach for conducting impact evaluations. In general, impact evaluations consist of the following components, all of which are described in more detail in the remainder of this section:

* Understanding the Program Context
* Designing the Sample
* Conducting Gross-Verified Activities
  + Document Audits
  + Telephone Surveys
  + Onsite Verification
  + Billing Analysis
* Conducting Net-Verified Activities

## Understanding the Program Context

1. To understand the portfolio of programs to be evaluated, the evaluation team reviewed Avista’s 2014 and 2015 DSM Business Plans and collected data from Avista on 2014 program performance through October 2014. Table 2‑1 and Table 2‑2 summarize the estimated percent of savings of each program in the portfolio as related to the total savings. Because these values are based on a combination of both actual 2014 energy savings (through October 2014) and planned 2015 values, the distribution of program contribution to the portfolio may shift as the programs progress.

Table ‑: Percent WA Natural Gas Program Savings of Total Portfolio (2014-2015)

|  |  |
| --- | --- |
| WA Natural Gas Programs | % of Portfolio |
| 1. **Residential Portfolio** | |
| Water Heat Program | 3% |
| ENERGY STAR HOMES | 0% |
| HVAC Program | 62% |
| Shell Program | 29% |
| Opower Behavioral Program | 0% |
| Low Income | 6% |
| **TOTAL Residential Portfolio** | 100% |
| 1. **Nonresidential Portfolio** | |
| Nonresidential Appliance | 0% |
| Prescriptive Shell | 3% |
| HVAC | 10% |
| Food Service Equipment | 10% |
| Site Specific | 77% |
| **TOTAL Nonresidential Portfolio** | 100% |

Table ‑: Percent WA/ID Electric Program Savings of Total Portfolio (2014-2015)

|  |  |  |  |
| --- | --- | --- | --- |
| WA/ID Electric Programs | % of Savings of the Portfolio | | |
| 1. **Residential Portfolio (WA and ID)** | | |
| Residential Appliance Recycling | | 3% |
| HVAC Program | | 4% |
| Water Heat Program | | 1% |
| ENERGY STAR HOMES | | 0.5% |
| Fuel Efficiency | | 24% |
| Residential Lighting Program | | 23% |
| Shell Program | | 6.5% |
| Opower Behavioral Program | | 28% |
| Low Income | | 10% |
| **TOTAL Residential Portfolio** | | **100%** |
| 1. **Nonresidential Portfolio (WA and ID)** | | |
| EnergySmart Grocer | | 9% |
| Food Service Equipment | | 1% |
| Green Motors Program | | 0% |
| Comm Motor Controls HVAC | | 2% |
| Appliance | | 0% |
| Prescriptive Lighting | | 26% |
| Power Management for PC Networks | | 0% |
| Shell Program | | 0% |
| Standby Generator | | 0% |
| Cascade Energy Pilot | | 2% |
| Site Specific | | 56% |
| AirGuardian | | 1% |
| Fleet Heat | | 3% |
| **TOTAL Nonresidential Portfolio** | | **100%** |

## Designing the Sample

1. Sample development is an important step that enables the evaluation team to deliver meaningful, defensible results to Avista. The evaluation team plans to use stratified random sampling approaches for much of our data collection activities. Our sampling methodology will be guided by a “value of information” (VOI) framework which allows us to target activities and respondents with expected high impact and yield, while representing the entire population of interest. VOI focuses budgets and rigor towards the programs/projects with high uncertainty and high impact.
2. Avista offers a large number of programs across both market segments (residential/nonresidential) and fuel type (electric/gas). For the sample design, the evaluation team organized the programs into ‘bins’, segmenting the programs based on two metrics:

* **Program Uncertainty:** The risks associated with a program’s reported savings (i.e., custom vs. deemed vs. Regional Technical Forum status), delivery mechanism, and performance goals, etc., broken into three categories: high, medium, and low.
* **Program Size:** Either large, or small; based on projected energy savings, and planned budget allocations.

1. Bins are created for residential and nonresidential programs separately and for electric (WA/ID) and natural gas (WA) programs separately.
2. In parallel, we calculate a ‘level of rigor’ value for each program, and based on assumed measure complexity and RTF influence, we identify an appropriate level of sampling and evaluation rigor.

* **Level of Sampling:** Defined as confidence/precision for calculating sample sizes, the evaluation team is using three levels: 90/10, 85/15, or 80/20.
* **Evaluation Rigor:** Defined as the level of detail used for the evaluation activities, including four levels: document audit, surveys, onsite inspections, and billing analysis. A detailed discussion of evaluation rigor is provided in Section 2.3 below.

1. The evaluation bin identified for each program is one factor in determining the sample size and level of rigor for the evaluation activities. Additional factors that influence the sample size and level of rigor include evaluation costs, Regional Technical Forum (RTF) influence, and findings and recommendations from prior evaluations.
2. The approaches (i.e. level of rigor) for estimating the gross energy savings for the programs being evaluated include: document audit, surveys, site inspections, and statistical billing analysis. In many cases, a combination of approaches are used to both validate savings and provide insights into any identified discrepancies between reported and verified savings values. The sampling strategy for the impact evaluation will also overlay, as applicable, with the sample approach used for the process evaluation activities in order to obtain information for both the impact and process evaluations during one single on-site inspection and/or survey. This nested sampling approach will help to minimize costs while still maintaining adequate sample sizes.
3. Table 2‑3andTable 2‑4 show the anticipated confidence/precision level, planned sample sizes and level of rigor by program separately for WA Natural Gas and WA/ID Electric portfolios. The samples are drawn to meet the specified confidence/precision for each program and to meet a 90% confidence and 10% precision at the portfolio level.

Table ‑: Sampling and Evaluation Rigor for WA Natural Gas Programs

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| WA Natural Gas Portfolio Program Name | Target Sample Sizes based on Level of Rigor | | | | |
| **Target C/P1** | **Document Audit** | **Surveys** | **Onsite Inspections** | **Billing Analysis** |
| **Residential (WA)** | | | | | |
| Water Heat Program | 80/20 | 11 | 11 |  |  |
| ENERGY STAR Homes | 85/15 | 13 | 13 |  | census |
| HVAC Program | 90/10 | 68 | 68 |  | census |
| Shell Program | 85/15 | 24 | 24 |  | census2 |
| Opower Behavioral Program | census |  |  |  | census |
| Low Income | 85/15 | 24 |  |  | census |
| **Nonresidential (WA)** | | | | | |
| Prescriptive Appliance | 80/20 | 11 |  |  |  |
| Prescriptive Shell | 80/20 | 24 | 11 | 11 |  |
| HVAC Program | 85/15 | 24 |  |  |  |
| Food Service Equipment | 80/20 | 11 |  |  |  |
| Site Specific | 90/10 | 43 | 24 | 24 | based on IPMVP |

1. 1Sample sizes for document audit designed to meet C/P target and are based on actual 2014 participation values through October, and 2015 Business Plan values.

2Focus on manufactured homes

Table ‑: Sampling and Evaluation Rigor for WA/ID Electric Programs

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| WA/ID Electric Portfolio Program Name | Target Sample Sizes for each Level of Rigor | | | | |
| **Target C/P1** | **Document Audit** | **Surveys** | **Onsite Inspections** | **Billing Analysis** |
| **Residential (WA and ID)** | | | | | |
| Residential Appliance Recycling | 90/10 |  | 70 |  |  |
| HVAC Program | 90/10 | 67 | 67 |  |  |
| Water Heat Program | 80/20 | 11 | 11 |  |  |
| ENERGY STAR Homes | 85/15 | 15 | 15 |  | census |
| Fuel Efficiency | 85/15 | 24 | 24 |  | census |
| Residential Lighting Program | NA |  |  | 702 |  |
| Shell Program | 85/15 | 24 | 24 |  | census |
| Opower Behavioral Program | census |  |  |  | census |
| Low Income | 85/15 | 24 |  |  | census |
| **Nonresidential (WA and ID)** | | | | | |
| Prescriptive Lighting | 90/10 | 68 | 16 | 16 |  |
| Prescriptive Non- Lighting3 | 90/10 | 68 | 24 | 24 |  |
| Cascade Energy Pilot | 80/20 | 5 | 5 |  |  |
| Site Specific | 90/10 | 84 | 84 | 84 | based on IPMVP |

1. 1Sample sizes for document audit designed to meet C/P target and are based on actual 2014 participation values through October, and 2015 Business Plan values.
2. 2 Denotes sample size for residential lighting program logger study
3. 3Please note that for purposes of the evaluation sampling, the evaluation team has bundled the following Nonresidential Electric Programs into one program titled ‘Prescriptive Non-Lighting’: EnergySmart Grocer, Food Service Equipment, Green Motors, Commercial Motor Controls HVAC, Appliance, Power Management for PC Networks, Shell, Fleet Heat, AirGuardian and Standby Generator.

## Conducting Gross-Verified Activities

1. Based on data and information gathered as part of the evaluation activities chosen for each project and program, the evaluation team will calculate the verified energy savings for each sampled project. We will leverage existing calculations and methods that are available for review and are presented in a transparent and complete way. This also applies to those cases where the RTF has existing unit energy savings for the measure being evaluated. In some cases (such as for a measure that does not have an RTF-approved UES or for the Site Specific projects), we may conclude that savings estimates and reports are either not adequately supported or are not appropriate to the weather zone or service territory. In these cases, we will provide ground-up methods and calculations. We will use accepted evaluation practices to extrapolate savings and realization rates from our sample findings.
2. The estimation of gross verified energy savings will occur through one or more levels of ‘evaluation rigor’. The four levels of rigor that will be used for the Avista evaluation include document audit, surveys, onsite inspections, and billing analysis. Each of these approaches is outlined in more detail in the following sections.

### Document Audit

1. The first level of rigor to be utilized in the evaluation activities is to conduct a document audit of all sampled projects, for which documentation exists. Document audits are also a critical precursor to conducting telephone surveys and onsite inspections and more specifically for the determination of project-specific variables to be collected during these activities. The document audit for each sampled project will seek to answer the following questions:
2. Are the data files of the sampled projects complete, well documented and adequate for calculation and reporting of the savings?
3. Are the calculation methods used correctly applied, appropriate and accurate?
4. Are all necessary fields properly populated?

### Telephone Survey

1. A second level of evaluation rigor is to conduct stand-alone telephone surveys with program participants. Telephone surveys will be utilized to gather information on the energy efficiency measure implemented, the key parameters needed to verify the assumptions utilized by RTF for approved values or to estimate verified energy savings, and any baseline data that may be available from the participant. Surveys conducted for the process evaluation activities will include questions relevant to the impact evaluation, and vice versa, when applicable.
2. Standard data collection input forms will be developed for use by field and telephone survey engineers and for ease of input into a data collection database. Our standard approach and the approach we will use are as follows:
3. Select information that we need to perform the needed impact evaluation tasks and develop appropriate survey questions to gather this information during a telephone conversation.
4. Build a database form to allow for quick and easy population of tables with data and information once information is gathered through the survey implementation.

### Onsite Inspections

1. A higher level of rigor for the evaluation activities is to conduct onsite measurement and verification on a select sample of projects. Prior to conducting site inspections, it is important for the field engineer to understand the project that they are going onsite to verify. This understanding, therefore, corresponds with the document audit task discussed in the prior section. For all onsite inspections, a telephone survey will serve as an introduction to the evaluation activities and will be used to confirm that the customer participated in the program, confirm the appropriate contact, and to verify basic information such as building type and building size. On-site recruitments will be made during the telephone survey and will be scheduled with a Nexant field engineer.
2. Site inspections are the key to the accurate evaluation of programs and represent a significant portion of the effort for the evaluation of the nonresidential portfolio. Because of the importance of the task, the evaluation team will work to ensure that site inspections are carefully planned and executed and that site inspectors have the appropriate experience and training. Field engineers will be fully equipped to perform a comprehensive audit with all the necessary data loggers, tools, and complete survey tools or PC tablets. Steps in the site inspection process are as follows:
3. Train site inspectors so that they can successfully collect the needed site-specific information. It is important that the inspectors are trained not only on the engineering aspects, but also on proper protocols and interaction with facility staff to ensure that the necessary data is collected and that utilities’ relationship with its customers is not damaged, but rather is enhanced.
4. Group inspections by geographic location to minimize time allocation, labor and direct costs associated with getting to and conducting site inspections.
5. Perform site inspections and enter all needed data into the program evaluation database developed specifically for Avista.
6. The evaluation team will conduct two levels of rigor associated with the onsite inspections – measurement AND verification (M&V) and verification-only (V). Upon review of the project documents, the evaluation team will decide which level of rigor is appropriate for each sampled project/measure. In cases where the measure being evaluated has an approved RTF UES value, the evaluation team’s effort will focus on verifying quality and quantity of installation to apply the RTF UES values to. We will also gather information that ties into the RTF UES value as appropriate (examples could include heating/cooling fuel type, occupancy, operating hours, etc.).
7. For projects selected for measurement & verification, an M&V plan will be developed for each project based on our review of the calculation methods and assumptions used for determining measure-level energy savings (if available). These plans will aid in understanding what data to collect while on-site and during the telephone survey in order to calculate gross verified savings for each sampled project. The review may result in different energy savings values as reported by Avista, depending on the accuracy of reporting and assumption used by Avista and its contractors.
8. M&V plans developed for each project type will be developed with adherence to the IPMVP. The broad categories of the IPMVP are as follows:

* Option A, Retrofit Isolation: Key Parameter Measurement – This method uses engineering calculations, along with partial site measurements, to verify the savings resulting from specific measures.
* Option B, Retrofit Isolation: All Parameter Measurement – This method uses engineering calculations, along with ongoing site measurements, to verify the savings resulting from specific measures.
* Option C, Whole Facility – This method utilizes whole-facility energy usage information, most often focusing on a utility bill analysis, to evaluate savings.
* Option D, Calibrated Simulation – Computer energy models are employed to calculate savings as a function of the important independent variables. The models must include verified inputs that accurately characterize the project and must be calibrated to match actual energy usage.

In addition, the evaluation team will conduct metering tasks on a subset of the on-site inspection sample chosen for M&V level of rigor. Projects will be selected for metering activities based on the measure type, project complexity, and the level of information needed in order to estimate gross savings for the project.

### Billing Analysis

1. The final evaluation level of rigor to be conducted is billing analysis, which the evaluation team will conduct on a handful of residential programs in both the electric and natural gas portfolios, including the Opower Behavioral Program, which has a relatively large share of the overall residential portfolio targets for 2014.
2. The majority of the residential programs planned for billing analysis provide the opportunity for a comparison group billing analysis. The evaluation team’s approach for estimating the gross annual kWh and therm savings through this approach is a difference-in-differences comparison between participants and a comparison group of non-participating customers who resemble the participants with respect to key observable characteristics. For the participating group of customers, the difference between energy consumption before and after program intervention is attributable to two things:
3. Receipt of energy efficiency measure(s).
4. Exogenous changes not related to the program. The changes can have a positive effect (increase in consumption) or a negative effect (decrease in consumption).
5. For the comparison group, any differences in energy consumption between the pre-implementation period and post-implementation period can only be a function of exogenous changes because no program measures were installed. By subtracting the differences observed in a well-specified comparison group from the differences observed in the treatment group, we effectively isolate the effect of the program measures because exogenous changes will impact both groups in a similar fashion. For example, a hypothetical decline in electric consumption across a portion of Avista’s territory due to adverse weather has no relation to Avista’s program. The effects must be captured using a comparison group and netted out to produce accurate estimates of program impacts.

#### Model Specification

1. Rather than model each customer independently, the evaluation team prefers to analyze this data as a panel. Although the choice of technique doesn’t change the underlying noisiness of the data, we’ve found that panel regressions, stratified by groups of interest, produce more stable estimates than running individual customers regressions and averaging the results. The basic form of the model is shown below for gas usage.

Where:

Daily Therms = Billed gas usage in home i during billing period t divided by the number of days in billing period t.

Ave HDD = The average number of heating degree days in billing period t. Various base temperatures can be used as the ceiling of the heating range.

Cohort = Dummy structure to separate groups of interest. We anticipate distinguishing between Single Family Treatment, Single Family Control, Multi-Family Treatment and Multi-Family Control residences at minimum, both other groups can be formed at the direction of Avista.

Post = An indicator variable indicating that the billing period after the customer received the energy efficiency measures

terms = Regression coefficients determined from the modeling process.

1. The key parameter in this model is. This term should be negative and represents the average therm savings, per heating degree, for. For example, if the β3 term for single-family homes is equal to -0.0059 and the 30-year average number of base 65 heating degree days for Avista sub-program participants is 5200, the calculation of weather normalized natural gas savings would be performed as follows.

The impact will be calculated as negative (because it is a reduction at the meter), but presented as a positive savings number in any report. Exogenous impacts from the corresponding control group would then be netted out.

### Calculating Gross-Verified Savings

1. The impact evaluation activities will result in adjustment factors, termed realization rates, which are applied to the reported savings documented in the program tracking records. The ratio of project savings determined from the evaluation activities to the project-reported savings is the project realization rate; the program realization rate is the weighted average for all projects in the sample. The adjusted savings obtained by multiplying the program realization rates by the program-reported savings are termed the gross verified savings and they reflect the direct energy and demand impact of the program’s operations. These savings do not account for customer or market behavior that may have resulted in greater or lesser savings; these market effects (freeridership and spillover) are captured through tasks carried out in net impact analysis. The following equation outlines the calculation for determining the gross savings value.
2. Where

kWhadj = kWh adjusted by the impact team for the program, the **gross savings**

kWhrep = kWh reported for the program

Realization rate = kWhadj / kWhrep for the research sample

Natural gas (therm) savings will be treated in a similar manner.

## Overview of Net-Verified Approach and Methods

1. The evaluation team will derive net savings—the savings directly attributable to the program—by adjusting the gross-verified energy savings estimates to account for freeridership and spillover when applicable. We will estimate NTG values for all electric programs in Avista’s WA and ID service territory. However, for those program measures that utilize an RTF defined market baseline value, we will not apply freeridership to these measures since freeridership is already accounted for in the market baseline. To rephrase, for RTF or TRM measure savings estimates based on market baselines, freeridership ratios based on the evaluation activities will not be applied and only spillover ratios will be used for the NTG adjustment.
2. We will rely on participant and non-participant surveys as well as interviews with trade allies, manufacturers, and other key stakeholders to estimate freeridership and spillover. “Freeridership” refers to a participant who, on some level, would have acquired the energy efficiency measure regardless of the program influence. The effect of freeriders reduces the net savings attributable to the program. “Spillover” refers to actions taken outside the program that are attributable to participation. The spillover effect of energy-efficiency programs is an impact that evaluators can add to the program’s savings results (unlike the impact of freeriders). Freeridership and spillover are used to calculate NTG ratios for each program, through the following equation:
3. NTG Ratio = 1 – Freeridership + Spillover
4. The NTG ratio is applied to the program’s gross verified impacts in order to calculate the net impacts or the savings directly attributable to the program. The following equation outlines the relationship between net and gross impacts, when applying the NTG ratio:
5. Net Verified Savings = Gross Verified Savings x NTG Ratio
6. We will use a battery that the evaluation team developed with Energy Trust of Oregon to assess free-ridership. This brief battery independently assesses two separate, equal, and additive components of free-ridership: 1) the extent to which the respondent’s upgrade would have differed if not for program participation (the project “change” component); and 2) the extent of program influence on the project (the “influence” component). Each component is assessed with a few brief questions and is assigned a value from 0 (no free-ridership) to 50 (complete free-ridership according to that component). The change component is assigned a value of 0 for respondents that indicate that they would have done no energy upgrade without program participation, 50 if they would have done exactly the same project without program participation, and an intermediate value if they would have done some upgrade without program participation but one that would have saved less energy. The influence component is assigned a value of 0 for respondents that report that any program assistance or service had the maximum influence (on a 5-point scale) on their decision to do the energy upgrade, a value of 50 if the maximum influence rating was 1 on the 5-point scale, and an intermediate value if the maximum influence rating was between 1 and 5. The two component scores are added to create an overall free-ridership score ranging from 0 to 100.
7. The evaluation team will assess spillover by asking about program influence on participant’s decision to install non-incented equipment.
8. In an effort to control costs and deliver the most value to Avista, we will leverage the interviews planned as part of the impact and process evaluations for each individual program in order to capture information needed to estimate freeridership and spillover.

## WA/ID Electric Program-Specific Tasks

### Residential Programs

1. The following section outlines the electric residential programs offered in Avista’s Washington and Idaho service territory. The general approaches used for conducting the impact evaluation activities are outlined in the sections above, therefore this section provides a brief overview of each program, the sample design for this portfolio of programs and explains any special studies or approaches that will be conducted for the impact evaluation.

#### Program Overview

1. Avista offers nine residential electric programs as summarized in Table 2‑5 below. Fuel Efficiency, HVAC, Residential Shell, and Residential Water Heat are implemented directly by Avista, while Appliance Recycling, ENERGY STAR Homes, Residential Lighting, Opower Behavioral, and Low-income programs have varying levels of assistance from third-party implementers.

Table ‑: WA/ID Residential Electric Programs

|  |  |  |
| --- | --- | --- |
| WA/ID Electric Programs | Description | Implementer |
| **Residential Appliance Recycling** | This program is intended to prompt the customer to decrease their energy used on inefficient second refrigerators or freezers by recycling and receiving financial incentives. | JACO Environmental |
| **ENERGY STAR Homes** | Provides incentives for stick-built and manufactured homes that achieve ENERGY STAR / ECO-Rated labels. | NEEA administers, Avista pays rebate |
| **Fuel Efficiency** | The fuel efficiency prescriptive rebate encourages customers to consider converting their electric space and water heat to natural gas. | Avista |
| **HVAC** | The HVAC program encourages residential customers to select a high efficiency solution when making energy upgrades to their home (prescriptive). | Avista |
| **Residential Lighting** | Direct financial incentives are offered at the manufacturer level that result in cost reductions through participating retailers on select compact fluorescent lamps (CFL’s). | CLEAResult |
| **Residential Shell** | The shell program encourages residential customers to improve their home’s shell or exterior envelope with upgrades to insulation and windows. | Avista;  WSU/UCONS(manufactured home duct sealing in 2014) |
| **Residential Water Heat** | The water heat program encourages residential customers to select a high efficiency solution when making energy upgrades to their home (prescriptive). | Avista |
| **Opower Behavioral Program** | June of 2013, Avista launched a three year Residential Behavioral Program using the Opower platform for Home Energy Reports (HER). 73,500 electric customers in Washington and Idaho were targeted for these reports and will continue receiving reports throughout the duration of this three year program unless they opt-out or move. No one is allowed to opt-in. | Opower |
| **Low Income** | Avista utilizes the infrastructure of six Community Action Partner (CAP) agencies to deliver low income energy efficiency programs. The CAPs have the ability to income-qualify customers and have access to a variety of funding resources, including Avista funding, which can be applied to meet customer needs. | SNAP, Rural Resources, Community Action Center Whitman County, Opportunities Industrialization Council, Washington Gorge Action Programs, Community Action Partnership (Lewiston) |

#### Gross-Verified Approach

1. Each program will be assigned a specific number of desk audits, telephone surveys, and for the Lighting Program, site inspections in order to gather necessary data to estimate energy impacts. In addition, specific programs will be evaluated using billing analysis. Once the samples are identified, desk audits of project files will verify basic information and will inform telephone surveys, on-site inspections, and billing analysis activities.
2. Table 2‑6 outlines the planned sample sizes and level of rigor for the impact evaluation activities for the residential electric programs in WA/ID. The Water Heat Program evaluation will also include analysis of the Simple Steps, Smart Savings high efficiency showerheads component.  The evaluation of the Residential Lighting Program will include an assessment of both the upstream lighting component and the giveaway component through a database review and through the activities outlined in the Residential Lighting Study described in the section below.

Table ‑: Sampling and Evaluation Rigor for WA/ID Residential Electric Programs

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| WA/ID Electric Portfolio Program Name | Target Sample Sizes for each Level of Rigor | | | | |
| **Target C/P** | **Document Audit** | **Surveys** | **Onsite Inspections** | **Billing Analysis** |
| Residential Appliance Recycling | 90/10 |  | 701 |  |  |
| HVAC Program | 90/10 | 67 | 67 |  |  |
| Water Heat Program1 | 80/20 | 11 | 11 |  |  |
| ENERGY STAR Homes | 85/15 | 15 | 15 |  | census |
| Fuel Efficiency | 85/15 | 24 | 24 |  | census |
| Residential Lighting Program2 | 90/10 |  |  | 703 |  |
| Shell Program | 85/15 | 24 | 24 |  | census |
| Opower Behavioral Program | census |  |  |  | census |
| Low Income | 85/15 | 24 |  |  | census |
| **TOTAL:** |  | **165** | **211** | **70** |  |

1Includes Simple Steps, Smart Savings upstream showerhead component

2Includes Simple Steps, Smart Savings upstream lighting program and CFL giveaway events

3Denotes sample size for residential lighting program logger study

##### 

##### Residential Lighting Study

1. The evaluation team will conduct a residential lighting study to determine the average annual hours of use of residential lamps, including compact fluorescent lamps (CFLs) for Avista’s Residential Lighting program. The study methodology will align with the Department of Energy (DOE) Uniform Measure Protocol (UMP) for residential lighting. We will use the results of the study to inform the hours of use input to the analysis of the upstream and CFL giveaway lighting programs.

###### Methodology

1. Because retailer or give-away distribution streams do not target specific fixtures or high-usage areas, the study will meter between four (4) to eight (8) lamps per home with a targeted average of six (6) metered lamps per home. Collecting data for an average of 6 lamps per residence maximizes the data collected at a specific residence and allows for a large dataset to be gathered for analysis across multiple delivery streams, residence, room, and fixture types. Metered lamps will include LEDs, CFLs, and incandescent lamps. The lighting study will target annual operating hour results with 8% precision at the 90% confidence level for premises and lamps. Table 2‑7 summarizes the sampling frame targeting 420 lamps in 70 residences.

Table ‑: Residential Lamps Sampling Frame

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Confidence | Precision | Cv[[1]](#footnote-2) | Sample Size[[2]](#footnote-3) | Installed Loggers |
| 90% | 8% | 0.95 | 382 | 420 |

1. With the number of installed loggers at 420, it is also expected the study will provide statistically meaningful results for delivery methods, multiple room configurations, and fixture types, as well as efficient lamps versus incandescent lamps operating hours.

###### Measurement Activities

1. Between four and eight HOBO® light on/off data loggers will be placed in customer homes, in addition to asking the occupant about occupancy and operating schedules. The location of loggers placed in each home will be determined by a random sampling method by the visiting engineer. The visiting engineer will utilize a random selection program operating on an on-site tablet and/or computer to select the location of the loggers, so that the engineer cannot introduce any bias. Additionally, the sampling algorithm will confirm compliance with the overall target sample frame to ensure representativeness of the general population with respect to room location. Finally, the random sampling method will consider the number of lighting circuits in a home, so that two loggers are not installed on different fixtures on the same circuit, as this could provide duplicate results. In order to fully estimate the changes in daily operating schedules, loggers will be left in place for at least one month in each season (winter, spring/fall, and summer).
2. In addition to an estimate of average annual operating hours, the metering study will provide the evaluation with additional important information, as outlined below.

* Coincidence Factor – the rate at which the operation of the CFLs coincides with Avista’s system peak period.
* Installation Rate – the percent of CFLs bought that are actually installed and stored, if found to be different from RTF.
* Installation Location – the residential areas where CFLs were installed and corresponding operating hours.
* Burnout Rate – the percent of CFLs that burnout during the study horizon.

##### Residential Billing Analysis

1. The evaluation team will develop regression models to analyze billing data for the following programs:

* Shell Program (duct sealing for manufactured homes)
* Fuel Efficiency
* Low Income
* ENERGY STAR® New Homes
* Opower Behavioral Program

1. The Opower Behavioral Program was designed and implemented with a defined treatment and control group, thereby allowing for a randomized controlled trial (RCT) to evaluate energy impacts from the program. The Opower program design lends itself well to a RCT as there is no recruiting process. Rather, the program employs an opt-out design whereby customers are assigned either to the treatment or the control group. This design prevents customers in the control group from knowing that an experiment is occurring and therefore do not influence the program outcomes. To evaluate the program, the evaluation team will calculate estimated savings for the program using a regression model that is appropriate for estimating impacts in the context of a RCT.
2. The other four programs evaluated using billing regression will use a similar analysis approach. However, because these programs were not designed as RCTs, the evaluation team will define a comparison group to conduct the analysis. The comparison group will serve the same function as a control group and will be matched based on characteristics of the treatment group with focus on energy consumption during the pre-treatment period.

#### Net-Verified Approach

1. The evaluation team will derive net savings (the savings directly attributable to the program) for the electric residential programs by adjusting the gross-verified energy savings estimates to account for freeridership and spillover when applicable. We will estimate NTG values for all programs being evaluated in the residential portfolio for which NTG ratios should be applied. For example, for RTF measure savings estimates based on market baselines, freeridership ratios based on the evaluation activities will not be applied and only spillover ratios will be used for the NTG adjustment.
2. Section 2.4 provides an overview of the approach that will be utilized to estimate free-ridership and spillover, again, when applicable.

### Nonresidential Programs

1. The following section outlines the electric nonresidential programs offered in Avista’s Washington and Idaho service territory. The general approaches used for conducting the impact evaluation activities are outlined in Section 2; therefore this section provides a brief overview of each program, the sample design for this portfolio of programs and explains any special studies or approaches that will be conducted for the impact evaluation.

#### Program Overview

1. Avista offers twelve nonresidential electric programs as summarized in Table 2‑8 below. Avista partners with implementers on the Energy Smart Grocer, Green Motors, AirGuardian and Cascade Strategic Energy Management programs, and directly implements the remaining programs.

Table ‑: WA/ID Nonresidential Electric Portfolio Programs

| WA/ID Electric Programs | Description | Implementer |
| --- | --- | --- |
| **EnergySmart Grocer** | This program is intended to prompt the customer to increase the energy efficiency of their refrigerated cases and related grocery equipment through direct financial incentives. | PECI – outreach and referrals, Avista |
| **Food Service Equipment** | This program offers incentives for commercial customers who purchase or replace food service equipment with Energy Star or higher equipment (prescriptive). | Avista |
| **Green Motors** | The Green Motors Initiative is to organize, identify, educate, and promote member motor service centers to commit to energy saving shop rewind practices, continuous energy improvement and motor driven system efficiency. | Green Motors Practices Group, Green Motors Initiative |
| **Motor Controls HVAC** | This program is intended to prompt the customer to increase the energy efficiency of their fan or pump applications with variable frequency drives through direct financial incentives. | Avista |
| **Appliances** | The non res appliance program encourages nonresidential customers to improve the efficiency of their clothes washing equipment (prescriptive). | Avista |
| **Prescriptive Lighting** | This program is intended to prompt commercial electric customer to increase the energy-efficiency of their lighting equipment through direct financial incentives. | Avista, regional Account Executives (AEs) |
| **Power Management for Personal Computers** | This program is designed to encourage implementation of power management software in networked PC’s to obtain energy efficiency. | Avista |
| **Prescriptive Shell** | The Commercial Insulation program encourages nonresidential customers to improve the envelope of their building by adding insulation. | Avista |
| **AirGuardian** | The AirGuardian program is a third party delivered turnkey program for direct install compressed air and facility efficiency. | EnSave |
| **Fleet Heat** | Installation of technology that reduces standby losses of vehicle engine blocks by fleet operators by adding the ability to energize block heaters only when Outside Air Temperature drops below a temperature set-point and the engine mounted thermostat is calling for heat. | Avista |
| **Site-Specific** | This program approach strives for a flexible response to energy efficiency projects that have demonstrable kWh/Therm savings within program criteria. The majority of site specific kWh/Therm savings are comprised of appliances, compressed air, HVAC, industrial process, motors, shell measures, some custom lighting projects that don’t fit the prescriptive path and natural gas multifamily market transformation. | Avista |
| **Cascade Strategic Energy Management** | Cascade’s Industrial System Tune‐up (IST) program is designed to support and incent industrial energy efficiency improvements through low/no cost operations and maintenance (O&M) optimization. Tune‐up projects can occur on a facility‐wide basis or on specific sub‐systems for large customers. | Cas Cascade Energy |

#### Gross-Verified Approach

1. Each program will be assigned a specific number of telephone surveys, desk audits, and site inspections based on overall portfolio savings. Once the samples are identified, desk audits of project files will verify basic information and will inform telephone surveys, on-site inspections, and M&V activities.
2. Table 2‑9 outlines our anticipated sample sizes and level of rigor for the impact evaluation activities for the nonresidential electric programs in WA/ID. The sample frames outlined herein will be further stratified by measure type, based on the percent of measures approved through each program, the respective reported savings values, and any known uncertainties in a particular measure-type.

Table ‑: Sampling and Evaluation Rigor for Nonresidential WA/ID Electric Programs

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| WA/ID Electric Portfolio Program Name | Target Sample Sizes for each Level of Rigor | | | | |
| **Target C/P1** | **Document Audit** | **Surveys** | **Onsite Inspections** | **Billing Analysis** |
| Prescriptive Lighting | 90/10 | 68 | 16 | 16 |  |
| Prescriptive Non- Lighting | 90/10 | 68 | 24 | 24 |  |
| Cascade Energy Pilot | 80/20 | 5 | 5 |  |  |
| Site Specific | 90/10 | 84 | 84 | 84 | based on IPMVP |
| TOTAL: |  | 225 | 129 | 124 |  |

1. 1Sample sizes for document audit designed to meet C/P target and are based on estimated participation values stated in 2014 Business Plan, extrapolated to the biennial cycle.
2. We will conduct on-site metering for a subset of onsite visits. Variables targeted as part of the metering activities will be determined on a case-by-case basis depending on the project and measure type. Based on the evaluation team’s experience evaluating commercial sector projects and the measures offered in Avista’s programs, all projects will be measured for at least fourteen (14) days with on-site trend measurements. Seasonally variable measures may be metered for more than 2-3 months to better understand performance changes with weather conditions. Metering data available from building management systems (BMS) will be utilized, and the decision to implement metering equipment will be determined on each specific project based on preliminary desk audits. In addition, where RTF protocols have been established or are currently under review, the evaluation team will take the protocols into consideration and use them when appropriate during the development of the M&V plans and activities.

#### Net-Verified Approach

1. The evaluation team will derive net savings (the savings directly attributable to the program) for the electric nonresidential programs by adjusting the gross-verified energy savings estimates to account for freeridership and spillover when applicable. We will estimate NTG values for all programs being evaluated in the nonresidential portfolio for which NTG ratios should be applied. However, for RTF measure savings estimates based on market baselines, freeridership ratios based on the evaluation activities will not be applied and only spillover ratios will be used for the NTG adjustment.
2. Section 2.4 provides an overview of the approach that will be utilized to estimate free-ridership and spillover (when applicable).

## WA Natural Gas Program-Specific Tasks

### Residential Programs

1. The following section outlines the natural gas residential programs offered in Avista’s Washington service territory. The general approaches used for conducting the impact evaluation activities are outlined in Section 2 above, therefore this section provides a brief overview of each program, the sample design for this portfolio of programs and explains any special studies or approaches that will be conducted for the impact evaluation.

#### Program Overview

1. Six programs apply to Avista’s Natural Gas customers in their Washington service territory. Avista implements the HVAC, Residential Shell, and Residential Water Heat programs. Additional implementation contractors for ENERGY STAR Homes, Opower, and Low-Income programs are described with each program summary in Table 2‑10 below. The descriptions for each program can be found in Table 2‑5 in Section 2.5.

Table ‑: WA Residential Natural Gas Portfolio Programs

|  |  |
| --- | --- |
| WA/ID Electric Programs | Implementer |
| **HVAC** | Avista |
| **ENERGY STAR Homes** | NEEA administers, Avista pays rebate |
| **Residential Shell** | Avista |
| **Residential Water Heat** | Avista |
| **Opower Behavioral Program** | Opower |
| **Low Income** | SNAP, Rural Resources, Community Action Center Whitman County, Opportunities Industrialization Council, Washington Gorge Action Programs, Community Action Partnership (Lewiston) |

#### Gross-Verified Approach

1. Each program in the WA natural gas portfolio will be assigned a specific number of desk audits or telephone surveys based on overall portfolio savings. Once the samples are identified, desk audits of project files will verify basic information and will inform subsequent telephone surveys conducted with program participants.
2. Table 2‑11 outlines the planned sample sizes and level of rigor for the impact evaluation activities for the residential natural gas programs in WA. The Water Heat Program evaluation will also include analysis of the Simple Steps, Smart Savings high efficiency showerheads component. Billing analysis will be used to evaluate impacts for the HVAC, Shell, Low Income, and Opower programs. Additionally, ENERGY STAR Homes may also be evaluated via billing analysis if sufficient data is available. Please see Section 2.3.4 for additional discussion on the billing analysis approach.

Table ‑: Sampling and Evaluation Rigor for Residential WA Natural Gas Programs

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| WA Natural Gas Portfolio Program Name | Target Sample Sizes based on Level of Rigor | | | | |
| **Target C/P** | **Document Audit** | **Surveys** | **Onsite Inspections** | **Billing Analysis** |
| Water Heat Program1 | 80/20 | 11 | 11 |  |  |
| ENERGY STAR Homes | 85/15 | 13 | 13 |  | census |
| HVAC Program | 90/10 | 68 | 68 |  | census |
| Shell Program | 85/15 | 24 | 24 |  | census2 |
| Opower Behavioral Program | census |  |  |  | census |
| Low Income | 85/15 | 24 |  |  | census |
| TOTAL: |  | 140 | 116 |  |  |

1Includes Simple Steps, Smart Savings upstream showerhead component

2Focus on manufactured homes

#### Net-Verified Approach

1. Net to gross ratios are not required for Avista’s natural gas programs.

### Nonresidential Programs

1. The following section outlines the natural gas nonresidential programs offered in Avista’s Washington service territory. The general approaches used for conducting the impact evaluation activities are outlined in Section 2; therefore this section provides a brief overview of each program, the sample design for this portfolio of programs and explains any special studies or approaches that will be conducted for the impact evaluation.

#### Program Overview

1. Avista offers five programs to nonresidential natural gas customers in Washington. Implementation for all five programs is managed by Avista. Program summaries are listed below in Table 2‑12.

Table ‑: WA Nonresidential Natural Gas Portfolio Programs Savings

|  |  |  |
| --- | --- | --- |
| WA/ID Electric Programs | Description | Implementer |
| **HVAC** | This program offers direct incentives for installing high efficient natural gas HVAC equipment. | Avista |
| **Food Service Equipment** | This program offers incentives for commercial customers who purchase or replace food service equipment with Energy Star or higher equipment (prescriptive). | Avista |
| **Appliances** | The non res appliance program encourages nonresidential customers to improve the efficiency of their clothes washing equipment (prescriptive). | Avista |
| **Prescriptive Shell** | The Commercial Insulation program encourages nonresidential customers to improve the envelope of their building by adding insulation. | Avista |
| **Site-Specific** | This program approach strives for a flexible response to energy efficiency projects that have demonstrable kWh/Therm savings within program criteria. The majority of site specific kWh/Therm savings are comprised of appliances, compressed air, HVAC, industrial process, motors, shell measures, some custom lighting projects that don’t fit the prescriptive path and natural gas multifamily market transformation. | Avista |

#### Gross-Verified Approach

1. Each program will be assigned a specific number of telephone surveys, desk audits, and site inspections based on the evaluation sample design. Once the samples are identified, desk audits of project files will verify basic information and will inform telephone surveys, on-site inspections, and M&V activities.
2. Table 2‑13 outlines the preliminary sample sizes and level of rigor for the impact evaluation activities for the nonresidential natural gas programs in WA. We will conduct the level of sampling shown here over the two-year evaluation period. The sample frames outlined herein will be further stratified by measure type, based on the percent of measures approved through each program, the respective reported savings values, and any known uncertainties in a particular measure-type.

Table ‑: Sampling and Evaluation Rigor for Nonresidential WA Natural Gas Programs

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| WA Natural Gas Portfolio Program | Target Sample Sizes based on Level of Rigor | | | | |
| **Target C/P1** | **Document Audit** | **Surveys** | **Onsite Inspections** | **Billing Analysis** |
| Prescriptive Appliance | 80/20 | 11 |  |  |  |
| Prescriptive Shell | 80/20 | 24 | 11 | 11 |  |
| HVAC Program | 85/15 | 24 |  |  |  |
| Food Service Equipment | 80/20 | 11 |  |  |  |
| Site Specific | 90/10 | 43 | 24 | 24 | based on IPMVP |
| TOTAL: |  | 113 | 35 | 35 |  |

1. 1Sample sizes for document audit designed to meet C/P target and are based on estimated participation values stated in 2014 Business Plan, extrapolated to the biennial cycle. 2 Focus on manufactured homes.
2. We will conduct metering activities for a subset of onsite visits. Variables targeted as part of the metering activities will be determined on a case-by-case basis depending on the project and measure type. Based on the evaluation team’s experience evaluating commercial sector projects and the measures offered in Avista’s programs, projects may be measured for up to fourteen (14) days with on-site trend measurements. Seasonally variable measures may be metered for more than 2-3 months to better understand performance changes with weather conditions. Metering data available from building management systems (BMS) will be utilized, and the decision to implement metering equipment will be determined on each specific project based on preliminary desk audits.

#### Net-Verified Approach

1. Net to gross ratios are not required for Avista’s natural gas programs.

## Other Tasks

### Program Theory and Logic Model Review

1. The evaluation team will review and revise as necessary Avista’s program theories and logic models. To complete this task, we will review the program documentation Avista provides us with including the existing program theory and logic models. We will interview program managers to understand the barriers the programs address, their activities to address them, and the outputs the programs are generating. We will assess this information in light of our understanding of residential and nonresidential appliance and building markets, market barriers, and common program approaches. With this information from Avista and our understanding of markets and programs, we will confirm or revise Avista’s existing theory and logic models.
2. In our review we will identify the key barriers to the uptake of efficiency measures among Avista’s residential and nonresidential program as well as the approaches to the market to mitigate these barriers. The program theory and logic model review will identify these activities and their outputs – countable “things” that the activities generate, such as a user-friendly application forms and meetings with contractors. The logic model will also identify the program-related outcomes – near-, intermediate-, and long-term – that flow from these outputs. The outcomes, such as reduced energy use and increased efficiency of the building stock, are thus clearly attributed to the program, as the program intervened to reduce market barriers that inhibit the uptake of efficiency measures. A key element of the analysis is developing a visual representation of the logic model, and we will use graphic software such as Visio or PowerPoint to produce the models.
3. If applicable, we will submit the revised logic model diagrams to Avista for review and will revise them based on comments and feedback received. We will then document our analysis as a separate chapter (or as appropriate, a chapter section) of the evaluation report.

### Technical Reference Manual Review

1. The evaluation team will review Avista’s Technical Reference Manual (TRM) annually throughout the evaluation cycle. Specifically, we will review and make recommendations (as necessary) regarding all developed assumptions for each measure in Avista’s programs. Our review will include both deemed savings values and simple savings calculation assumptions. We understand that Avista’s current TRM does not include natural gas measures. The evaluation team will review all deemed assumptions and savings values currently being used by Avista for their natural gas programs and include the finding of our review and any recommendations as part of the annual TRM review process.

As an outcome of our review, the evaluation team will document inconsistencies found throughout our review and provide an assessment of gaps where additional formative impact evaluation efforts could be beneficial. If necessary, we will add data points to the information gathered during our impact evaluation activities, which will allow us to gather real-time data for revisions into the TRM. Our review of the TRM, including any recommendations for revisions, will be delivered in a separate memo to Avista and included in each required report for WA and ID separately, if requested.

# Process Evaluation Overview

## Overview of Approach and Methods

1. The purpose of the process evaluation is to identify any improvements needed at the program or portfolio level to increase program effectiveness, efficiency, and opportunities for future programs. Working in collaboration with the impact activities, the process evaluation will be carried out through data and documentation analyses and by collecting primary data from program staff, program participants and nonparticipants, and participating trade allies. We will use in-depth interviews and surveys as appropriate for each of these groups.
2. The evaluation team has identified some primary objectives and specific areas for investigation, which we summarize in Table 3-1 and discuss in greater detail in the following sections. In the table, a check mark illustrates the primary process evaluation objectives and the sources of information we will use to address the objective, while an “s” in a cell indicates the source will provide secondary or supporting information. We will discuss additional areas of inquiry with the Avista team in our initial round of staff interviews.

Table ‑: Information Sources to Be Used to Meet Process Evaluation Objectives

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Objective— To Assess: | Information Sources | | | | |
| **Program Documents** | **Interviews** | **Surveys** | | |
| **Descriptions; procedures; design docs; application forms; participant records; marketing materials; etc.** | **Staff & Implementation Contractors** | **Participating**  **Customers** | **Participating**  **Trade Allies** | **Nonparticipating Customers** |
| Appropriateness of design, participation procedures, internal communication, rebate processing activities (e.g., ease of use, cycle time) | ✓ | ✓ | ✓ | ✓ | ✓ |
| Accuracy, consistency, completeness of program records | ✓ | ✓ |  |  |  |
| Participant satisfaction with programs |  | s\* | ✓ | ✓ |  |
| Barriers to participation, effectiveness of incentives in motivating action | ✓ | s\* | ✓ | ✓ | ✓ |
| Effectiveness of marketing and promotional efforts; status of marketing research activities | ✓ | ✓ | ✓ | ✓ | ✓ |
| Opportunities for process improvement and potential programs; status of Avista response to previous evaluation recommendations |  | ✓ | ✓ | ✓ | s\* |
| Obtain data for net-to-gross analysis |  |  | ✓ | ✓ | ✓ |

1. \*indicates the source will provide secondary or supporting information

Table 3‑2 provides a summary of our interview and survey data collection for the process evaluation. These sample sizes will provide 10% precision at 90% confidence for most surveys. The participant survey will provide well more than 90/10 confidence/precision at the portfolio level. The retailer survey is not designed specifically to achieve 90/10 confidence precision for the entire population of retailers. Rather, the goal is to survey retailers to account for the largest portion of sales, and so it will represent *sales* rather than *retailers*.

Table ‑: Sample Sizes for Process Interviews and Surveys

|  |  |  |  |
| --- | --- | --- | --- |
| Contact | Sample Size | Method | Precision |
| Program Staff (Avista and Implementation Contractor) | 15 to 20 | Interview | n/a |
| Participating Customers | 665 | Survey | 90/10 |
| Nonparticipating Customers – Residential | 67 | Survey | 90/10 |
| Nonparticipating Customers – Nonresidential | 67 | Survey | 90/10 |
| Participating Trade Allies | 75 | Survey | 90/10 |
| Participating Buy-down Lighting Retailers | 30 to 50 | Survey | n/a |
| TOTAL | **920 to 948** | **Mixed Methods** |  |

1. We provide details of our planned evaluation activities for each of the interviewed or surveyed data sources in the subsequent section. Specifically, we identify the primary research questions that will guide instrument development, any sampling considerations, and details of how we will implement the data collection activities. In all cases, we will submit a draft data collection instrument to the Avista evaluation lead and will revise the instrument based on comments received.
2. We will analyze all data using the most appropriate method for the specific type of data and for the specific research questions asked. The in-depth interviews will consist primarily of open-ended questions, while the surveys will be primarily close-ended, with some brief open-ended items.
3. When there are a substantial number of respondents, we use NVivo, a proprietary software tool for analysis of qualitative data.[[3]](#footnote-4) This tool allows any response to be associated with multiple codes. Codes may be based on *a priori* considerations (as identified by interview guide topics, for example) or may arise from a content analysis of the responses themselves. This tool also allows for cross-tabulation of coded responses by other variables, such as respondent subgroups.
4. The evaluation team will analyze survey data (close-ended responses such as scales and categorical responses) with SPSS software, using both descriptive (e.g., frequency tables) and inferential methods (e.g., chi-square or Kruskal-Wallis H for nonparametric data and ANOVA for parametric data). We will analyze responses to open-end survey questions (e.g., an “other-specify” response from a multiple-choice item) by carrying out a content-analysis of responses using spreadsheet software such as Microsoft Excel. We will use inferential methods to investigate differences between specific groups. For example, we can examine whether program satisfaction or various aspects of program experience differ among participant subgroups.
5. Below, we organize our process evaluation activities into three areas: 1) inward-facing activities, 2) market feedback, and 3) special studies. Within each area, we describe the planned evaluation activities for each of the relevant interviewed or surveyed data sources.

## Inward Facing Activities

1. As described above, a key component of a process evaluation is identifying opportunities to improve program effectiveness and efficiency as well as identify opportunities for future programs. One useful perspective for viewing program-related activities is the inside view of the program among those working with the residential and nonresidential programs on a daily basis: the program staff and implementation contractors. We will review existing program documentation and interview both Avista program staff as well as representatives of program implementation contractors (both internal to Avista and third-party). Interviews with program staff are especially important in light of the mid-year 2014 organizational restructuring.
2. As described in more detail below, we will conduct several rounds of in-depth interviews (IDIs) beginning in early 2015. These IDIs will enable us to:

* Assess and revise as needed the program logic models,
* Develop basic program flow diagrams and identify any bottlenecks,
* Assess effectiveness of organizational structure, communication, program processes,
* Learn of status of past recommendations and any plans for changes or new activities,
* Understand strategic, market, and programmatic issues of concern to staff, and
* Solicit ideas for program improvements and opportunities.

### Interview Guide Development

1. The evaluation team will draft a single, comprehensive interview guide that senior evaluation team staff can tailor as-needed to accommodate the role and expertise of individual interview contacts. While preparing the guide, we will draw extensively on available program documentation such as the 2014 and 2015 Demand-Side Management Business Plans. As appropriate, we will request and review additional documentation such as Avista’s descriptions of marketing and outreach activities.
2. We will coordinate specific topic areas with Avista including the following:

* the contact’s role and responsibilities,
* objectives, activities, and expected outcomes for each program,
* program- and market-related barriers,
* staff organization (Avista’s or third party implementation contractor’s),
* perceptions regarding the mid-year 2014 Avista organizational changes,
* program support such as marketing and outreach,
* program tracking databases (including changes since the 2012-2013 evaluation),
* Avista’s responses to previous evaluation recommendations,
* issues of concern relevant to the 2014-2015 evaluation, and
* additional research issues to address through the current evaluation.

### Initial Interviews with Avista and Third Party Implementer Staff

1. Following Avista’s approval of the final interview guide, the process evaluation leads for the residential and nonresidential programs will schedule and conduct approximately one-hour telephone interviews with key Avista staff. We will audio record all interviews to ensure that we accurately capture all responses provided by staff.
2. During the project kick-off meeting, we identified the following individuals as candidates for initial interviews:

* Bruce Folsom (former Director of Energy Efficiency Policy)
* Dan Johnson (Sr. Manager, Energy Efficiency)
* Pat Lynch (Director of Energy Solutions)
* Chris Drake (Manager, DSM)
* Tom Lienhard (Chief Energy Efficiency Engineer)
* Jon Powell (DSM Analytical Manager)
* Catherine Bryan (Manager of Energy Solutions)
* David Thompson (2012-2013 Evaluation Project Manager)

1. In addition to discussing the topics mentioned above with these staff, an additional objective of the interviews will be to identify additional topics to discuss with the individual Avista program leads and implementation contractor contacts. We also use these interviews to identify any additional Avista staff that we should interview.
2. Following our interviews with the staff identified above, we will make adjustments to the interview guide as necessary and then schedule and conduct telephone interviews with Avista program managers for the residential and nonresidential programs. The current organization chart suggests that individual staff have multiple responsibilities with some overlap among programs, and with Avista’s input, we will consider the feasibility and benefits of scheduling one or two group interviews with these staff rather than multiple individual interviews.
3. In addition to interviewing Avista staff, we will also interview key contacts from third party implementation contractors and we will work with Avista to identify three to four Community Action Agency contacts to interview. These interviews will primarily address how the agencies work with Avista, including understanding of program requirements, program paperwork and reporting requirements, how they work with installers to serve the low-income community, challenges they have faced, and feedback they have received from participants and installers.
4. We will revise our list of contacts as needed based on feedback from Avista.

### Mid-year 2015 Staff Interviews

1. Approximately midway through calendar year 2015, in consultation with Avista evaluation staff, we will schedule and conduct follow-up telephone interviews with up to a dozen program staff. We will use these interviews as a ‘check-in’ to learn about any mid-year program changes, market developments, and further perceptions or reflections regarding the Avista organizational changes. We anticipate these interviews will last about 30 minutes.

### 2016 Staff Interviews

1. In early 2016, we will again schedule and conduct ‘check-in’ interviews with relevant program staff. We will use these to learn about any further program changes, updates on program-related activities, and any program-related concerns. We will also use this final round of interviews to inform our final analysis prior to drafting the process evaluation report.

### Analysis and Reporting

1. We will use NVivo qualitative analysis software to analyze the responses from all the in-depth interviews. NVivo enables us to analyze responses by individual contact or by question across all contacts. The software also facilities the coding of responses to aid our analysis, as well as identifying relevant quotes suitable for the report.
2. We will develop process flow diagrams to address program challenges identified through our interview and survey activities. This could include issues such as slow delivery or confusion regarding program flow. Process diagrams are especially useful for programs that are very new or complicated, or for programs that are struggling, either with low participation or project delays. They help identify steps in the program process that may create problems or bottlenecks, opportunities to reduce the number of steps or players, and approaches to mitigate these problems. Once developed, the flow diagrams often serve as a working document that can be modified as the program changes.
3. Our review of program documents will inform our development of the diagrams. The process flow diagrams will graphically show the flow of information and paperwork. If the programs have existing process flow diagrams, we will use them during the evaluation and update them when appropriate. At a minimum, our updates will identify the key program processes and who is responsible for each, and how long each of the processes takes (if sufficient data are tracked). A key element of the analysis is developing a visual representation of the process flows, and we will use graphic software such as Visio or PowerPoint to produce the flow diagrams.
4. We will document our analysis along with our conclusions and recommendations in one or more chapters in the draft process evaluation report. We will determine the specific structure and content outline of the report in consultation with Avista EM&V staff. In our report, we will discuss program-related activities and progress towards goals, identify success and challenges in current program design, program delivery and implementation, and recommendations for program improvement.
5. We will submit the process flow diagrams and draft chapters to Avista for review and will revise them based on comments and feedback received.

## Market Feedback

### Participating Customers

1. We will survey 2014 and 2015 program participants. We will survey the 2014 participants in Q1 2015 and will survey the 2015 participants on a quarterly basis, starting in Q2 2015 and ending in Q1 2016. In each quarterly survey of the 2015 participants, we will survey participants that received incentives the previous quarter.

#### Instrument Development

1. In developing the participant survey, we will work to identify the most important research questions – the “must haves” – to ensure that the survey provides the information that will best serve the process evaluation while minimizing respondent burden. We have already identified several important research topics: satisfaction, source of awareness, decision-making, net-to-gross inputs (free-ridership and spillover), motivations for and barriers to participation, purchase of promotional CFLs, and ideas for program improvements and program opportunities. We will use interviews with Avista and implementer staff members to identify any additional topics or research questions to ask.
2. We will use the satisfaction questions as phrased by the previous process evaluation contractor, so that we might be able to compare satisfaction rates from 2010 through 2015.
3. The survey of 2014 program participants will assess both free-ridership and spillover. The quarterly cohort surveys for 2015 participants will assess free-ridership but will not assess spillover as insufficient time will have passed between participation and survey for customers to have engaged in much spillover behavior. On Avista’s approval, in 2016 we will conduct an optional spillover-only survey of 2015 electric participants. If Avista decides not to approve the optional 2016 spillover study, the evaluation team we can apply the spillover estimate from the survey of 2014 participants to both the 2014 and 2015 program years.
4. We will submit the draft survey instrument to Avista’s evaluation lead by January 21, 2015 and will revise the instrument within one business week after receiving comments.

#### Sample Development

1. To ensure coordination between the impact and process evaluations in participant contact, Nexant will lead the sample development activities. Nexant will work with Avista to identify a schedule for receiving the program data necessary to support the survey cohorts described above.
2. We have estimated quarterly cohort sample sizes under the simplifying assumption that participation rates do not vary across the year (see Table 3‑3). We will revise the sample sizes as necessary to reflect participation rates by quarter in 2014. For each program, we will select the samples so that the distribution of measures is roughly similar to the distribution of rebated measures.

Table ‑: Sample Sizes for Participant Survey

|  |  |  |  |
| --- | --- | --- | --- |
| Programs | 2014 Cohort | Each 2015 Quarterly Cohort | Total Sample |
| Washington/Idaho Electric | | | |
| Residential Appliance Recycling | 34 | 9 | **70** |
| HVAC Program | 32 | 9 | **67** |
| Water Heater Program | 5 | 2 | **11** |
| ENERGY STAR Homes | 8 | 2 | **15** |
| Fuel Efficiency | 5 | 4 to 5 | **24** |
| Shell Program | 12 | 3 | **24** |
| Nonresidential Prescriptive (except Lighting) | 32 | 9 | **68** |
| Cascade Energy Pilot | 1 | 1 | **5** |
| Nonresidential Lighting | 32 | 9 | **68** |
| Site Specific | 40 | 11 | **84** |
| Washington Gas | | | |
| Water Heater Program | 5 | 1 to 2 | **11** |
| ENERGY STAR Homes | 5 | 2 | **13** |
| HVAC Program | 32 | 9 | **68** |
| Shell Program | **12** | 3 | **24** |
| Nonresidential Prescriptive (Appliance) | 5 | 1 to 2 | **11** |
| Nonresidential Prescriptive (Shell) | 12 | 3 | **24** |
| Nonresidential HVAC | 12 | 3 | **24** |
| Nonresidential Food Service | 5 | 1 to 2 | **11** |
| Site Specific | 20 | 5 to 6 | **43** |
| TOTAL | **309** | **356\*** | **665** |

1. \* This is the total for 2015

#### Survey Implementation

1. The team will field the survey using Nexant’s in-house call center. We will field the survey of 2014 participants as soon as possible in Q1 of 2015. Our goal will be to complete the 2014 survey before we begin surveying the first quarterly cohort of 2015 participants. However, the 2014 cohort will be equal in size to the entire 2015 cohort, so it may be completed only shortly before the Q1 2015 survey begins, or conceivably there may be some overlap.
2. We will monitor results of the 2014 cohort survey on an ongoing (e.g., weekly or biweekly) basis. This will enable us to determine whether we should add, drop, or revise any survey questions before we begin implementing the Q1 2015 survey.

### Participating Trade Allies

1. We will also conduct surveys with up to 75 participating trade allies working in the following six markets: HVAC, water heating, insulation, motors, commercial lighting, and commercial refrigeration (groceries). We anticipate that most installers working in Avista’s territory serve both residential and nonresidential customers. Below, we explain how we will ensure that this survey speaks to Avista’s residential and nonresidential programs, its Washington and Idaho territories, and its electric and natural gas fuels.

#### Instrument Development

1. As with the participant survey, we already have identified several research topics to explore, which we may supplement with any additional topics or research questions identified in our interviews with Avista and implementer staff.
2. We will explore trade allies’ familiarity and satisfaction with program offerings (including qualifying measures, incentives, and application procedures), Avista’s program marketing, and their experiences and satisfaction with Avista’s program communications and problem-solving.
3. We will explore motivations for and barriers to participation (both the trade allies’ and their customers’) and will seek ideas for program improvements and potential program opportunities.
4. We also will ask respondents about their sales practices and their roles in identifying savings opportunities and designing solutions. We know from past studies that while some installers use a “Good, Better, Best” approach to sales – an approach that can promote qualifying measures as “Best” – other installers bid only their “Good” option, for fear of losing the bid or raising customer suspicion that they are seeking a high margin. We will investigate the use of those competing approaches.
5. We will assess net-to-gross inputs, including program impact on sales, stocking and nonparticipant spillover.
6. Finally, we will assess firmographic information, such as company size, type(s) of equipment sold and installed, primary type(s) of customers, and geographic area(s) covered.
7. We will submit the draft survey instrument to Avista’s evaluation lead by the first week of May 2015 and will revise the instrument within one business week after receiving comments.

#### Sample Development

1. We will develop the sampling plan for the trade ally survey from a roster of known trade allies, such as the Northwestern Lighting Network or any Avista-sponsored trade ally network, or from the project database.
2. We will use the available information on trade allies, such as their geographic location, the type(s) of equipment they handle and customers they serve, and the number and size of Avista-funded projects completed, to develop the sample. Our goal will be to ensure that the sample represents trade allies that serve Avista’s residential and nonresidential programs, its Washington and Idaho territories, and its electric and natural gas fuels. We currently anticipate completing surveys with installers working in the following six markets: HVAC, water heating, insulation, motors, commercial lighting, and commercial refrigeration (groceries).
3. Table 3‑4 shows our initial expectation regarding the distribution of the sample across equipment types. We may revise this after reviewing the available information on trade allies and interviewing Avista and implementer staff. We will submit a draft sampling plan to Avista’s evaluation lead by the first week of May 2015 and may revise the plan based on feedback received.

Table ‑: Sample Sizes for Trade Ally Survey

|  |  |
| --- | --- |
| Installer Type | Sample Size |
| HVAC | 15 |
| Water Heating | 15 |
| Insulation | 15 |
| Commercial Lighting | 15 |
| Commercial Refrigeration | 8 |
| Motors | 7 |
| TOTAL | **75** |

#### Survey Implementation

1. The team will field the survey using Nexant’s in-house call center. We anticipate fielding the survey over a three-to-four-week period in mid-2015.

### Nonparticipating Customers

1. We will survey 67 residential and 67 nonresidential nonparticipating Avista customers in mid-2015.

#### Instrument Development

1. As with the participant and trade ally surveys, we already have identified several research topics to explore, which we may supplement with any additional topics or research questions identified in our interviews with Avista and implementer staff. Again, in instrument development, we will focus on identifying the most important topics to address to minimize survey burden.
2. We will explore, among other topics, awareness of Avista’s energy efficiency programs appropriate to their fuel usage, source of awareness, purchases in the last two years of the types of products for which Avista provides incentives (such as water heaters), purchases of efficient equipment (spillover), and purchase of promotional CFLs (for the CFL markdown measures uptake study). We also will assess motivations for and barriers to participation and decision-making, including the role that contractors and vendors have made in their decisions.
3. We will tailor the residential and nonresidential surveys to their specific audiences.
4. We will submit the draft survey instrument to Avista’s evaluation lead by the end of May 2015 and will revise the instrument within one business week after receiving comments.

#### Sample Development

1. We will develop the nonparticipant samples from Avista customer records, if they are made available to us. This is the best possible source of data, as it ensures that we do not contact businesses and residences outside of Avista territory (as may happen with purchased lists). Further, customer records would include energy usage data, which would be particularly valuable in developing the nonresidential sample. Basing the sample on Avista customer data also will enable us to ensure that the sample accurately represents the geographic distribution of Avista customers – so that, for example, we do not over-sample customers from areas with low population density.
2. The team will adhere to all Avista requirements in handling customer data. Both Nexant and Research Into Action have developed strict protocols for handing confidential information. These include using secure ftp sites rather than email to transfer data, transferring data in encrypted files, and keeping customer contact information separate from other sensitive data, such as usage data.

#### Survey Implementation

1. The team will field the survey using Nexant’s in-house call center. We anticipate fielding the survey over a three-to-four-week period in mid-2015.

## Special Studies

1. In addition to our inward-facing and market feedback-related process evaluation activities, we will conduct three additional special studies.

### Investigating Declining Program Participation Rates

1. The 2012-2013 process evaluation report noted that program participation rates peaked in 2010 based on the number of rebated measures and that participation has since declined. We will conduct analyses to investigate several possible explanations for the decline.

#### Analysis of Discontinued Measures and Reduced Rebate Incentives

1. The 2012-2013 process evaluation report suggested that one explanation for the decline in participation was fewer rebated measures and the reduced incentive amounts that Avista offered in response to declining avoided costs. Using data from the 2010 program database as our baseline, we will compare the list of rebated measures in the 2010 program database against the list of rebated measures in the 2014 program database to determine the measures that have since been discontinued. We will determine the proportion of delivered rebates in 2010 comprised by these subsequently discontinued measures and use this information to determine theoretical participation in 2014 in the absence of these measures. We will then determine actual participation using the 2014 program database and compare the results against the theoretical participation results to assess the effect of the discontinued measures on participation, and we will complete the analysis for both residential and nonresidential program measures for customers in both Washington and Idaho.
2. We illustrate our analysis approach below with the following simple, hypothetical example:

Table ‑: Hypothetical Example

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 2010 | | Theoretical 2014 | | Actual 2014 | |
| **Measure** | **Available (Y/N)** | **# Rebates** | **Available (Y/N)** | **# Rebates** | **Available (Y/N)** | **# Rebates** |
| A | Y | 17 | Y | 17 | Y | 20 |
| B | Y | 20 | N | 0 | N | 0 |
| C | Y | 9 | Y | 9 | Y | 8 |
| **Total** | **Y** | **46** | **2** | **26** | **2** | **28** |

Using the data above, the theoretical 2014 decline (relative to 2010) in participation because of discontinued measures is 43%, whereas the actual decline is 39%. In turn, these results suggest that although increased participation in other measures has ameliorated the overall decline, most of the overall decline is attributed to the discontinued measures.

We will repeat the analysis above focusing on the measures for which Avista has lowered the rebate incentive amount rather than discontinue the measure. This analysis will provide a high-end estimate of the amount of decline associated with reduced rebate incentives. After accounting for the potential effects of these two program changes, we will be able to assess the relative importance of other factors that Avista may be able to influence through program design changes.

#### Analysis of Repeat and/or Multiple Program Participation among Customers

Although we still need to verify the feasibility and determine the logistics of matching customer records over multiple program years, pending further investigation of the program databases, we will conduct a second analysis to assess patterns of participation in multiple programs among both residential and nonresidential customers over three-year increments.

We will assemble the program databases for 2010 through 2015 (when it becomes available), and then beginning with 2012, we will calculate the proportion of residential and nonresidential program participants that also participated in one or more programs during 2010 or 2011. Similarly, for 2013, 2014, and 2015 participants, we will calculate the proportion of participants that also participated in one or more programs during the two previous years. This process will yield four distinct data points that we will use to identify year-over-year changes in multi-program participation.

#### Analysis of Availability of Qualifying Measures at Lower Price Points

We will conduct a third analysis using existing program data to determine whether limited product availability may be influencing program participation. Previous research we conducted for the Energy Trust of Oregon revealed that the proportion of rebated refrigerators at lower price points declined sharply over several years. A single brand dominated the lower-priced refrigerator models that qualified for rebates, which, in turn, suggested that consumers had relatively few models to choose from at the lower end of the market. We will conduct a similar analysis using a measure selected in consultation with Avista staff from among those that have declined in rebated units over the past few years. As part of our analysis, we will examine the program database to assess the measure’s efficiency tier, rebate amount, manufacturer, unit cost, and if relevant, configuration.

### Investigating Participation Rates among Opower Behavioral Program Participants and Nonparticipants

1. We will conduct an analysis of Opower Behavioral Program participants and nonparticipants to explore differences in participation rates in Avista’s rebate programs. Using program databases for 2013, 2014, and when available, 2015, we will organize residential customers by state into three groups—Opower treatment group customers (participants), Opower control group customers, and customers in neither the treatment nor control (uninvolved) groups. For a sample of customers in each group (to be determined later in consultation with Avista), we will match each customer with their participation records in Avista’s rebate programs during the three program years. We will analyze differences in overall rebate program participation rates among the three groups by year, and we will explore differences in the participation rates among individual programs. For example, we might find that 17% of Opower Behavioral Program participants received rebates in a given year, compared with 7% of customers in the control group, and 1% of customers in the uninvolved group.
2. We will also compare participant rebate incidence rates with the proportion of savings attributable to the rebates. For example, we might find that 17% of Opower Behavioral Program participants also received rebates and the rebated savings comprise 38% of total Opower program savings when those savings are not adjusted to eliminate double counting.[[4]](#footnote-5) We will also determine the proportion of rebate program savings attributable to Opower program participants.
3. We will conduct these analyses for each program year, to explore changes over time. We note, for example, that Opower participants received their Home Energy Reports (HERs) monthly during the first three months of the program and bi-monthly reports thereafter. Understanding the importance of rebated measures in Opower Behavioral Program savings will enable Avista to better understand the extent to which Opower (the HERs) is effective in promoting Avista’s other programs, changes in effectiveness over time, the extent of induced behavioral savings not attributed to rebated measures, and the persistence of the rebated measure portion of the savings.

### Investigating Commercial Uptake of CFL Markdown Measures

1. We will employ two methods for estimating the proportion of CFL markdown bulbs going to the residential and nonresidential sectors. We will triangulate the research findings to obtain an estimate to be used in the impact assessment.
2. Our first approach is to include questions in the residential and nonresidential participant and nonparticipant survey to assess purchase of promotional CFLs and whether the description of the promotional CFLs correspond to the in-store signage. The second approach, described in Section 3.4.3.1, will be to field a very short survey to retail contacts for the program to assess the distribution of sales across sectors.

#### Retailer Survey

1. We will develop a brief (10 question) survey asking retail contacts to estimate what percentage of their sales of promotional CFLs go to the residential and nonresidential sectors. We will ask whether that estimate is based on tracked sales or their general impression. We will use this information to gauge reliability of the information received. We will ask when they began their promotion of CFLs and whether and how the distribution of CFLs between sectors changed after the promotion began. We will explore a similar line of questioning for the distribution of sales of LEDs between sectors.
2. We will submit the draft survey instrument to Avista’s evaluation lead by September 30, 2015 and will revise the instrument within one business week after receiving comments.
3. We will target the retailers that collectively account for more than two-thirds of the total program sales. Depending on the distribution of sales across stores, we anticipate interviewing 30 to 50 retailers. We will request a list of participating stores from Avista, including information on number of bulbs sold and store contacts. The surveys will be completed by evaluation team survey staff.

# Other Activities

1. This section outlines additional activities to be conducted for the evaluation, including the cost-effective analysis, interactions with the Advisory Group and Commission staff, and the evaluation team’s planned reference to the Regional Technical Forum.

## Cost-Effectiveness Analysis

1. Cost-effectiveness analysis is critical for comparing different resource options and for optimizing investments. When completed correctly, it allows for meaningful comparisons between DSM offerings and traditional resource options (generation, transmission, and distribution,) and provides a basis for prioritizing investments. Key goals of cost-effectiveness analysis are to provide factual insights, make tradeoffs transparent, improve the planning process, and help maximize value. The evaluation team also understands that submission of annual cost-effectiveness reports and findings are a regulatory compliance requirement for Avista and must follow filed agreements. Cost-effectiveness can be assessed from a variety of perspectives, including;

* Total Resource Cost (TRC) Test; including the perspective of both the participant and the sponsoring utility,
* Program Administrator Cost (PAC) Test; as known as the Utility Cost Test (UCT), which represents the perspective of both the participant and the sponsoring utility
* Participant Cost Test (PCT); which represents the perspective of the participant,
* Ratepayer Impact Measure (RIM) Test; which represents the perspective of rates for the general population, in particular the non-participating customer, and
* Levelized Cost of Saved Energy.

1. The evaluation team will complete a benefit-cost analysis to compare the value of the benefits resulting from DSM program intervention to the costs incurred. The calculations will be completed consistent with standard industry practices, including prior Avista filings, the California Standard Practice Manual[[5]](#footnote-6), and the National Action Plan for Energy Efficiency. The evaluation team understands that Avista’s regulatory compliance rules require different cost-effectiveness tests, including: the Total Resource Cost Test for electricity programs and the Program Administrator Cost Test for natural gas programs. The evaluation team will directly provide the benefits, as verified gross and net demand and energy savings, as well as time of use characteristics to calculate avoided cost benefits. It is expected that the calculation of other cost-effectiveness components, including additional resource savings, program administrative costs, and incentive payments will be generated by Avista. Table 4‑1 summarizes the allocation of cost-effectiveness components as a cost or benefit to each cost-effectiveness test.

Table ‑: Cost-Effectiveness Component Inputs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Component | Program Administrator  Cost Test (PACT) | Total Resource Cost (TRC) | Participant Cost Test (PCT) | Rate Impact Measure (RIM) |
| Utility Energy & Capacity Avoided Costs | **Benefit** | **Benefit** |  | **Benefit** |
| Non-Utility Energy & Capacity Energy Costs |  | **Benefit** | **Benefit** |  |
| Non-Energy Benefit Impacts |  | **Benefit** | **Benefit** |  |
| Incremental Equipment and Installation Costs |  | **Cost** | **Cost** |  |
| Program Non-incentive (admin) Costs | **Cost** | **Cost** |  | **Cost** |
| Incentive Payments | **Cost** |  | **Benefit** | **Cost** |
| Retail Savings due to Technology Installation |  |  | **Benefit** | **Cost** |

### Key Parameters

1. The evaluation team’s cost-effectiveness analysis methods allow for 8,760 hourly avoided cost tables to be included, especially where the evaluation team collects or has access to 8,760 hourly load shapes (e.g., CFL hourly operation) for energy-efficiency measures. We anticipate using a 10% additional benefit for utility energy avoided costs consistent with practices in the Pacific Northwest to account for broader environmental benefits.
2. The cost effectiveness analysis will include key parameters from Avista filings and/or RTF and Northwest Power and Conservation Council wherever possible. Examples would include net incremental equipment costs, measure life, discount rate, etc. Included non-energy benefits will be limited to where reliable and quantifiable research is present, such as water savings and equipment maintenance. “Softer” benefits that are significantly more difficult to quantify, such as comfort, reliability, productively, safety, etc., will not be included in the analysis.

### Reporting

1. The evaluation team anticipates performing an individual annual cost-effectiveness report for each program and the portfolio by fuel and state for each year by the April following each program year. In the first annual report for 2014, we will utilize “locked” values from the filing, because very limited evaluation research will have been completed.
2. The reports will include step by step methodologies for each of the cost-effectiveness tests, all cost and benefit components, and the algebraic formulas used to derive the tests, so that the reader may follow the mathematical logic and better understand the inputs, operators, and outputs. An example of the algebraic formulas used to derive the tests is provided below for illustration purposes:
3. Where:

UACt = Utility avoided supply costs in year t

PRCt = Program administrator program costs in year t

PCNt = Net participant costs (equipment costs) in year t

FRINCt = Incentives paid to freeriders in year t

d  *=* Nominal discount rate

## Interactions with Advisory Group and Commission Staff

1. The evaluation team understands the importance of keeping the advisory group and commission staff informed of pertinent evaluation activities and findings. Applicable evaluation team members will attend, either via phone conference or in-person, quarterly Advisory Group meetings and update this group on evaluation activities as deemed appropriate and necessary.

## Use of reference to Regional Technical Forum

1. The Regional Technical Forum (RTF) has developed formalized processes for calculating, approving, and updating Unit Energy Savings (UES) for a broad spectrum of energy efficiency measures applicable across customer segments. The evaluation team recognizes the economic benefits of utilizing the RTF measure workbooks to streamline the evaluation process. Where Avista energy efficiency programs incentivize measures with proven RTF values, the evaluation team will rely heavily on this resource to manage evaluation costs. There are cases, however, in which the measures Avista incentivizes may only align with RTF measures in the Provisional or Small Saver categories. In these circumstances, we will review the RTF UES values and measure workbooks, as well as rely on our expertise and utilize industry best practices to evaluate the impact of these measures. We will also balance the priorities for study rigor and evaluation complexity with a focus on high impact measures, new or changed programs, and measures or programs that will be flagged for deeper focus based on a review of the prior evaluation. Furthermore, experts on the evaluation team will review all “proven” UES measure savings to ensure they are applicable to Avista’s specific customer programs.
2. We will estimate NTG values for all evaluated program savings. However, for those program measures that utilize an RTF defined market baseline value, we will not apply freeridership to these measures, since freeridership is already accounted for in the market baseline. In other words, for RTF measure savings estimates based on market baselines, freeridership ratios based on the evaluation activities will not be applied and only spillover ratios will be used for the NTG adjustment

# Schedule and Budget Summary

1. This section presents the schedule and budget for the evaluation activities, including major and intermediate deliverables. In addition to the deliverables outlined herein, the evaluation team will also conduct regular meetings with Avista evaluation staff to keep the team apprised of current status, upcoming tasks, and to discuss any questions or concerns.

## Schedule and Key Milestones

1. The project timelines shown in Figure 5‑1and Figure 5‑2 outline the expected timing of key impact and process evaluation activities and deliverables for the EM&V of Avista’s 2014-2015 DSM Programs.

Figure ‑: Impact Team Activities Gantt Chart

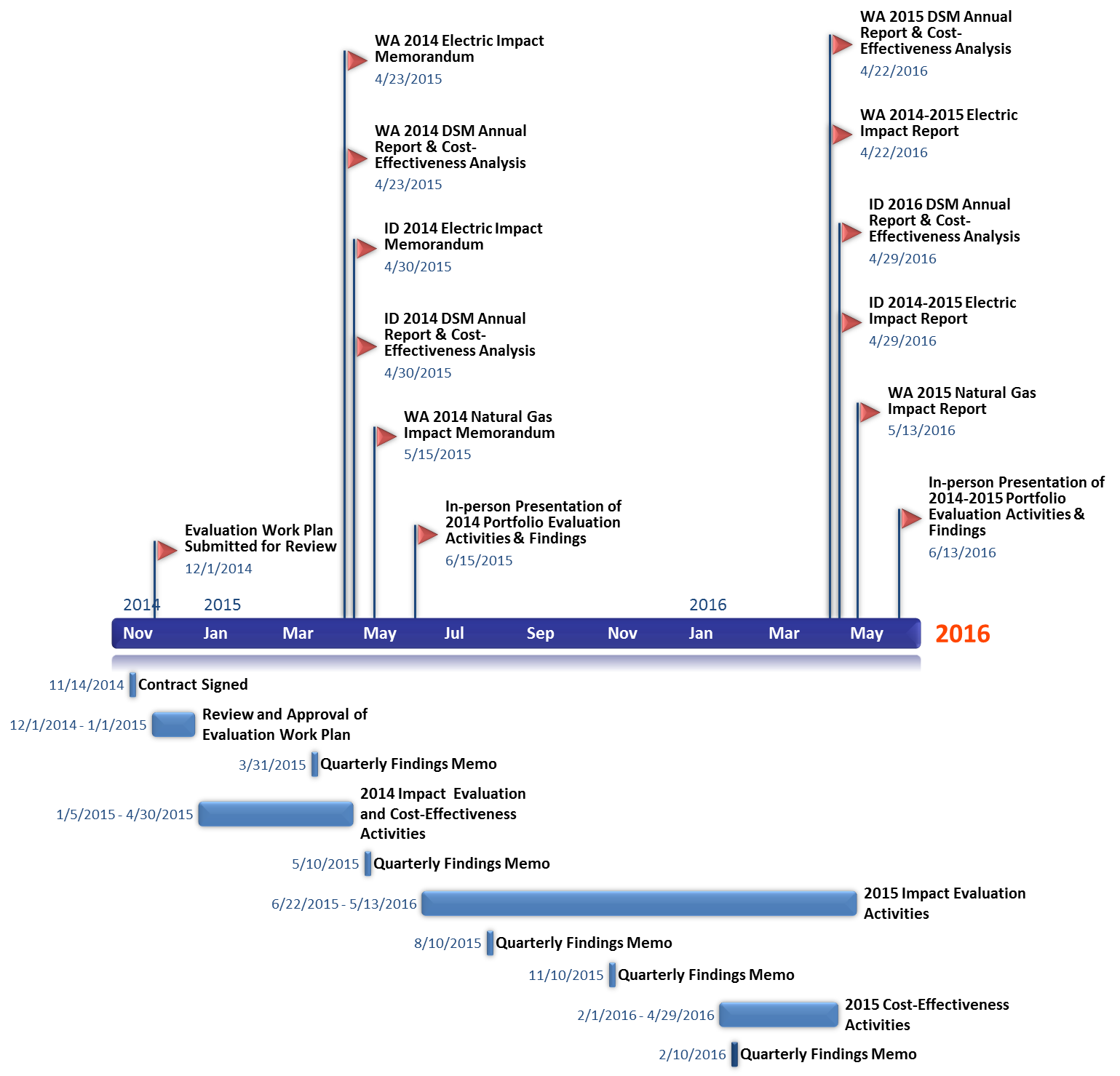
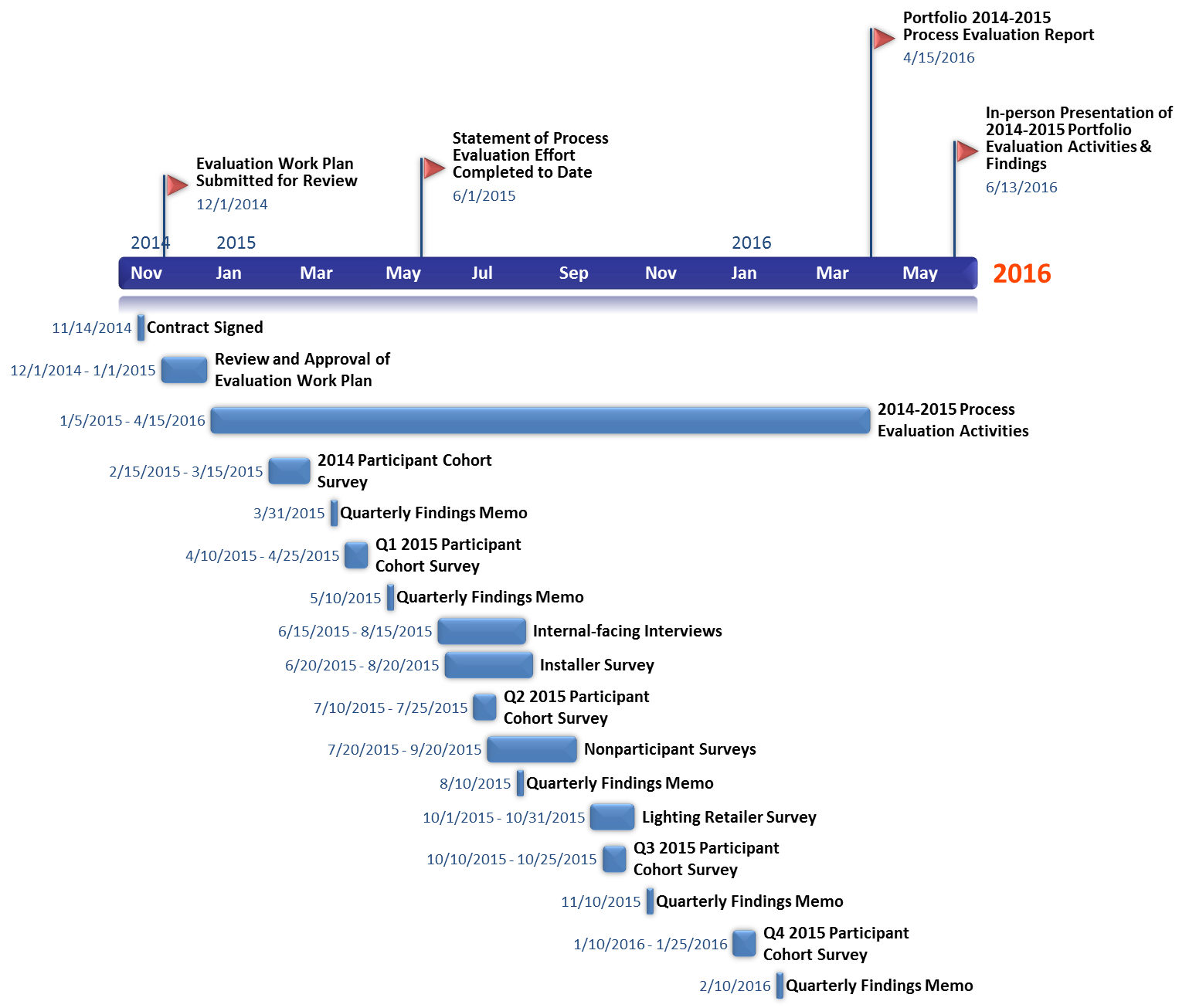
1. 

Figure ‑: Process Team Activities Gantt Chart

1. 

## Budget

1. Table 5‑1 outlines the evaluation team’s cost to complete the scope of work for each deliverable outlined in this work plan. The services will be conducted on a time and materials basis (T&M) with a total not-to-exceed of **$1,138,575**.

Table ‑1: Evaluation Team budget per deliverable

|  |  |
| --- | --- |
| 1. Deliverable | 1. Cost |
| 1. Deliverable 1: Evaluation Work Plan | 1. $40,000 |
| 1. Deliverable 2: Natural Gas Impact Evaluation | 1. $197,120 |
| 1. Deliverable 3: Electric Impact Evaluation | 1. $565,537 |
| 1. Deliverable 4: Process Evaluation Report | 1. $286,028 |
| 1. Deliverable 5: Annual Reports with Cost Effective Analysis | 1. $49,890 |
| 1. **TOTAL BASE COST** | 1. **$1,138,575** |

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1. Coefficient of Variance for lamps is established at 0.95 based on prior metering experience. [↑](#footnote-ref-2)
2. Final metered sample size of approximately 420 is 10% larger than needed sample size to accommodate poor data and/or study drop-outs as recommended by DOE UMP. [↑](#footnote-ref-3)
3. For more information, see: <http://www.qsrinternational.com/products_nvivo.aspx>. [↑](#footnote-ref-4)
4. During the kick-off, Avista staff confirmed that the previous evaluation did verify that savings estimates were not being double counted. [↑](#footnote-ref-5)
5. “California Standard Practice Manual: Economic Analysis for Demand-Side Programs and Projects”; State of California; July 2002, with subsequent amendments [↑](#footnote-ref-6)