Appendix B:

2018 Evaluation, Measurement and Verification Plan

Avista Utilities

2018 Energy Efficiency Evaluation, Measurement and Verification Annual Plan

I. Contents

2018 Energy Efficiency Evaluation, Measurement and Verification Annual Plan

II. Background

The Company's 2018 Energy Efficiency Evaluation Measurement and Verification (EM&V) Annual Plan, in combination with the Avista EM&V Framework, is intended to identify the evaluation, measurement and verification activities planned to be performed in 2018 in order to adequately inform and assess energy efficiency programs provided by Avista for its customers in Washington and Idaho. This evaluation effort is not only to verify savings estimates of the 2017 program year, but is to be used to enhance program design and improve the marketing and delivery of future programs. This document also provides the projected 2018 EM&V budget.

III. Overview

Avista's 2018 EM&V Annual Plan identifies evaluation activities intended to be performed during 2018 on the 2017 energy efficiency portfolio. For Washington, the evaluation of 2016 acquisition will be consolidated with results from the 2017 evaluation to satisfy biennial reporting requirements associated with Washington's Energy Independence Act (EIA), also known as I-937. The scope of this Plan is consistent with prior evaluation plans as presented to Avista's Advisory Group. A comprehensive EM&V overview and definitions are included in Avista's EM&V Framework, a companion document to this Plan.

A key consideration integrated into this Plan is the role of the independent third-party evaluator that will perform the majority of evaluation planning, tasks, analysis, and external reporting as coordinated by Avista DSM Staff. Nexant is the current evaluator for the 2016-2017 biennium and an evaluator for the next biennium is unknown at the time of this writing.

The following details the key aspects of this Plan:

- The Company continues to pursue a portfolio approach for Impact Analysis, insuring a comprehensive annual review of all programs, to the degree necessary, based on the

magnitude of savings and uncertainty of the related unit energy savings (UES) values and magnitude of claimed energy efficiency acquisition relative to the portfolio.

- Inherent in the impact analysis for 2016, a locked UES list identifying a significant number of UES values is available to leverage through verification rather than fundamental impact analysis, however this list of UES will be reevaluated for 2017 once the impact analysis from Nexant is provided. Measures will also be updated to reflect "best science" from other sources as well, primarily the RTF.
- Portfolio impact evaluations will be conducted for all electric and natural gas programs in Washington and Idaho. For programs with a majority of savings or particular aspects of interest, such as a high level of uncertainty, detailed impact evaluations using protocols from the Uniform Methods Project, International Performance Measurement and Verification Protocol (IPMVP) and other industry-standard techniques for determining program-level impacts will be used. Billing analyses will be incorporated as appropriate.
- Electric energy efficiency acquisition achieved during 2016 will contribute to the biennial savings acquisition for EIA compliance, which will complete its fourth biennium at the end of 2017.[1]
- A final evaluation of the electric programs deployed during 2016 and 2017 will be initiated prior to the end of 2017 in order to meet the June 1, 2018, filing deadline in Washington.
- The evaluation will provide energy efficiency acquisition results with 90% precision with a 10% confidence interval. Discrete measures may be represented by reduced precision and wider confidence, such as 80% with a 20% confidence interval, but must support the required portfolio criteria of 90%/10%.
- This planning document will not be construed as pre-approval by the Washington or Idaho Commissions.
- Evaluation resources will be identified through the development of the 2018 evaluation work plan in conjunction with the independent, third-party evaluator. Primary segments will include:
  - Residential
    - The impact analysis will consider the portfolio of measures provided to residential customers during the program year. Evaluation effort will be focused on measures that contribute significant portfolio savings and allow consolidation and grouping of similar measures to facilitate the evaluation.
  - Low Income
    - For the impact analysis, billing analysis on the census of measures, including conversions, will be conducted. In addition, a comparison group, possibly consisting of Low Income Home Energy Assistance Program

[1] Washington Initiative 937 was approved by voters on November 7, 2006. Codified as RCW 19.285 and WAC 480-109, the energy efficiency aspects of this law became effective on January 1, 2010.

(LIHEAP) or Low Income Rate Assistance Program (LIRAP) participants, may be incorporated into the analysis if possible.

- Non-Residential
  - Interviews of Avista staff and third-party implementers will be conducted, along with customer surveys, tracking databases, marketing materials and quality assurance documents.

- Consideration will be made recognizing most of Avista's current portfolio of electric energy efficiency offerings has been in place since 1995 and natural gas programs available since 2001.
- A Process Evaluation report will be delivered as part of the 2017 Demand Side Management Annual Conservation Report which addresses program considerations for that program year.

IV. External EM&V Budget for Evaluations

For 2018, the total budget for external evaluation is estimated to be $1,312,612 on a total system basis. The following table identifies evaluation activities and allocations that are anticipated for 2018. The Washington and Idaho expenses include evaluation activities for both electric and natural gas fuel types.

Individual Evaluations	Evaluation Type	Contractor	Budget (System)	WA expense	ID expense
2016-2017 Electric and Natural Gas Portfolio	Impact	Nexant	$415,000	$315,400	$99,600
2018 Electric and Natural Gas Portfolio	Impact and Process	TBD	$777,612	$544,328	$233,283
Electric and Natural Gas DSM Operations (or components of)[2]	Process	Nexant	$120,000	$91,200	$28,800
Total Budget for Individual Evaluations			**$1,312,612**	**$950,928**	**$361,683**

V. Overall 2018 EM&V Budget

The table below captures the individual evaluations specifically identified in the previous table in aggregate and augments them with the associated expenses necessary to manage EM&V activities,

[2] Process evaluation efforts may be directed to a further investigate past process evaluation findings rather than perform a new portfolio evaluation.

perform internal EM&V evaluations, acquire physical EM&V equipment and actively participate in and fund the activities of the Regional Technical Forum (RTF).

Activity	Budget (WA/ID system)	Internal budget	External budget	WA expense	ID expense
Individual evaluations previously specified	$1,227,612	$10,000	$1,217,612	$852,328	$365,284
Regional Technical Forum dues	85,000	-	85,000	59,500	25,500
Total	**1,312,612**	**$10,000**	**$1,322,612**	**911,828**	**390,784**
Expected total DSM budget	$27,474,289			$19,547,270	$7,927,019
EM&V as a % of total DSM budget[3]	**4.78%**			**4.66%**	**4.93%**

VI. EM&V External Evaluation Contract

In September 2017 Avista published a Request for Proposal for the evaluation, measurement, and verification activities associated with the demand side management portfolio as executed by Avista during the 2018 and 2019 program years. The selected external evaluator is yet to be determined.

VII. Summary of Individual Evaluations

Provided below is a summary of each of the external evaluation activities anticipated to occur in 2018. All savings estimates, calculations, assumptions and recommendations will be the work product of the independent evaluator in conjunction with the respective portfolio impact, process, or market evaluation component. The final evaluation plan provided by Nexant will also be included in this plan as an appendix.

2016-2017 Electric and Natural Gas Portfolio Impact Evaluation

The electric and natural gas portfolio impact evaluation will be performed by Nexant, an independent third party evaluator that was selected through a competitive bidding process. Based

[3] While EM&V expenditures will be directly assigned where appropriate, this illustrates the anticipated allocation of estimated EM&V expenditures

on the evaluator's work plan, performance data and supporting information may be derived from primary consumption data collected in the field, site audits, phone surveys, billing analysis, and other methods identified to effectively quantify the energy performance of the energy efficiency measure.

Similar to prior evaluations, billing analyses is to be conducted to identify the electric and natural gas impacts of the Low Income Program based on a census of program participants to estimate savings by state, fuel type, and overall program levels. For this evaluation cycle, savings estimates will be evaluated through a combined approach of billing and engineering analysis, as well as developing net savings estimates by measuring the effects of a comparison group.

If possible, a Low Income comparison group study may be used to evaluate this specific program activity. There are two feasible approaches for selecting this comparison group. One method would be to identify nonparticipants from data on Avista customers that receive energy assistance payments such as LIHEAP or LIRAP, who have not participated in the Low Income Program. A second method would be to consider using future program participants. The best approach will be identified as the timeline and available data are considered.

Additional participant phone surveys may be conducted to provide a better understanding of certain topics, such as primary and secondary heating sources, equipment functionality prior to replacement, customer behaviors and take-back effects, participant non-energy benefits and other building or equipment characteristics.

For nonresidential, site and metering visits on prescriptive and site specific projects will support project verification and gather necessary data to validate energy savings and engineering calculations. Sample sizes for each type of fuel will be based on the combined two-year (2016-2017) projected project count. Prior evaluations may inform sampling rates to effectively reduce the sample size in measure categories with less uncertainty, and increase the sampling for those measures with greater variation.

2017 Portfolio Process Evaluation

To identify program changes and areas of interest, brief interviews will be employed to gather relevant information. Key participants in the interview process will include Avista staff, and as appropriate, third-party implementation staff and trade allies.

The independent third-party evaluator will review communication and participant materials for critical program documents that have new or updated materials, including program tracking databases, marketing materials and trade ally materials. The program materials will be evaluated against industry best practices for their adequacy, clarity, and effectiveness. Where appropriate, feedback will be provided to support the development of new or enhancement of existing program materials.

Participant and nonparticipant surveys will be conducted in 2017 and 2018 for both residential and nonresidential segments and be used to assess differences in customer experiences, effectiveness of programs and materials available for customers and trade allies. Participant and nonparticipant surveys will focus on the decisions, attitudes, barriers, and behaviors regarding Avista's programs and efficient equipment/measure installations as well as supplement past spillover research.

Nexant Evaluation Plan

As part of Nexant's contractual requirements they provided an overall detailed evaluation plan for 2016-2017. That plan will be included attached to this EM&V plan.

2018-2019 Electric and Natural Gas Portfolio Impact Evaluation

Avista began to solicit bids for the evaluation of the 2018-2019 biennium and will work with the Advisory Group to finalize the selection of the next external evaluator.

PLAN

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Reimagine tomorrow.

Evaluation Work Plan for 2016-2017
Demand Side Management Programs

Submitted to Avista Corporation

Submitted by Nexant
In partnership with: Research Into Action

October 14, 2016

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1 Introduction and Key Issues

Nexant, Inc. (Nexant) and its partner, Research Into Action (collectively, the evaluation team) have been retained by Avista Corporation (Avista) to evaluate the 2016-2017 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, 2018. 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 2016-2017 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 and Idaho Natural Gas Portfolio Measurement and Verification Impact Evaluation for program years 2016 and 2017.
- **Deliverable 3: Electric Impact Evaluation:** Perform the Washington and Idaho Electric Portfolio Measurement and Verification Impact Evaluation for program years 2016 and 2017.
- **Deliverable 4: Process Evaluation Report:** Perform a process evaluation of the Washington and Idaho programs for years 2016 and 2017.
- **Deliverable 5: Annual Reports with Cost Effectiveness Analysis:** In both 2016 and 2017, and for the combined years, perform a cost-effectiveness analysis for each of Avista's programs and portfolio of programs in Washington and Idaho.

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, 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.

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, can 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.

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.

The evaluation team reviewed available material for each of Avista's 2016-2017 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 August 2016 and planned values for 2017).
- A program's budget allocation relative to the sector and DSM portfolio (as outlined in Avista's 2016 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.

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 2016-2017 DSM programs, which meet the understood regulatory requirements in Washington and Idaho.

1.1 Approach and Methodology

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.

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.

1.2 Evaluation Goals and Objectives

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:

> *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.*
>
> *Evaluation has two key objectives:*
>
> *1. To document and measure the effects of a program and determine whether it met its goals with respect to being a reliable energy resource.*
>
> *2. To help understand why those effects occurred and identify ways to improve.*

Avista and evaluation team 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 in 2016 and 2017,
- Calculate the cost effectiveness of the portfolio and component programs,
- Identify program improvements, if any, and
- Identify possible future opportunities.

1.3 Evaluation Management

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.

Documentation of revisions to the sampling methods, change of management memorandums, and survey instruments will be provided to Avista. In addition, quality control/assurance onsite 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 reports issued to Avista.

1.3.1 Project Management

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.

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.

1.4 Summary of Program Evaluation Activities

Table 1-1 summarizes the major survey, interview, and document audit 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

Evaluation Audience/Program	Impact	Process	Survey Quantity	Document Audit Quantity
Residential – Washington/Idaho Electric Portfolio				
Program Staff Interviews		√	1	N/A
Residential Focused Contractors		√	10-20	N/A
Water Heat Program	√		0	68
ENERGY STAR Homes	√		0	68
HVAC Program	√		0	68
Shell Program	√	√	42	68
Fuel Efficiency	√	√	42	68
Opower	√		N/A	N/A
Low Income	√		0	68

Evaluation Audience/Program	Impact	Process	Survey Quantity	Document Audit Quantity
Residential – Washington/Idaho Natural Gas Portfolio				
Program Staff Interviews		√	1	N/A
Residential Focused Contractors		√	10-20	N/A
Water Heat Program	√		0	68
ENERGY STAR Homes	√		0	68
HVAC Program	√	√	42	68
Shell Program	√	√	42	68
Low Income	√		0	68
Residential – General				
Nonparticipants		√	70	N/A
Nonresidential – Washington/Idaho Electric Portfolio				
Program & Implementation Staff Interviews		√	~5-10	N/A
Nonresidential Focused Contractors		√	~30-40	N/A
Prescriptive Other	√	√	24	24
Prescriptive Lighting	√	√	42	42
Small Business	√	√	34	34
Site Specific	√	√	68	68
Nonresidential – Washington Natural Gas Portfolio				
Program & Implementation Staff Interviews		√	~5-10	N/A
Nonresidential Focused Contractors		√	~15-20	N/A
Prescriptive (Shell)			0	0
Energy Smart Grocer	√		0	11
HVAC	√		0	11
Food Service	√	√	24	11
Small Business	√	√	34	23
Site Specific	√	√	24	24
Nonresidential – General				
Nonparticipants		√	70	N/A

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.

In addition to the quantities noted above, the evaluation team will also conduct onsite

measurement and verification (M&V) for a sample of nonresidential customers. Table 1-2 summarizes the target onsite M&V sample sizes for the electric and gas programs.

Table 1-2: Impact Evaluation Onsite M&V Sampling

Nonresidential Program	Impact Evaluation – Onsite M&V Sample
WA/ID Electric Programs	
Nonresidential Prescriptive Lighting	11
Nonresidential Prescriptive Energy Smart Grocer	11
Nonresidential Prescriptive Other	11
Site Specific	68
Small Business	16
WA/ID Natural Gas Programs	
Nonresidential HVAC	6
Nonresidential Food Service	6
Site Specific	24
Small Business	16

1.5 Areas of Research Emphasis

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 evaluation completed for Avista. Specifically, this evaluation includes the following highlights:

- **Rapid Market Feedback:** We will provide Avista with quarterly feedback on participant satisfaction, engineering review 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.
- **T-12 Lighting Study:** The evaluation team will research strategies to encourage businesses to replace T12s, which are still in use by a significant portion of the existing small business market. Questions we will explore include: What are the barriers that are preventing customers from upgrading? Which approaches and value proposition messaging are likely to be effective at encouraging customers to transition to more efficient lighting technologies? This investigation will review and incorporate findings from Avista's T-12 Small Business Lighting Pilot.
- **High Participation Contractor Study:** The evaluation team will conduct in-depth interviews with "high-participation" contractors who are actively engaged in Avista's rebate programs. We will seek to understand what these contractors are doing that could be transferred to other contractors to encourage greater participation.

2 Impact Evaluation Overview

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).

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

2.1 Understanding the Program Context

To understand the portfolio of programs to be evaluated, the evaluation team reviewed Avista's 2016 DSM Business Plan and collected data from Avista on 2016 program performance through July 2016. 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 only part of the biennium (January through July 2016), the distribution of program contribution to the portfolio may shift as the programs progress.

Table 2-1: Percent WA/ID Electric Program Savings of Total Portfolio (2016-2017)

WA/ID Electric Programs	% of Savings of the Portfolio
Residential Portfolio (WA and ID)	
HVAC Program	4%
Water Heat Program	0.0%
ENERGY STAR HOMES	0.4%
Fuel Efficiency	30%
Residential Lighting Program	61%
Shell Program	4%
Opower Behavioral Program	not received
Low Income	1%
Total Residential Portfolio	**100%**
Nonresidential Portfolio (WA and ID)	
EnergySmart Grocer	4%
Food Service Equipment	0.3%
Green Motors Program	0.003%
Comm Motor Controls HVAC	2%
Appliance	0.21%
Prescriptive Lighting	76%
Shell Program	0.04%
Site Specific	18%
AirGuardian	0.06%
Fleet Heat	0%
Total Nonresidential Portfolio	**100%**

Table 2-2: Percent WA/ID Natural Gas Program Savings of Total Portfolio (2016-2017)

WA/ID Natural Gas Programs	% of Portfolio
Residential Portfolio	
Water Heat Program	9%
ENERGY STAR HOMES	1%
HVAC Program	56%
Shell Program	34%
Low Income	1%
Total Residential Portfolio	**100%**
Nonresidential Portfolio	
EnergySmart Grocer	22%
Prescriptive Shell	6%
HVAC	15%
Food Service Equipment	47%
Site Specific	10%
Total Nonresidential Portfolio	**100%**

2.2 Designing the Sample

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.

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.

Bins are created for residential and nonresidential programs separately and for electric (WA/ID) and natural gas (WA) programs separately.

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 four levels: 90/10, 80/10, 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.

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.

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 onsite inspection and/or survey. This nested sampling approach will help to minimize costs while still maintaining adequate sample sizes.

Table 2-3 and Table 2-4 show the anticipated confidence/precision level, planned sample sizes and level of rigor by program separately for WA/ID 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 2-3: Sampling and Evaluation Rigor for WA/ID Natural Gas Programs

WA/ID Natural Gas Portfolio Program Name	Target Sample Sizes based on Level of Rigor				
	Target C/P[1]	Document Audit	Surveys	Onsite Inspections	Billing Analysis
Residential (WA)					
Water Heat Program	80/20	68	-	-	-
ENERGY STAR Homes	census	68	-	-	census
Shell	census	68	42	-	census
HVAC Program	census	68	42	-	census
Low Income	census	68	-	-	census
Nonresidential (WA)					
HVAC Program	80/20	11	6	6	-
Energy Smart Grocer	80/20	11	0	0	
Food Service Equipment	80/20	11	6	6	-
Small Business	90/15	23	16	16	-
Site Specific	85/15	24	24	24	based on IPMVP

[1]Sample sizes for document audit designed to meet C/P target and are based on actual 2016 participation values through July, 2016

Table 2-4: 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/P[1]	Document Audit	Surveys	Onsite Inspections	Billing Analysis
Residential (WA and ID)					
HVAC Program	census	68	-	-	census
Water Heat Program	80/20	68	-	-	-
ENERGY STAR Homes	census	68	-	-	census
Fuel Efficiency	census	68	42	-	census
Residential Lighting Program	NA	NA	-	-	-
Shell Program	census	68	42	-	census
Opower Behavioral Program	census	-	-	-	census
Low Income	census	68	-	-	census
Nonresidential (WA and ID)					
Prescriptive Lighting	80/10	42	11	11	-
Prescriptive Other[2]	85/15	24	11	11	-
Small Business	90/15	34	16	16	-
Site Specific	90/10	68	68	68	based on IPMVP

[1]Sample sizes for document audit designed to meet C/P target and are based on actual 2016 participation values through July, 2016
[2]Please note that for purposes of the evaluation sampling, the evaluation team has bundled the following Nonresidential Electric Programs into one program titled 'Prescriptive Other': EnergySmart Grocer, Food Service Equipment, Green Motors, Commercial Motor Controls HVAC, Appliance, Power Management for PC Networks, Shell, Fleet Heat, AirGuardian and Standby Generator.

2.3 Conducting Gross-Verified Activities

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. We will review RTF workbooks for applicable measures and assess RTF parameter assumptions in context of Avista's service territory. However, for all RTF measures, the evaluation team will default to the RTF value for reporting achieved energy savings toward Avista's biennial goals and the results of the verification analysis will only be used to inform parameter assumptions used in future RTF measure workbook iterations. For all non-RTF measures, for example gas measures, the majority of nonresidential measures, or Site Specific projects, we will use accepted evaluation practices to conclude whether or not savings estimates are adequately supported, are appropriate to the weather zone or service territory and if applicable, we will calculate savings based on engineering algorithms and/or billing regression analysis to derive a verified savings value. We will calculate realization rates based on the verified savings analysis for the sample of projects and extrapolate our findings to the program population.

The following sections outline each of the approaches we will use to estimate gross verified energy savings.

2.3.1 Document Audit

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:

1. Are the data files of the sampled projects complete, well documented and adequate for calculation and reporting of the savings? Do the reported values match the Technical Reference Manual (TRM) when applicable?

2. Are the calculation methods used correctly applied, appropriate and accurate?

3. Are all necessary fields properly populated?

2.3.2 Telephone Survey

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.

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:

1. 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.

2. 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.

2.3.3 Onsite Inspections

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. Onsite recruitments will be made during the telephone survey and will be scheduled with a Nexant field engineer.

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:

1. 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.

2. Group inspections by geographic location to minimize time allocation, labor and direct costs associated with getting to and conducting site inspections.

3. Perform site inspections and enter all needed data into the program evaluation database developed specifically for Avista.

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.).

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 onsite 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.

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 onsite 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.

2.3.4 Billing Analysis

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.

For programs in which a comparison group can be developed and for which this is an applicable approach, the evaluation team's approach for estimating the gross annual kWh and therm

savings 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:

1. Receipt of energy efficiency measure(s).

2. Exogenous changes not related to the program. The changes can have a positive effect (increase in consumption) or a negative effect (decrease in consumption).

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.

2.3.4.1 Model Specification

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.

$$\text{Daily Therms}_{i,t} = \beta_0 + \beta_1 * \text{AveHDD} + \beta_2 * \text{AveHDD} * \text{Cohort}_i + \beta_{3,i} * \text{AveHDD} * \text{Cohort}_i * \text{Post}$$

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

β terms = Regression coefficients determined from the modeling process.

The key parameter in this model is $\beta_{3,i}$. This term should be negative and represents the average therm savings, per heating degree, for $Cohort_i$. For example, if the β_3 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.

$$\text{Annual Gas Impact} = \beta_3 * \text{HDD}$$

$$\text{Annual Gas Impact} = -0.0059 * 5200$$

$$\text{Annual Gas Impact} = -30.68 \text{ therms}$$

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.

2.3.5 Calculating Gross-Verified Savings

The impact evaluation approaches described above will be used to calculate verified energy savings for Avista programs. If none of the above mentioned approaches are applicable for the evaluation, we will conduct a secondary review of the reported deemed energy savings values against similar measures offered in similar programs across the region. For these cases, the findings from the secondary review will be used to assess the verified energy savings.

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. We will compare reported savings within the program databases against the technical reference manual (TRM) to ensure the measure-level reported savings align with values published in the TRM. 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.

$$\text{kWh}_{\text{adj}} = \text{kWh}_{\text{rep}} \times \text{Realization Rate}$$

Where:

kWh_{adj} = kWh adjusted by the impact team for the program, the **gross savings**

kWh_{rep} = kWh reported for the program

Realization rate = kWh_{adj} / kWh_{rep} for the research sample

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

The evaluation team will estimate realization rates for all measures being evaluated. For RTF approved measures, we will compare these verified savings values to the RTF values to inform assumptions used in future iterations of RTF measure savings. However, we will not apply realization rates to RTF-approved measures and will report the deemed RTF savings values for establishing achievement towards goal.

2.4 Overview of Net-Verified Approach and Methods

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 programs in Avista's WA and ID service territory for which we are conducting participant surveys. For programs where we are not conducting participant surveys, we will apply the NTG values from the prior evaluation for the estimation of net savings. 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.

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:

$$NTG\ Ratio = 1 - Freeridership + Spillover$$

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:

$$Net\ Verified\ Savings\ =\ Gross\ Verified\ Savings\ x\ NTG\ Ratio$$

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.

The evaluation team will assess spillover by asking about program influence on participant's and non-participant's decision to install non-incented equipment.

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.

2.5 WA/ID Electric Program-Specific Tasks

2.5.1 Residential Programs

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.

2.5.1.1 Program Overview

Avista offers eight 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 ENERGY STAR Homes, Residential Lighting, Opower Behavioral, and Low-income programs have varying levels of assistance from third-party implementers.

Table 2-5: WA/ID Residential Electric Programs

WA/ID Electric Programs	Description	Implementer
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
Water Heat	Provides incentives for heat pump electric water heaters as well as low-flow showerheads and clothes washers as part of the Simple Steps program	Avista and CLEAResult for Simple Steps
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
Opower Behavioral Program	In January of 2016, Avista 'refilled' their existing Home Energy Reports Program by 24,000 customers bringing total distribution to 70,000 electric customers in Washington and Idaho that will receive home energy reports throughout the duration of the 2016-2017 biennium, 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)

2.5.1.2 Gross-Verified Approach

Each program will be assigned a specific number of desk audits and telephone surveys 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 and billing analysis activities.

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.

Table 2-6: 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
HVAC Program	census	68	-	-	census
Water Heat Program[1]	80/20	68	-	-	-
ENERGY STAR Homes	census	68	-	-	census
Fuel Efficiency	census	68	42	-	census
Residential Lighting Program[2]	NA	NA[3]	-	-	-
Shell Program	census	68	42	-	census
Opower Behavioral Program	census	NA	-	-	census
Low Income	census	68	-	-	census
Total:	**90/10**	**408**	**84**	**-**	**-**

[1]*Includes Simple Steps, Smart Savings upstream showerhead component*
[2]*Includes Simple Steps, Smart Savings upstream lighting program and CFL giveaway events*
[3]*Evaluation team will conduct a review of the Simple Step's database*

Residential Billing Analysis

The evaluation team will develop regression models to analyze billing data for the following programs, assuming that there are is enough available billing data to conduct the analysis:

- HVAC Program
- Shell Program
- Fuel Efficiency
- Low Income
- ENERGY STAR® New Homes
- Opower Behavioral Program

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.

If deemed applicable, the evaluation team will attempt to conduct a billing regression approach on the other five programs using a similar analysis approach. However, because these programs were not designed as RCTs, the evaluation team will attempt to 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. If an appropriate comparison group cannot be defined, the evaluation team will use a pre-post billing regression approach for the analysis.

2.5.1.3 Net-Verified Approach

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 those programs being evaluated in the residential portfolio for which NTG ratios should be applied and for which participant surveys are conducted. For programs where we are not conducting participant surveys, we will apply the NTG values from the prior evaluation for the estimation of net savings.

Section 2.4 provides an overview of the approach that will be utilized to estimate free-ridership and spillover, again, when applicable.

2.5.2 Nonresidential Programs

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.

2.5.2.1 Program Overview

Avista offers ten nonresidential electric programs as summarized in Table 2-7 below. Avista partners with implementers on the Energy Smart Grocer, Green Motors, AirGuardian, and Small Business programs, and directly implements the remaining programs.

Table 2-7: WA/ID Nonresidential Electric Portfolio Programs

WA/ID Electric Programs	Description	Implementer
Energy Smart 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.	CLEAResult – 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
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)
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
Small Business	This program provides direct-install energy efficiency measures to small business customers, as well as information about eligibility for other Avista program offerings.	SBW

2.5.2.2 Gross-Verified Approach

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, onsite inspections, and M&V activities.

Table 2-8 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

may 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. Nexant may also shift sample sizes between programs depending on participation levels in order to ensure defensible program-level results.

Table 2-8: 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/P[1]	Document Audit	Surveys	Onsite Inspections	Billing Analysis
Prescriptive Lighting	80/10	42	11	11	-
Prescriptive Other[2]	85/15	24	11	11	-
Small Business	90/15	34	16	16	-
Site Specific	90/10	68	68	68	based on IPMVP
Total:	**90/10**	**168**	**106**	**106**	

[1] Sample sizes for document audit designed to meet C/P target and are based on actual 2016 participation values through July, and 2017 Business Plan values.

[2] Please note that for purposes of the evaluation sampling, the evaluation team has bundled the following Nonresidential Electric Programs into one program titled 'Prescriptive Other': Energy Smart Grocer, Food Service Equipment, Green Motors, Commercial Motor Controls HVAC, Shell, Fleet Heat, and AirGuardian.

We will conduct onsite 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 onsite 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.

2.5.2.3 Net-Verified Approach

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 those programs being evaluated in the nonresidential portfolio, for which participant surveys are being conducted, and 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.

Section 2.4 provides an overview of the approach that will be utilized to estimate free-ridership and spillover (when applicable).

2.6 WA/ID Natural Gas Program-Specific Tasks

2.6.1 Residential Programs

The following section outlines the natural gas residential programs offered in Avista's Washington and Idaho service territories. 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.

2.6.1.1 Program Overview

Six programs apply to Avista's Natural Gas customers in their Washington and Idaho service territories. 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 2-9 below. The descriptions for each program can be found in Table 2-5 in Section 2.5.

Table 2-9: WA Residential Natural Gas Portfolio Programs

WA/ID Electric Programs	Description	Implementer
HVAC	The HVAC program encourages residential customers to select a high efficiency solution when making energy upgrades to their home (prescriptive).	Avista
ENERGY STAR Homes	Provides incentives for stick-built and manufactured homes that achieve ENERGY STAR / ECO-Rated labels.	NEEA administers, Avista pays rebate
Shell	The shell program encourages residential customers to improve their home's shell or exterior envelope with upgrades to insulation and windows.	Avista
Water Heat	Provides incentives for heat pump electric water heaters as well as low-flow showerheads and clothes washers as part of the Simple Steps program.	Avista
Opower Behavioral Program	In January of 2016, Avista 'refilled' their existing Home Energy Reports Program by 24,000 customers bringing total distribution to 70,000 electric customers in Washington and Idaho that will receive home energy reports throughout the duration of the 2016-2017 biennium, 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)

2.6.1.2 Gross-Verified Approach

Each program in the WA/ID 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, document audits of project files will verify basic information and will inform subsequent telephone surveys conducted with program participants.

Table 2-10 outlines the planned sample sizes and level of rigor for the impact evaluation activities for the residential natural gas programs. 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 2-10: Sampling and Evaluation Rigor for Residential WA/ID Natural Gas Programs

WA/ID 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	68	-	-	-
ENERGY STAR Homes	census	68	-	-	census
HVAC Program	census	68	42	-	census
Shell Program	census	68	42	-	census
Opower Behavioral Program	census	NA	-	-	census
Low Income	census	68	-	-	census
Total:	**90/10**	**340**	**84**	**-**	**-**

[1]*Includes Simple Steps, Smart Savings upstream showerhead component*

2.6.1.3 Net-Verified Approach

Net to gross ratios are not required for Avista's natural gas programs. However, information necessary for estimating net to gross ratios is collected in the process of performing participant surveys.

2.6.2 Nonresidential Programs

The following section outlines the natural gas nonresidential programs offered in Avista's Washington and Idaho service territories. 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, and the sample design and impact evaluation approaches that will be conducted for this portfolio of programs

2.6.2.1 Program Overview

Avista offers five programs to nonresidential natural gas customers in Washington and Idaho. Implementation for all five programs is managed by Avista. Program summaries are listed below in Table 2-11.

Table 2-11: WA Nonresidential Natural Gas Portfolio Programs

WA/ID Natural Gas 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
Prescriptive Shell	The Commercial Insulation program encourages nonresidential customers to improve the envelope of their building by adding insulation.	Avista
Energy Smart 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.	CLEAResult – outreach and referrals, Avista
Small Business	This program provides direct-install energy efficiency measures to small business customers, as well as information about eligibility for other Avista program offerings.	SBW
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

2.6.2.2 Gross Verified Approach

Each program will be assigned a specific number of telephone surveys, document 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, onsite inspections, and M&V activities.

Table 2-12 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. The evaluation team is not planning on conducting any impact evaluation activities on the Prescriptive Shell program, therefore it is not listed in the table.

Table 2-12: Sampling and Evaluation Rigor for Nonresidential WA/ID Natural Gas Programs

WA/ID Natural Gas Portfolio Program	Target Sample Sizes based on Level of Rigor				
	Target C/P1	Document Audit	Surveys	Onsite Inspections	Billing Analysis
HVAC Program	80/20	11	6	6	
Food Service Equipment	80/20	11	6	6	
Energy Smart Grocer	80/20	11	0	0	
Small Business	85/15	23	16	16	
Site Specific	85/15	24	24	24	based on IPMVP
Total:	**90/10**	**80**	**52**	**52**	

[1] *Sample sizes for document audit designed to meet C/P target and are based on actual 2016 participation values through July, and 2017 planning values.*

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 onsite 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.

2.6.2.3 Net-Verified Approach

Net to gross ratios are not required for Avista's natural gas programs. However, information necessary for estimating net to gross ratios is collected in the process of performing participant surveys.

2.7 Other Tasks

2.7.1 Pullman EM&V 2.0 Pilot Study

Avista currently has Advanced Metering Infrastructure (AMI) in their Pullman, WA service territory. The evaluation team will conduct a pilot evaluation comparing traditional evaluation techniques to methods proposed as part of "EM&V2.0" in the Pullman, WA area where smart meters have been deployed. This pilot study will include a brief feasibility study and limited comparison of techniques based on outcomes of the feasibility study.

The "EM&V 2.0" concept has gained traction as interval data from advanced meters has become more common throughout the country. While interval data certainly holds promise to improve EM&V, it will be important in this task to take the opportunity to discuss the nuances of this relatively nascent concept. Therefore, the evaluation team proposes to have a 1-hour kickoff meeting specifically for the EM&V 2.0 task. In the kick off meeting, the evaluation team

will lead the group through the following agenda:

- Avista's perception of EM&V 2.0 and the promise it holds
- Situations in which interval data can improve EM&V
- Strengths and weaknesses of various meter-based methods (pre-post, matching, etc.)
- Potential issues with using whole-premise data (measure-specific attribution, low "signal-to-noise" ratio and net-to-gross)
- Importance of real-time EM&V and the value it can provide
- Review of two Nexant EM&V 2.0 case studies and comparative analyses
- Identification of comparative analyses to be conducted in this project
- Next steps and timeline

The meeting should include key EM&V stakeholders and program managers at Avista who are interested in leveraging interval data and conducting more real-time ongoing EM&V.

The next step will be to prepare an EM&V 2.0-specific evaluation plan that will outline the specific comparative analyses that the evaluation team will conduct in this project and the associated timelines and deliverables.

The overarching objective of the study is to conduct comparative analyses that will assess the energy savings that are estimated from the traditional method as compared to meter-based (EM&V 2.0) methods. In many cases, various meter-based methods may be assessed, given that there are many potential methods, each with its specific strengths and weaknesses (as will be discussed in the kickoff meeting). Finally, the evaluation team will conduct these comparative analyses and provide a section in the draft and final Washington impact evaluation report.

2.7.2 Program Theory and Logic Model Review

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, along with 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.

If applicable, we will submit the revised logic model diagrams to Avista for review and will revise them based on comments and feedback received.

3 Process Evaluation Overview

3.1 Overview of Approach and Methods

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.

The evaluation team has documented primary objectives and specific areas for investigation in Table 3-1 and 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 3-1: 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	✓	s*	✓	✓	✓
Effectiveness of incentives in motivating action			✓	✓	✓
Effectiveness of organizational structure, communication and program processes	✓	✓			
Status of marketing research activities	✓	✓			
Effectiveness of marketing and promotional efforts	✓	✓	✓	✓	✓
Opportunities for process improvement and potential programs		✓	✓	✓	s*
Status of Avista response to previous evaluation recommendations		✓			
Obtain data for net-to-gross analysis			✓	✓	✓

**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 survey sample sizes will provide 10% precision at 90% confidence for most surveys. The participant survey will provide more than 90%/10% confidence/precision at the portfolio level.

Table 3-2: Sample Sizes for Process Interviews and Surveys

Sector	Contact Group	Sample Size	Method	Confidence/ Precision
Residential	Avista Program Staff *	2	Interview	n/a
	Participating Customers (84 Electric, 84 NG)	168	Survey	90/10
	Nonparticipating Customers	70	Survey	90/10
	Residential Focused Contractors	38	Survey	80/10
Nonresidential	Program Staff (Avista and Implementation Contractors)*	5-10	Interview	n/a
	Participating Customers (192 Electric, 82 NG)	274	Survey	90/10
	Nonparticipating Customers	70	Survey	90/10
	Nonresidential Focused Contractors	57	Survey	80/10
Crosscutting	Avista Leadership and Management Staff*	16	Interview	n/a

** We will conduct two rounds of interviews. The sample size captures both rounds (for example, for residential program staff, we will interview one staff member on two occasions). The interviews may be with a single individual or with a group, as appropriate to the topic under discussion.*

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.

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.

When there are a substantial number of respondents, we use NVivo, a proprietary software tool for analysis of qualitative data.[1] 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.

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

[1] For more information, see: http://www.qsrinternational.com/products_nvivo.aspx.

investigate differences between specific groups. For example, we can examine whether program satisfaction or various aspects of program experience differ among subgroups.

Below, we organize our process evaluation activities into three areas:

1. Staff and implementer interviews,
2. Market feedback, and
3. Special studies.

Within each area, we describe the planned evaluation activities for each of the relevant data sources and identify any differences in approach between residential and nonresidential programs.

3.2 Staff and Implementer Interviews

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. We will review existing program documentation and interview both Avista program staff as well as representatives of program implementation contractors to help identify opportunities.

As described in more detail below, we will conduct two rounds of in-depth interviews (IDIs). The first round will occur in late 2016 and the second round will occur in summer 2017. These IDIs will enable us to:

- Identify any changes to programs since the 2014-15 evaluation;
- Learn status of Avista's response to prior evaluation recommendations;
- Understand and confirm or revise program logic;
- Understand the process flow of implementation activities and assess effectiveness of processes;
- Assess effectiveness of current organizational structure and communication;
- Understand strategic, market, and programmatic issues of concern to staff;
- Learn of ideas under consideration for portfolio and program evolution, such as pilot programs;
- Identify what staff and implementers would like to know from the process evaluation; and
- Solicit ideas for program improvements and opportunities.

3.2.1 Interview Guide Development

We will draft interview guides that cover topics common to all staff. Working from this common core of questions, we will develop guides tailored to contacts' roles, adding questions specific to their responsibilities. While preparing the guides, we will draw on available program

documentation such as the 2015, 2016, and 2017 Demand-Side Management Business Plans. As appropriate, we will request and review additional documentation such as Avista's descriptions of marketing and outreach activities.

We will explore the following topics:

- Contact's role and responsibilities and any changes from prior evaluation
- Current staff organization (Avista's or third party implementation contractor's), any changes from prior evaluation
- Changes to programs since the 2014-15 evaluation and status of Avista's response to prior evaluation recommendations
- Program logic (objectives, activities, outputs, expected outcomes), especially relating to any program changes
- Process flow of implementation activities
- Coordination and communication among staff and decision-making processes
- Program- and market-related barriers
- Program support such as marketing and outreach
- Program tracking databases (including changes since the prior evaluation)
- Expectations for current evaluation (any programmatic, strategic, or organizational questions or concerns; commission and stakeholder expectations as applicable)
- Ideas under consideration for portfolio and program evolution, such as pilot programs, and ideas for program improvements and opportunities
- Issues relevant to the special studies (section 3.4) such as understanding barriers to T12 replacement

3.2.2 Initial Interviews with Avista and Third Party Implementer Staff

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.

We identified the following individuals as having DSM leadership and/or portfolio-wide responsibilities:

- Dan Johnson (Director of Energy Efficiency)
- Chris Drake (Manager, DSM)
- Tom Lienhard (Chief Energy Efficiency Engineer)
- Mike Dillon (DSM Analytical Manager)
- Linda Gervais (Director of Policy)
- Catherine Bryan (Manager of Energy Solutions)

- Collette Bottinelli (Marketing Communication Manager for DSM)
- Mark Baker (Utility Resource Analyst)

Following our interviews with the staff identified above, we will make adjustments to the interview guide as necessary and then schedule and conduct one-on-one or small group telephone interviews with the Avista program-specific managers and implementers. The managers and implementers we will interview for this evaluation include:

- Residential Program Managers
  - David Schafer (Rebate Programs)
- Nonresidential Program Managers and Implementation Staff
  - Greta Zink (Non-lighting prescriptive and Small Business)
  - Lorri Kirstein (Site Specific and Lighting)
  - Rachelle Humphrey (Lighting)
  - Implementer contact(s) for Energy Smart Grocer
  - Implementer contact(s) for Small Business

We will revise our list of contacts as needed based on feedback and additional information from Avista.

3.2.3 Mid-program Cycle Staff Interviews

In summer 2017, approximately three-quarters of the way through the 2016-2017 program cycle, in consultation with Avista evaluation staff, we will schedule and conduct follow-up one-on-one or small group interviews with the same staff interviewed in 2016. We anticipate interviews of up to one hour with the DSM leadership/portfolio-wide staff and update interviews of up to 30 minutes with the program-specific staff.

3.2.4 Analysis and Reporting

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.

We will document our analysis along with our conclusions and recommendations in one or more chapters in the draft process evaluation report. Section 6 presents our preliminary outline for the process evaluation report. 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.

3.3 Customer and Contractor Feedback

3.3.1 Participating Customers

We will survey 2016 and 2017 program participants. We will survey the 2016 Q1 through Q3 participants in Q4 of 2016. We will survey the 2017 participants on a quarterly basis, starting in Q2 2015 and ending in Q1 2018. In each quarterly survey of the 2017 participants, we will survey participants that received incentives the previous quarter.

3.3.1.1 Instrument Development

We will take, as a starting point, the survey instruments used in the 2014-15 evaluation, and revise them as warranted based on the findings from the 2014-15 study. These instruments address the following topics:

- Satisfaction
- Source of awareness
- Decision-making
- Net-to-gross inputs (free-ridership and spillover),
- Motivations to participation
- Barriers to participation
- Ideas for program improvements
- Program opportunities

By using the same questions used in the 2014-2015 evaluation we will be able to provide a perspective on these issues over time.

The survey of 2016 program participants will assess both free-ridership and spillover. The quarterly cohort surveys for 2017 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. We can apply the spillover estimate from the survey of 2016 participants to 2017 program year.

In addition to the above topics, in service of the Special Study noted in Section 3.4.1, nonresidential participants will be asked about their use of T12 lights and what, if anything, would encourage T12 replacement.

We will submit the draft survey instrument to Avista's evaluation lead and will revise the instrument within one business week after receiving comments.

3.3.1.2 Sample Development

As noted earlier, we will develop the sample in an effort to ensure coordination between the impact and process evaluations. The evaluation team will work with Avista to identify a schedule

for receiving the program data necessary to support the survey cohorts described above.

We have estimated quarterly cohort sample sizes under the simple 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 2017. We will endeavor to design samples that represent the participant population with respect to state, fuel type, urban/rural, program, and measures.

Please note that we will only survey participants of rebate programs. The nonparticipant survey will capture responses of midstream Simple Steps and Opower HER program.

Table 3-3: Sample Sizes for Participant Survey

	Programs	Q1-Q3 2016	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Total
	Electric							
Residential	Fuel Efficiency	15	5 to 6	5 to 6	5 to 6	5 to 6	5 to 6	42
Residential	Shell Program	15	5 to 6	5 to 6	5 to 6	5 to 6	5 to 6	42
Residential	***Res. Subtotal***	***30***	***10 to 12***	***10 to 12***	***10 to 12***	***10 to 12***	***10 to 12***	***84***
Nonresidential	Prescrip. Other	9	3	3	3	3	3	24
Nonresidential	Prescrip. Lighting	16	5	5	5	5	5	42
Nonresidential	Site Specific	26	9	9	9	9	9	68
Nonresidential	Small Business	13	4	4	4	4	4	34
Nonresidential	Energy Smart Grocer	9	3	3	3	3	3	24
Nonresidential	***Nonres. Subtotal***	***73***	***24***	***24***	***24***	***24***	***24***	***192***
	Gas							
Residential	HVAC Program	15	5 to 6	5 to 6	5 to 6	5 to 6	5 to 6	42
Residential	Shell Program	15	5 to 6	5 to 6	5 to 6	5 to 6	5 to 6	42
Residential	***Res. Subtotal***	***30***	***10 to 12***	***10 to 12***	***10 to 12***	***10 to 12***	***10 to 12***	***84***
Nonresidential	Food Service	9	3	3	3	3	3	24
Nonresidential	Site Specific	9	3	3	3	3	3	24
Nonresidential	Small Business	12 to 13	4 to 5	4 to 5	4 to 5	4 to 5	4 to 5	34
Nonresidential	***Nonres. Subtotal***	***30 to 31***	***10 to 11***	***10 to 11***	***10 to 11***	***10 to 11***	***10 to 11***	***82***
Total		**163 to 164**	**54 to 56**	**54 to 56**	**54 to 56**	**54 to 56**	**54 to 56**	**433 to 444**

3.3.1.3 Survey Implementation

The team will field the survey using Nexant's in-house call center. We will field the survey of Q1-Q3 2016 participants as soon as possible in Q4 of 2016. Our goal will be to complete the Q1 to Q3 2016 survey before we begin surveying the Q4 2016 participants. However, the Q1 to Q3 2016 cohort will be large so it may be completed only shortly before the Q4 2016 survey begins, or there may be some overlap.

We will monitor results of the 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 that appear problematic.

3.3.2 Participating Contractors

We will conduct surveys with up to 95 participating contractors, 38 who focus on the residential HVAC and shell market and 57 who focus on the nonresidential HVAC and lighting market. Because contractors often work in both sectors, we will begin the survey by asking respondents to report which sector they do the majority of their work and direct questions to them accordingly.

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.

3.3.2.1 Instrument Development

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.

- We will explore contractors' 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.
- We will explore motivations for and barriers to participation (both the contractors' and their customers') and will seek ideas for program improvements and potential program opportunities.
- 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.
- We will assess net-to-gross inputs, including program impact on sales, stocking and nonparticipant spillover, as applicable.
- 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.

Due to the special study (described in Section 3.4.1) focus on encouraging replacement of T12s, we will survey more nonresidential lighting contractors than HVAC contractors. Lighting contractors will receive additional questions about the market and messaging about T12 replacements.

We will submit the draft survey instrument to Avista's evaluation lead and will revise the

instrument within two business weeks after receiving comments.

3.3.2.2 Sample Development

We will develop the sampling plan for the contractor survey from a roster of known contractors provided to us by program staff, the Northwestern Lighting Network, and the Northwest HVAC/R Association.

We will use the available information on contractors, such as their geographic location and the type(s) of equipment they handle (HVAC, lighting, or shell) to develop the sample. Our goal will be to ensure that the sample represents contractors that serve Avista's residential and nonresidential programs, its Washington and Idaho territories, and its electric and natural gas fuels.

Table 3-4 shows our initial expectation regarding the distribution of the sample across equipment types based on the population we determined during the last evaluation and our need to ask lighting specific questions to address the special study (Section 3.4.1). 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 2017 and may revise the plan based on feedback received.

Table 3-4: Sample Sizes for Contractor Survey

Installer Type	Population from 2014-15 Evaluation	Residential	Nonresidential	Total
HVAC	89	19	19	38
Lighting	400	-	38	38
Shell	55	19	-	19
Total	**544**	**38**	**57**	**95**

3.3.2.3 Survey Implementation

The evaluation 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-2017.

3.3.3 Nonparticipating Customers

We will survey 70 residential and 70 nonresidential nonparticipating Avista customers in mid-2017.

3.3.3.1 Instrument Development

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.

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). 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.

The residential and nonresidential surveys will be tailored to their specific audiences.

We will submit the draft survey instrument to Avista's evaluation lead and will revise the instrument within two business weeks after receiving comments.

3.3.3.2 Sample Development

The evaluation team will develop the nonparticipant samples from Avista customer records, when 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.

3.3.3.3 Survey Implementation

The evaluation 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-2017.

3.4 Special Studies

In addition to the aforementioned process evaluation activities, we will conduct two additional special studies. The first pertains to better understanding how to encourage T12 replacement in the nonresidential market and the second aims to better understand the motivations of highly active contractors. Each of these are discussed below.

3.4.1 T12 Baseline Study

The 2014-15 process evaluation activities demonstrated that T12s are still widely used in the marketplace despite the technological advances and lower costs associated with high efficiency fluorescent lighting and LEDs over the last few years. This special study will help Avista better understand what messages and strategies may be effective in encouraging T12 owners to upgrade to higher efficiency lighting.

To accomplish this, we will ask nonresidential participants and nonparticipants, in their respective surveys, about their awareness of T12s, the energy use of T12s compared to newer technologies, and about possible incentives and messaging that would encourage T12 replacement. We will ask nonresidential lighting contractors to tell us about any strategies they used for convincing customers to replace T12s particularly since the lighting baseline changed in January 2013 lowering incentives for T12 replacement. Finally, we will ask Small Business field staff about their experiences encouraging customers to replace T12s. Because this

analysis relies partially on participant surveys which will not be done till Q1 2018, this analysis will only appear in the final report, not the quarterly memos.

Primary data source: Nonresidential participant surveys (section 3.3.1), nonresidential focused contractor surveys (section 3.3.2), and Small Business field staff.

Research Questions: What are the barriers that are preventing customers from upgrading T12s? Which approaches and value proposition messaging are likely to be effective at encouraging customers to transition to more efficient lighting technologies?

3.4.2 High Participation Contractors

The 2014-15 process evaluation activities demonstrated that a subset of contractors, both residentially and non-residentially focused, are highly engaged in Avista's rebate programs and help drive customer participation and savings. We will identify and interview up to 10 of these contractors in each sector to understand and document their approach to promoting the rebate programs and their business practices. The intent of this study is to give Avista program staff insights they can share more broadly with other contractors. For example, interviews with high-participation contractors will enable Avista to learn what specific techniques or strategies high-participation contractors use to attract customers who become participants. Lessons learned from this research could increase the number of active contractors, which in turn could boost program participation and savings

Similar to all other data collection instruments, we will draft an interview guide and submit to Avista by the end of May 2017. We will respond to comments within a week and plan on fielding the instrument starting in late June 2017.

Primary data source: In-depth interviews with 10 "high-participation" contractors in each sector who are actively engaged in Avista's rebate programs.

Research Question: What are these contractors doing that could be transferred to other contractors to encourage greater participation?

4 Other Activities

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.

4.1 Cost-Effectiveness Analysis

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.

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, 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 4-1: 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

4.1.1 Key Parameters

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 conservation preference.

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.

4.1.2 Reporting

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 2016, we will utilize "unverified" values from Avista's internal reporting, because the evaluation research will still be underway.

4.2 Interactions with Advisory Group and Commission Staff

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. In addition, quarterly reports which will provide evaluation status and updates will be available to the Advisory Group.

4.3 Use of Reference to Regional Technical Forum

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 or where they may be an average of multiple iterations of measures in the RTF. 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. As noted in Section 2.3, the evaluation team will report deemed RTF measure values for establishing achievement towards goal. However, we will also complete verification activities and compare these verified savings value to the RTF value to inform assumptions used in future iterations of RTF measure savings.

We will estimate NTG values for all evaluated program savings where participant surveys will be conducted. For programs where we are not conducting participant surveys, we will apply the NTG values from the prior evaluation for the estimation of net 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.

5 Schedule and Key Milestones

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.

5.1 Schedule and Key Milestones

The project timelines and completion dates shown in Table 5-1 outline the expected timing of key impact and process evaluation deliverables for the EM&V of Avista's 2016-2017 DSM Programs.

Table 5-1: Evaluation Schedule

Deliverable	Start Date	Completion Date
Draft Evaluation Work Plan		9/2/2016
Review and approval of Draft Evaluation Work Plan	9/2/2016	9/14/2016
Evaluation Kick-Off Meeting		9/14/2016
Final Evaluation Work Plan		10/14/2016
2016 Process & Impact Evaluation & Cost-effectiveness Activities	10/3/2016	4/1/2017
2016 Q1-Q3 Findings Memo		11/10/2016
2016 Q4 Findings Memo		3/10/2017
Draft WA 2016 Electric Impact Memorandum		3/17/2017
Draft ID 2016 Electric Impact Memorandum		3/17/2017
Draft WA 2016 Electric Impact Memorandum Review Comments Received		3/31/2017
Draft ID 2016 Electric Impact Memorandum Review Comments Received		3/31/2017
Draft WA 2016 Natural Gas Impact Memorandum		3/31/2017
Draft ID 2016 Natural Gas Impact Memorandum		3/31/2017
Draft WA 2016 Natural Gas Impact Memorandum Review Comments Received		4/14/2017
Draft ID 2016 Natural Gas Impact Memorandum Review Comments Received		4/14/2017
Draft WA 2016 DSM Annual Report & Cost-Effectiveness Analysis		4/14/2017
Draft ID 2016 DSM Annual Report & Cost - Effectiveness Analysis		4/21/2017
Draft WA 2016 DSM Annual Report & Cost-Effectiveness Analysis Review Comments Received		4/28/2017
Draft ID 2016 DSM Annual Report & Cost - Effectiveness Analysis Review Comments Received		5/05/2017
Final WA 2016 Electric Impact Memorandum		5/25/2017
Final ID 2016 Electric Impact Memorandum		6/02/2017
Final WA 2016 Natural Gas Impact Memorandum		5/25/2017
Final ID 2016 Natural Gas Impact Memorandum		6/02/2017
Final WA 2016 DSM Annual Report & Cost-Effectiveness Analysis		5/25/2017
Final ID 2016 DSM Annual Report & Cost - Effectiveness Analysis		6/02/2017
Presentation of 2016 Portfolio Evaluation Activities & Findings		6/1/2017
2017 Process & Impact Evaluation & Cost-effectiveness Activities	2/15/2017	5/2/2018
2017 Q1 Findings Memo		5/12/2017
2017 Q2 Findings Memo		8/11/2017
2017 Q3 Findings Memo		11/10/2017
Draft Portfolio 2016-2017 Process Evaluation Report		4/6/2018
Draft Portfolio 2016-2017 Process Evaluation Report Review Comments Received		4/20/2018

Deliverable	Start Date	Completion Date
Draft WA 2017 DSM Annual Report & Cost-Effectiveness Analysis		4/13/2018
Draft WA 2016-2017 Electric Impact Report		4/13/2018
Draft WA 2016-2017 Natural Gas Impact Report		4/20/2018
Draft WA 2017 DSM Annual Report & Cost-Effectiveness Analysis Review Comments Received		4/27/2018
Draft WA 2016-2017 Electric Impact Report Advisory Group Review Comments Received		4/27/2018
Draft WA 2016-2017 Natural Gas Impact Report Advisory Group Review Comments Received		5/04/2018
Final Portfolio 2016-2017 Process Evaluation Report		5/25/2018
Final WA 2017 DSM Annual Report & Cost-Effectiveness Analysis		5/25/2018
Final WA 2016-2017 Electric Impact Report		5/25/2018
Final WA 2016-2017 Natural Gas Impact Report		5/25/2018
Draft ID 2017 DSM Annual Report & Cost-Effectiveness Analysis		4/27/2018
Draft ID 2016-2017 Electric Impact Report		4/27/2018
Draft ID 2017 DSM Annual Report & Cost-Effectiveness Analysis Review Comments Received		5/11/2018
Draft ID 2016-2017 Electric Impact Report Review Comments Received		5/11/2018
Draft ID 2016-2017 Natural Gas Impact Report		5/11/2018
Draft ID 2016-2017 Natural Gas Impact Report Review Comments Received		5/25/2018
Final ID 2017 DSM Annual Report & Cost-Effectiveness Analysis		6/15/2018
Final ID 2016-2017 Electric Impact Report		6/15/2018
Final ID 2016-2017 Natural Gas Impact Report		6/15/2018
Presentation of 2016-2017 Portfolio Evaluation Activities & Findings		6/20/2018

5.2 Budget

Table 5-2 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 **$995,291**.

Table 5-2: Evaluation Team Budget Per Deliverable

Deliverable	Cost
Deliverable 1: Evaluation Work Plan	$36,322
Deliverable 2: Natural Gas Impact Evaluation	$213,514
Deliverable 3: Electric Impact Evaluation	$420,284
Deliverable 4: Process Evaluation Report	$284,371
Deliverable 5: Annual Reports with Cost Effective Analysis	$40,800
Total Base Cost	**$995,291**

6 Evaluation Reports

The evaluation team anticipates providing quarterly and annual memos with impact and process evaluation findings as well as 2016-2017 impact evaluation reports by fuel and state and a 2016-2017 process evaluation report (see Table 5-1). The following subsections detail the preliminary outline for the 2016-2017 impact and process evaluation reports. We may revise these outlines as needed based on feedback from Avista and our judgment on how to best present findings.

6.1 2016-2017 Impact Evaluation Report

The 2016-2017 Impact Evaluation will report on activities using the following outline as guidance:

- Executive Summary
- Introduction
  - This section will summarize the purpose of the impact evaluation, evaluation goals and objectives, and provide descriptions and reported participation of evaluated programs
- Impact Evaluation Methodology
  - This section will provide an overview of the impact evaluation methods utilized for the 2016-2017 evaluation.
- Impact Evaluation (one section for Nonresidential and one section for Residential)
  - These sections will explain the specific evaluation activities and findings for each evaluated nonresidential and residential program.
- Conclusions and Recommendations
  - This section will present the overall impact evaluation findings and provide program-specific recommendations.

6.2 2016-2017 Process Evaluation Report

For the 2016-2017 process evaluation report, the team will use the following outline to guide reporting:

- Executive Summary
- Introduction
  - This section will address process evaluation objectives and descriptions of evaluated programs
- Methods

    - This section will describe nonresidential, residential, and crosscutting secondary and primary data collection activities
- Nonresidential Process findings
    - This section will describe program administration and delivery, organizational structure, program awareness and engagement, program experience (including reasons for participation), barriers to participation, effectiveness of incentives and marketing promotions, opportunities for program improvement, and net-to-gross changes over time, all as related to the 2016-2017 program years.
- Residential Process findings
    - This section will describe program administration and delivery, organization structure, program awareness, program experience (including reasons for participation), barriers to participation, effectiveness of incentives and marketing promotions, and opportunities for program improvement, all as related to the 2016-2017 program years.
- Special Studies
    - This section will cover two special studies: 1) T-12 analysis of opportunities to encourage T12 replacement with advanced lighting technologies and 2) high participation contractor interviews to learn about contractor promotions of rebate programs
- Conclusions and Recommendations
    - This section will discuss conclusion and recommendations as well as Avista response to prior evaluation recommendations.

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