

**AVISTA CORP.**  
**RESPONSE TO REQUEST FOR INFORMATION**

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**REQUEST:**

Provide the basis for Avista's estimate of the annual benefits of Conservation Voltage Reduction on Avista's distribution system.

**RESPONSE:**

Please see Exhibit No. HLR-3, Appendix B, pages 29-32 for an explanation of the basis of the Company's estimate of the value of this benefit.

Conservation voltage reduction is an energy conservation program that relies on a method of operational control of the distribution system that corrects the power factor and simultaneously lowers the voltage (v) to the lower portion of the range Avista is required to operate within for serving its customers (114v to 126v). The reduction in operating voltage reduces the electricity requirement for meeting the customer's end use needs and reduces the "losses" of electricity that occur as it "travels" on the distribution system. In the conventional operation of the distribution system, the utility uses "voltage regulators" in the substation to either boost or reduce the voltage on the feeder as needed, based on preset triggers that reflect the characteristics of the feeder and are based on its loading (number of amps) at any given point in time. Because the utility does not know the actual voltage along the feeder (other than when readings were taken as part of the process of adjusting the voltage regulator settings), the voltage regulator is set to maintain the voltage in the upper part of the allowed range (known as a "buffer") in order to ensure that the voltage will not fall below the required lower limit as customers' demand, types of loads such as motors, and usage fluctuates on a continuous basis.

**Automated Conservation Voltage Reduction** - Avista's conservation voltage program was initially based on installing "smart" devices at points along the entire feeder such as reclosers or transformers that record and send actual voltage readings from their locations on the feeder back to our operations in near real time. This near real time information representing voltage levels from along the feeder are then used to make voltage regulator adjustments, also in near real time, that are based on actual voltage conditions instead of static preset triggers. This operation allows us to reduce the range of the voltage buffer while still ensuring we maintain our required minimum voltage. The Company has fully automated this process, which operates every 30 seconds on a continuous basis, and has allowed Avista to reduce the voltage level on equipped feeders by an average of 2%. The efficacy of this program has been independently validated, and this capability is now installed on select feeders as part of the Company's Distribution Grid Modernization program (or "Grid Mod").

**Advanced Metering Enabled Conservation Voltage Reduction** - The conservation voltage reduction benefits contained in the Company's current business case arise from two sources: 1) a further optimization of conservation voltage reduction achieved by advanced metering on electric feeders that are already equipped with automated conservation voltage reduction capabilities (or "Grid Mod feeders"), and 2) Conservation voltage savings that are enabled by advanced metering on those electric feeders that are not already equipped with automated conservation voltage reduction.

**AMI Benefits on Feeders Already Equipped with Automated CVR** - The Company determined the potential added savings it could achieve through advanced metering by observing the actual voltage at every customer's service along a feeder, using the advanced metering system installed in Pullman, while the automated conservation voltage reduction system was in operation. These observations provided the basis for Avista's system modeling that integrated voltage readings from the customer's meter with the automated conservation voltage operation, to demonstrate that we could further reduce the voltage level (the size of the buffer) by an additional 2%, while still providing service above the minimum voltage threshold. Having both the automated conservation voltage operation provided by Grid Mod and the advanced metering system will allow Avista to achieve on average a 4% total voltage reduction.

**AMI Benefits on Feeders Not Equipped with Automated CVR** - For these feeders Avista has demonstrated that by using voltage readings provided by the advanced metering system that it can reduce the static voltage set points on the conventional voltage regulator (referred to in Exhibit No. HLR-3, Appendix B, pages 29-32, as "X&R Savings" or "R&X Settings") to reduce the overall voltage on the feeder by an estimated average of 1.25 %. This can be accomplished because the advanced metering system provides the voltage at every service allowing the Company to observe the actual end-point voltage levels under a variety of regulator settings and operating conditions.

**Feeders to be Equipped with Automated CVR** - Avista has also included in the current advanced metering business case the number of feeders in its system that are expected to be Grid Mod equipped during the life of the project. On these feeders, for a portion of the AMI project lifecycle the voltage level will be reduced by 1.25% (enabled by AMI alone), and the voltage for the balance of time will be reduced by 4% (When the feeder is equipped with Grid Mod and AMI, the total voltage reduction provided will average 4%: of that reduction, 2% is attributed to the Grid Mod investment, and 2% is attributed to the AMI investment). The expected contribution of these feeders to be Grid Mod equipped is modeled into the business case benefits to be provided through AMI-enabled conservation voltage reduction

**Mitigation of Low Voltage Services** - An assumption used in the modeling for Avista's current business case is based on the approach of using the voltage readings from individual customer services to identify any potential service where the voltage level is substantially lower than what is generally observed on the other services on the feeder. These voltage anomalies will limit the amount of voltage reduction that can be achieved on the entire feeder because the Company must supply the minimum voltage to that lowest-voltage customer at all times. To reduce this problem, Avista modeled its system to determine the number of instances where this situation is likely to occur, and what the conservation voltage benefit would be if these low service points were mitigated. Mitigation involves installing line devices on or near the low service points that boost the voltage level at that service to a level more in line with the voltages generally observed on the feeder. In addition to estimating the conservation voltage value that can be achieved by mitigating these low voltage services, the Company has also estimated the cost of this mitigation effort, which is included in the advanced metering project costs.

**Contributions to the Expected AMI-Enabled Conservation Savings** - The value of the financial savings to be derived by conservation voltage reduction, as achieved by advanced metering, is shown graphically in the chart on page 30 of Appendix B in Exhibit No. HLR-3. The “smart grid feeders” represented in the two green boxes (31 feeders + 44 feeders) are those that are equipped with automated conservation voltage operation today. Adding the AMI capability to these feeders will yield an incremental voltage reduction on average of 2%. Though these feeders will yield a total voltage reduction of 4%, only half is attributed to the AMI investment. On the far left side of the diagram is a white box representing 96 feeders that have not been Grid Mod equipped, and which Avista believes will not be equipped with automated conservation voltage capability when the feeders are rebuilt under the Grid Mod program.<sup>1</sup> For the life of the advanced metering project, Avista estimates that the AMI-enabled conservation voltage savings will average 1.25%. On the far right hand side of the chart, the orange box represents those feeders (39 Non Smart Grid Feeders) that are currently not equipped with automated conservation voltage reduction capability, but which are expected to be so equipped during the life of the AMI project. The conservation voltage benefit provided by advanced metering on these feeders will average 1.25% for the period of time until automated conservation voltage capability is installed, at which time the voltage savings will be increased by 0.75 %, to a total of savings of 2% for the remaining years of the project life.

**Modeling the Benefits** - Avista has modeled these benefits over the life of the advanced metering project as shown in the electronic workbook, Avista AMI Benefits Workbook, provided in Appendix B of Exhibit No. HLR-3, under the tab labeled “Energy Efficiency CVR.” With respect to the categories of conservation savings that are described above, each line in the workbook under the title “Source of Reduction” represents either a benefit or a cost used in modeling the benefits. The name and description of each line is provided below:

- “X&R Savings” shows the expected conservation voltage benefits to derived by AMI from the 96 Non Smart Grid Feeders, that Avista expects will not be so equipped.
- “AMI Augmentation” shows the expected benefits derived from the addition of advanced metering to the feeders already equipped today with automated conservation voltage reduction.
- “Future Grid Mod” shows the value to be derived from AMI for those feeders that will equipped with automated conservation voltage reduction during the life of the AMI project.
- “Grid Mod Cost” is zero because the costs to upgrade feeders with automated conservation voltage reduction capability is included as part of the Distribution Grid Modernization program.
- “CVR/AMI Cost Other (Capital)” shows the estimated costs to create the reporting systems required to track the savings performance of conservation voltage reduction as enabled by advanced metering.

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<sup>1</sup> Grid Mod, or “Distribution Grid Modernization” is a comprehensive program to upgrade the Company’s electric feeders. One element of the program is to install smart grid equipment, which includes CVR capability. Loads on some of the Company’s feeders (the 96 non smart grid feeders) have been determined to be small enough that such investment does not make sense. The remainder of the improvements (other than smart grid equipment) made under the Grid Mod program are performed on these feeders.

- “Mitigation” is the estimated cost for elimination the very low voltage services on the feeders, which allows the voltage level on the entire feeder to be further reduced (compared with not mitigation action).
- “CVR/AMI Costs Other (O&M)” shows the estimated operating expenses required to achieve the estimated benefits over the project life..