Exh. JD/LL-1T

WUTC DOCKET: UE-200900 UG-200901 UE-200894
EXHIBIT: JJ-LL-1T
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BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

DOCKET NO. UE-200900

DOCKET NO. UG-200901

DOCKET NO. UE-200894

(consolidated)

JOINT REBUTTAL TESTIMONY OF

JOSHUA D. DILUCIANO AND LARRY D. LA BOLLE

REPRESENTING AVISTA CORPORATION

## I. INTRODUCTION

**Q. Please state your name, business address and present position with Avista Corporation?**

A. My name is Joshua D. DiLuciano, and I am employed as the Director of Electrical Engineering for Avista Utilities (Avista or "Company"), at 1411 East Mission Avenue, Spokane, Washington.

**Q. Have you filed direct testimony in this proceeding?**

A. Yes. I filed direct testimony in this case addressing the history of our AMI Project deployment, its rationale, and refinements made over time. Joint witnesses Ms. Rosentrater/Mr. La Bolle provide the Company's rebuttal related to the positions of the parties on the AMI Project.

**Q. Please state your name, employer and business address?**

A. My name is Larry La Bolle and I am employed as Manager of Reliability Strategy and Analysis for Avista Utilities (Avista or Company), at 1411 East Mission Avenue, Spokane, Washington.[1]

**Q. Have you filed direct testimony in this proceeding?**

A. No, I have not.

**Q. Are you sponsoring any exhibits that accompany your testimony?**

A. Yes. We are sponsoring Exh. JD/LL-2, which includes the qualifications of Mr. La Bolle, applicable responses and documents provided to Public Counsel by the Company during discovery, and Staff's response to the data request No. 1 of Public Counsel.

**Q. What is the scope of your rebuttal testimony in this proceeding?**

[1] Please see Mr. La Bolle's statement of qualifications provided in Exh.JD/LL-2, page 1.

A. Our rebuttal testimony will address the testimony of Public Counsel witnesses Messrs. Alvarez and Stephens regarding capital investments made in our electric system, particularly in the areas of Grid Modernization and Substation Rebuilds. We will review the extensive record in this case demonstrating that Avista's investments in Grid Modernization and Substation Rebuilds have been comprehensively evaluated, properly budgeted and prudently incurred, which combined investment for both programs of $23.1 million[2] should be properly included in our customers' rates (rather than disallowed as is the request of Public Counsel). The consequence of a disallowance would be a $23.1 million "write-off" this year against the earnings of the Company. A Table of Contents for our testimony is as follows:



[2] Including $11.48 million for Substation Rebuilds (Exh. PADS-1T; page 53; lines 11-14) and $11.27 million for distribution Grid Modernization (Exh. PADS-1T; page 65; lines 4-6), both of which amounts Public Counsel recommends be disallowed by the Commission for any cost recovery.

**Q. What are the salient points of your rebuttal testimony?**

A. They are as follows for <u>Grid Modernization</u> and <u>Substation Rebuilds</u>:

- There is no basis for disallowing $11.27 million for Grid Modernization and $11.48 million for Substation Rebuilds as recommended by Public Counsel.
- The capital budgets for these efforts are not "unconstrained" or otherwise a "Standing Budget" simply filled without detailed study and reflection.
- Avista has for many years used a structured and disciplined approach for determining equipment replacement, employing it in the many ways described in our testimony. This may be new to the witnesses, but it is not new to the Commission and the Parties.
- Avista's "lifecycle cost analysis" is a rigorous analytical process that takes into account a myriad of factors to arrive at the reasonably lowest cost for managing system upgrades and replacements.
- Public Counsel's "use it until it breaks" philosophy, which it argues is superior to Avista's lifecycle cost analysis, is unsupported and will place hardships on customers, while actually increasing costs over time. (nor do all our substations have "full redundancy" allowing all equipment at all times to be removed from service, as suggested by Public Counsel, without losing substantial load).

As will be evident, many of the Parties' expressed concerns were addressed in Avista's responses to Data Requests, and where appropriate, excerpts from the Data Request responses have been imported into the text, or the entire response is otherwise included in Exh. JD/LL-2. (Avista understands that the references to Data Requests themselves do not make them part of the record offered by the Parties.)

## II. OVERVIEW OF AVISTA REBUTTAL OF PUBLIC COUNSEL'S CRITICISMS OF GRID MODERNIZATION AND SUBSTATION REBUILDS

**Q. Please summarize the criticisms of Public Counsel witnesses Messrs. Paul Alvarez and Dennis Stephens?**

A. As noted, the witnesses recommend the Commission deny Avista recovery of (i.e. disallow) $23.1 million invested in two electric infrastructure programs, Distribution Grid Modernization and Substations Rebuilds, based entirely on two alleged criticisms:

1) That the capital budgets for these programs are unconstrained[3] and are established independent of either demonstrated historical demand[4] or identified infrastructure needs, [5] which Public Counsel refers to as "Standing Budgets."[6]

2) That the approach used by Avista to determine the "end of useful life" for electric assets is "deeply flawed,"[7] and as such, results in wasteful overinvestment in electric infrastructure,[8] which they have coined as "Prospective Replacement."[9]

**Q. Has Avista evaluated the financial impact to the Company were the Commission to deny any cost recovery for these two programs as recommended?**

A. Yes, we have. Such a decision would result in the Company having to declare a write off in the amount of $23.1 million against this year's earnings.

**Q. Please summarize your rebuttal testimony as it relates to the claim of Public Counsel that Avista fails to properly budget for Distribution Grid Modernization and Substation Rebuilds, and that this alleged practice leads to wasteful investments?**

A. Messrs. Alvarez and Stephens offer no evidence of any kind to support their claim that funding for Avista's programs constitutes such "Standing Budgets,"[10] as coined by Public Counsel.[11] Our testimony will show that, in addition to NOT comporting with Public

[3] Exh. PADS-1T; page 35, lines 3-13.
[4] Exh. PADS-1T; page 29, lines 15-22.
[5] Exh. PADS-1T; page 29, line 23; page 30, lines 1-2.
[6] Exh. PADS-1T; page 28, lines 8-11; page 34, lines 6, 7.
[7] Exh. PADS-1T; page 41, lines 11-12.
[8] Exh. PADS-1T; page43, lines 6-9.
[9] Exh. PADS-1T; page 33, lines 9-15.
[10] "While Avista appears to follow most of this process in most cases, Avista also **appears to determine the budgets for some programs in advance**." (emphasis added) Exh. PADS-1T; page 30, lines 3, 4.
[11] The phrase "Standing Budgets" was introduced to Avista by Public Counsel in PC-DR-288 Revised, which is provided as Exh. PADS-11. In response, Avista explained it had "standing infrastructure programs," but we did not agree in any way with their characterization of this as "Standing Budgets."

Counsel's "Standing Budgets," our capital planning and budgeting processes adhere to the following budgeting concepts or principles:

- ✓ Avista significantly constrains capital spending across the enterprise each year.[12]
- ✓ Budgets for Grid Modernization and the 'Project Rebuild' portion of Substation Rebuilds[13] are based entirely on planned infrastructure work that is identified, prioritized, designed and planned years in advance, and
- ✓ The 'Asset Replacements' portion of the Substation Rebuilds program is properly based on recent historic experience.

Our testimony demonstrates that the claim of Public Counsel that Avista's budgeting contributes to wasteful investments, is erroneous, is not supported by any facts or evidence, and that this argument has no merit.

**Q. How will you address the claims of Public Counsel that Avista's Long-Standing Asset Management practices and Lifecycle Cost Analysis result in "Prospective Replacements," which they allege drives wasteful overinvestment?[14]**

A. Like their unsupported claim of "Standing Budgets," Public Counsel provides no evidence, any analysis, or applicable alternative research to support their claim that Avista's Asset Management practices are in any way wasteful or otherwise not in our customers' best financial interest. *They simply state that it is so*. In stark contrast, our testimony will show that Avista's practices are based on proven state-of-the-art analyses that have been regularly presented to the Commission over the years, and which it has regularly relied upon by its

[12] Exh. MTT-1T, pages 5, 6.

[13] The Business Case titled "Substation Rebuilds" is composed of two "programs," which address different needs and are budgeted differently. Rebuild Projects focus on rebuilding entire substations, while "Asset Replacements" funds the replacement of individual pieces of equipment during the year that have reached end of life or that fail in service. Because these equipment replacements can be difficult to predict, the budget is based on recent historical experience and budgets.

[14] Exh. PADS-1T; page 33, line 11; page 34, lines 9-11; lines 12, 13; page 36, lines 16, 17; page 43, lines 7-9.

approval of hundreds of millions of dollars of infrastructure investment made by the Company.

**Q. What are these "analytical tools" used by Avista as part of its "Lifecycle Cost Analysis?"**

A. These tools or "modules" are part of the analytical application known as "Availability Workbench,"[15] which are briefly summarized as follows:

- ✓ **"Failure Analysis"** - Analyzing the failure characteristics[16] of equipment to accurately predict future performance and reliability.
- ✓ **"Lifecycle Cost Analysis**" – Incorporating all costs associated with an asset, (i.e. install, inspection, testing, maintenance, repair, replacement and risks), which are integrated with the "Failure Analysis" to forecast future costs, and to evaluate alternatives for best optimizing maintenance and replacement strategies that achieve the lowest cost for customers.
- ✓ **"Integrated Asset Analysis"** – The capability to integrate lifecycle costs of many individual assets to predict performance and cost for managing "systems of assets," like an entire Substation, to optimize overall customer value.[17]
- ✓ **"Optimized Maintenance"** – Integrating the preceding analyses to develop optimized maintenance strategies.[18]

**Q. How are these "tools" brought to bear on the management of Company infrastructure, including "Grid Modernization and Substation Rebuilds?**

A. We use these tools or modules together to evaluate how best to manage high-risk assets like Aldyl pipe, to cost-effectively upgrade technology like LED streetlights, to analyze alternative maintenance strategies for inspection, testing, repair and replacement of equipment, as in our Wood Pole Management program, and we integrate results of these

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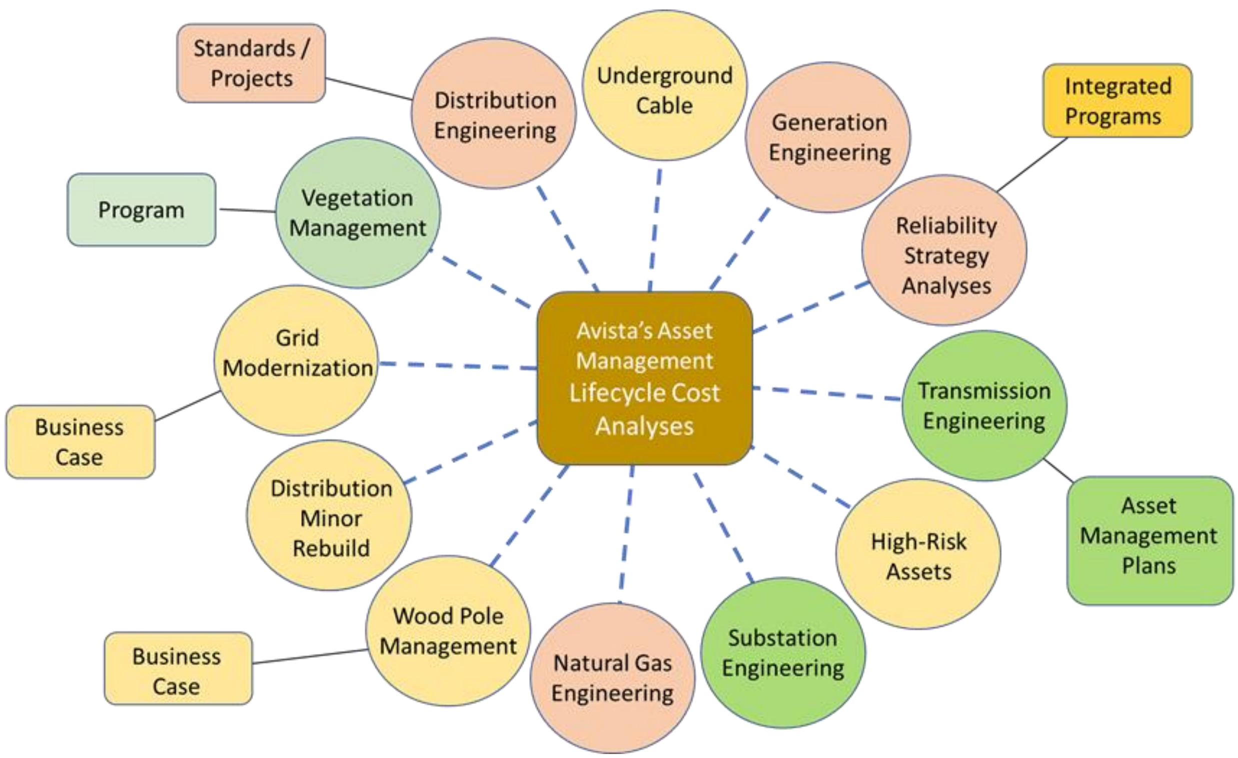
[15] Availability Workbench is an integrated set of asset management applications provided by the firm Isograph, which Avista has used continuously since 2006. Isograph's website is available at www.isograph.com.
[16] Commonly referred to as "Weibull Failure Analysis," or "Failure Curves."
[17] Referred to as "AvSim" in Availability Workbench, as described for Public Counsel in Exh. JD/LL-2, page 380, 381.
[18] Referred to as "RCM" or 'Reliability Centered Maintenance' in Availability Workbench, as described for Public Counsel in Exh. JD/LL-2, page 380.

analyses to identify the lowest-cost strategies for rebuilding infrastructure like electric transmission lines, distribution feeders (Grid Modernization) and substations (Substation Rebuilds).

**Q. When did Avista begin formally using this rigorous lifecycle cost analysis and to what infrastructure has it been applied?**

A. Our testimony notes we have made continuous use of Availability Workbench since 2006,[19] which we have applied across Avista's natural gas, electric and generation lines of business, as depicted in Illustration No. 1, below.[20]

**<u>Illustration No. 1 – Depiction of Avista's Application of Asset Management Analyses</u>**




[19] Exh. JD/LL-2, pages 372-379.

[20] Asset Management has also supported other infrastructure groups within Avista, not shown in Illustration No. 1, with specialized support as needed.

The circles represent the variety of ways Avista has relied on such rigorous analyses, most of which have been presented directly to the Commission in various forms supporting the prudence of our investments over the course of many years. This extensive list, however, barely scratches the surface of the depth of these analyses,[21] which are integrated and applied, as we noted above, to our engineering standards[22] and the Company's many infrastructure programs including Grid Modernization and Substation Rebuilds. The Commission has regularly reviewed these analyses in support of our investments made under these programs in the form of business cases, and as presented in comprehensive Asset Management Plans.

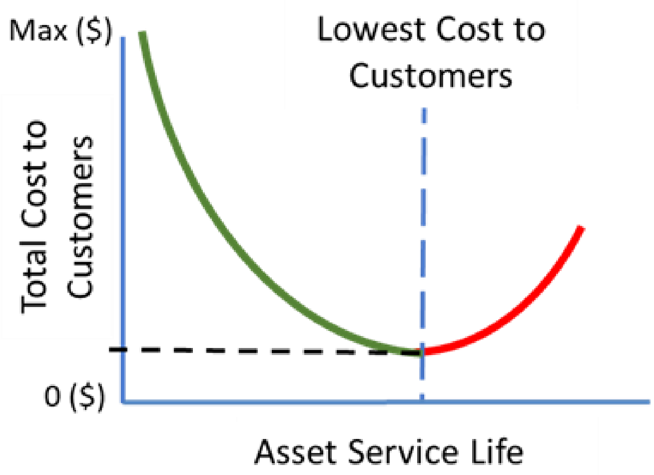
In yet another example, under the category above listed as "High Risk Assets," Avista's analyses include among the others shown, the Company's well-known Aldyl A Pipe Replacement Protocol, in which substantial investments have been deemed a prudent response to the risks associated with this pipe in all our jurisdictions, and which foundational analysis is based on the very lifecycle cost modeling now assailed and dismissed without evidence by Public Counsel.

**Q. How is "Lifecycle Cost Analysis" used by the Company?**

A. Our testimony shows that Avista's "lifecycle costs analysis," as properly applied by the Company, is used to evaluate reasonable alternatives and to identify the inspection, maintenance, repair and replacement strategies that achieve the lowest reasonable optimized cost for our customers, as depicted in the illustration provided below:

[21] Such as individual analyses for wood poles, reinforcement, crossarms, insulators, pins, transformers, cutouts, connectors, lighting arresters, and other distribution equipment applied to both our Distribution Standards and Wood Pole Management, Distribution Minor Rebuild, Worst Feeders and Grid Modernization Programs.
[22] Such as our Distribution Feeder Management Plan, provided in Exh. PADS-27.

**<u>Illustration No. 2 – Illustrative Example of Lowest Lifecycle Cost for Customers</u>**




We will further show that Avista has provided reasonable financial results in response to Public Counsel's requests, including numerous financial analyses which have been completely disregarded in their testimony.

**Q. How will your testimony address Public Counsel's criticisms of Avista's Grid Modernization program, including its lack of vegetation management and any cost-benefit analyses for a feeder rebuild?**

A. First, our testimony restates the purpose of our Grid Modernization program and the values it achieves <u>that cannot be captured though feeder maintenance alone</u>, which Public Counsel dismisses[23] as just another (more expensive) feeder maintenance or worst feeders program.[24] I explain the purpose of the Feeder Baseline Reports,[25] and show where we

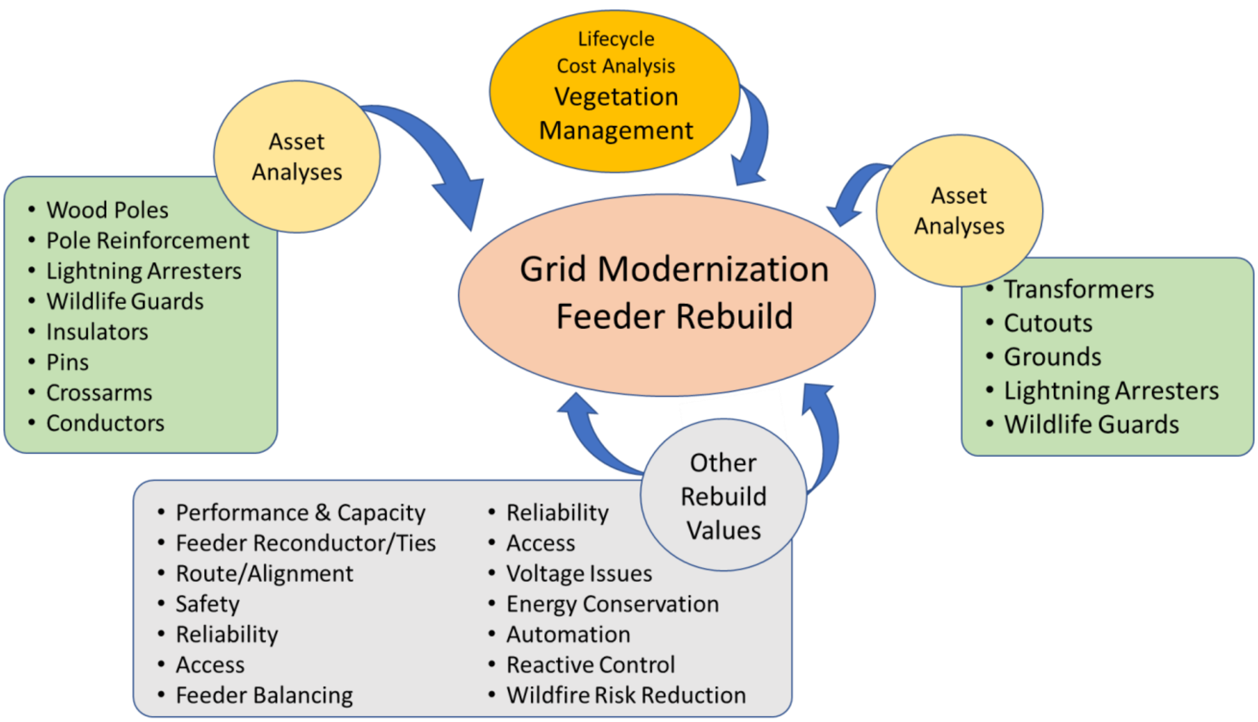
[23] This includes his erroneous assumptions used to significantly understate the financial value for the benefits of energy conservation by improperly applying a value for "energy only" ($15.37) to the MWh savings (Exh. PADS-1T; pages 61, 62), instead of an appropriate Total Avoided Cost, such as the value of $68.05 per MWh as documented by Avista in response to PC-DR-331 (b), provided in Exh. JD/LL-2, pages 366-371.

[24] Exh. PADS-1T; page 62, lines 7-11. Here Public Counsel is referring to Avista's Grid Modernization program by the witnesses' preferred title: "the feeder review program."

[25] Avista's Feeder Baseline Reports, provided as Exh. PADS-16, provide engineering analyses of feeder rebuild options. The cost-benefits of feeder rebuilds, as demonstrated through lifecycle cost analyses, were repeatedly identified and explained to Public Counsel in response to numerous data requests.

explained to Public Counsel, including providing them a working model, how our lifecycle cost analyses optimize Vegetation Management for all the Company's feeders as a program,[26] including feeders prioritized for rebuild under Grid Modernization. That is why vegetation management is not considered among the infrastructure goals optimized in the Feeder Baseline Reports. For cost-benefit analyses, we will point to Avista's many explanations[27] to Public Counsel how its studies of asset lifecycle costs have been applied to the Distribution Grid Modernization program in a standardized approach depicted in the diagram provided in Illustration No. 3, below.

**Illustration No. 3 – Illustration of How Lifecycle Cost Analyses are Applied to Grid Modernization Feeder Rebuild**



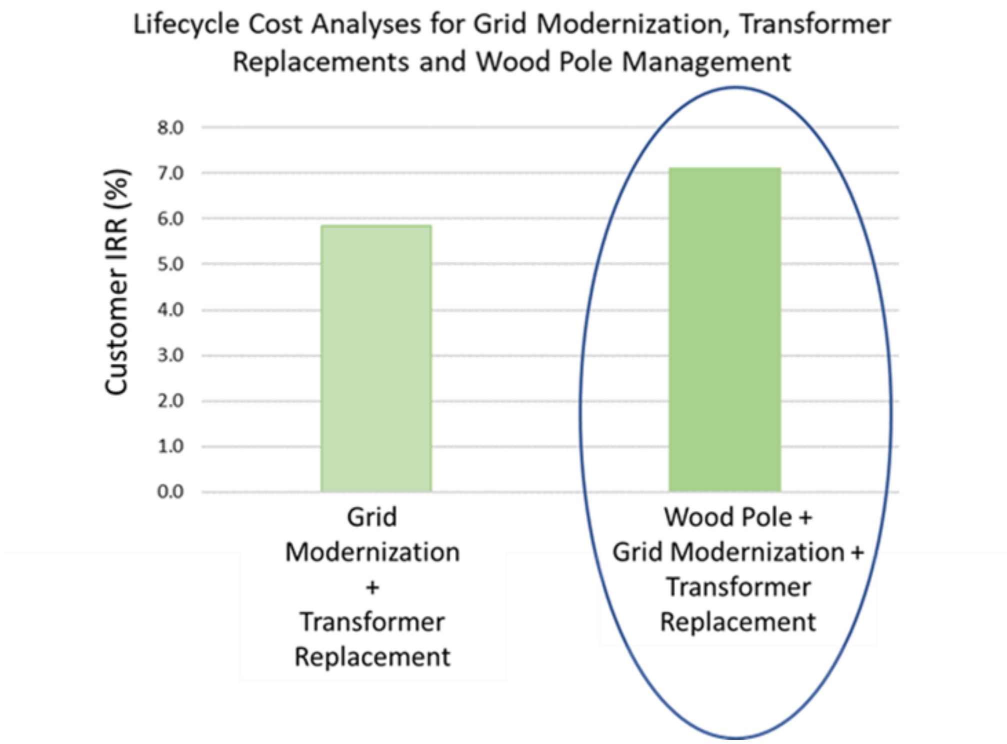

[26] PC-DR-121, PC-DR-122, provided as Exh. JD/LL-2, pages 140-141.
[27] Such as in response to PC-DR-245 as provided in Exh. JD/LL-2, pages 262-264.

In this approach, the lifecycle cost modeling supporting Asset Analyses for Wood Poles and equipment, and the Asset Analyses for Transformers and equipment identify the least-cost strategy for inspecting, repairing, and replacing the predominant assets treated in a feeder rebuild project. Importantly, in describing the overall value gained by a feeder rebuild, our testimony explains how many of the values achieved through Grid Modernization, namely the 'Other Rebuild Values' listed in the gray-shaded panel in the illustration above, provide real long-term value for our customers, but which value is not always easy to monetize today. We explain this is one of the reasons why feeder rebuilds are more costly than simple maintenance, and why Grid Modernization cannot be compared with the costs of maintenance programs alone. It solves a bigger problem for a longer-period of time.

Finally, our testimony shows where Avista provided Public Counsel with financial results of lifecycle cost analyses, as depicted in the diagram above, to achieve the lowest unit costs for rebuilding a feeder, to demonstrate that Grid Modernization is cost effective, and to show how we optimize Grid Modernization with Transformer Replacements and Wood Pole Management to achieve a favorable return on our customers' investment. Results of these analyses, provided in response to PC-DR-221 Attachment A, and appearing in Exh. JD/LL-2,[28] which I summarize in Illustration No. 4 below, demonstrate that a Grid Modernization feeder rebuild, as it includes the benefits of Transformer Replacements, achieves a modest customer internal rate of return approaching 6 percent.

[28] Exh. JD/LL-2, pages 2-94.

**Illustration No. 4 – Financial Analysis of Avista's Grid Modernization Program**




But more importantly, the optimized case, which is circled, shows that our current practice of limited feeder rebuilds, in combination with the low-cost maintenance of Wood Pole Management (both programs including Transformer Replacements) provides our customers an "optimized" rate of return for all three programs that exceeds 7 percent, which is the threshold for returns that actually reduce rate pressure with the investment.[29] Finally, I provide financial results performed by the Company in prior years, and at the request of Public Counsel in this case, that clearly demonstrate the financial harm that would accrue to our customers if the Company were to adopt the default "Run to Fail" strategy, which Public Counsel recommends to the Commission should be adopted by Avista for all electric distribution assets.[30]

[29] Exh. JD/LL-2, page 46.
[30] Exh. PADS-1T; page 66, lines 20, 21.

**Q. Please summarize the conclusions in your testimony as it pertains to the Company's Substation Rebuilds program?**

A. Our testimony shows, as in the case of Grid Modernization, that in response to many data requests, Avista has provided more than ample support for its practices, and that the underlying assumptions of Public Counsel as applied to Avista, are flawed. We further show that the single piece of evidence cited by Public Counsel is erroneously applied, and that Public Counsel's criticisms of Avista's alleged wasteful practices, are made without any evidence, analysis or support of any kind. Accordingly, we conclude these criticisms cannot be relied upon by the Commission to evaluate the prudence of the Company's Substation Rebuilds program.

**Q. How should the Commission view Public Counsel's assertions, including the recommendation that Avista should be disallowed $23.1 million as a result of these alleged practices?**

A. Our testimony clearly demonstrates that the assertions of Public Counsel that Avista uses wasteful "Standing Budgets" and "Prospective Replacements," are unsupported and erroneous, and cannot be relied upon by the Commission.

## III. PUBLIC COUNSEL'S CRITIQUE BASED ON "STANDING BUDGETS" FOR THE GRID MODERNIZATION AND SUBSTATION REBUILD PROGRAMS SHOULD BE REJECTED

**Q. Would you please summarize the testimony of Public Counsel regarding their description of "Standing Budgets?"**

A. Yes, the witnesses appear to draw from their own personal experience working for a multi-state utility[31] where capital was apparently relatively unconstrained and managers had a practice of requesting more budget than was needed, and which managers were encouraged to spend their entire budget each year to help ensure they would receive at least the same level of budget (i.e. "Standing Budget") in the following year.[32] They characterized these "Standing Budgets" as being divorced from the proper approach to budgeting "…based on identifying, assessing and prioritizing grid needs and risks to be reduced…."[33] Finally, the witnesses state that "…Avista determines the budgets for the Substation Rebuilds and Grid Modernization programs <u>in advance of any determination of grid needs</u>."[34]

**Q. Did the witnesses offer any evidence obtained through discovery or otherwise that the foregoing practices were employed by Avista for its Substation Rebuilds and Grid Modernization programs?**

A. No. And that is not what happens at Avista.

**Q. Did Messrs. Alvarez and Stephens offer any examples they considered as acceptable for capital budgeting for electric infrastructure?**

A. Yes, they did, as briefly summarized in the following points:

- The utility has a culture and practice of constraining capital;[35]
- Needed grid investments are identified through a systematic planning process, such as identified in a very recent task force report on the same;[36]
- Capital budgeting begins with grid needs and not "Standing Budgets" that encourage managers to seek solutions on which to spend available funds;[37]

[31] Exh. PADS-1T, page 35, line 13.
[32] Exh. PADS-1T, page 35, lines 3-7.
[33] Exh. PADS-1T, page 35, lines 8,9.
[34] Exh. PADS-1T, page 30, lines 6,7 (emphasis added).
[35] Exh. PADS-1T, page 35, lines 8,9.
[36] Exh. PADS-1T, page 35, lines 21-23; page 31, lines 1-5.
[37] Exh. PADS-1T, page 35, lines 19,20.

- Where managers are required to justify capital spending requests with rigorous analysis of project costs, benefits and risks,[38] and
- Budgets for programs, where necessary spending is difficult to predict with certainty (such as replacements for equipment failure or storm damage), are properly established using historical averages.

**Q. Do you agree with their capital planning and budgeting principles?**

A. Yes. And further, the witnesses attested that Avista appears to adhere to these principles in most cases,[39] with the exception of our Grid Modernization and Substation Rebuild programs.[40]

**Q. Please describe how Avista's capital planning and budgeting processes, including for Grid Modernization and Substation Rebuilds, comports with the principles recommended by the Public Counsel, which you briefly summarized above?**

A. Certainly.

- ✓ **Avista Constrains Capital Spending** below the level requested by projects and programs to promote innovation, balance cost and risk, to efficiently allocate capital and to reduce year-to-year variability in rates.[41] The result is not all of the prioritized programs will be funded in a given year at the level requested.[42]
- ✓ **Grid Investment Needs are Properly Evaluated** through comprehensive planning, evaluation of alternatives, and integrated prioritization.
- ✓ **Evaluated Grid Needs Drive Capital Requests** based on the planning, evaluation and prioritization, noted above, which determines the overall need for capital.
- ✓ **Funding Requests are Properly Evaluated** through multiple types of processes including comprehensive engineering review, evaluation, and prioritization, and robust analyses of lifecycle costs, benefits and financial risks, leading to solutions that deliver service to our customers at the lowest reasonable optimized cost.
- ✓ **Historical Spending is Properly Applied** to establish budgets for programs that

[38] Exh. PADS-1T, page 35, lines 14,15.
[39] Exh. PADS-1T, page 30, line 3.
[40] Exh. PADS-1T, page 30, lines 6,7.
[41] Exh. MTT-1T, pages 5, 6.
[42] As explained in detail in Avista's response to PC-DR-128, provided as Exh. JD/LL-2, pages 149-150.

address investment needs that cannot be determined through "zero-based" budgeting.

**Q. Please describe how Avista budgets for its Substation Rebuilds program?**

A. Avista applies these same principles for budgeting Substation Rebuilds, which business case includes two separate programs ("ERs") that address different investment needs, which I describe below.

1. **Asset Condition-Based Replacements** – this portion of the program budget provides funds for the repair or replacement of equipment that fails in service during the year or is otherwise damaged, requiring immediate remediation.

2. **Funding for Identified, Prioritized and Planned Projects –** funding requests for this portion of the budget derive from specific projects that have been reviewed, evaluated, prioritized, designed and planned for implementation years ahead of when the work will actually be completed.

**Q. How does the Company budget for the Asset Condition portion of the Substation Rebuilds program?**

A. Because, as noted by witnesses Messrs. Alvarez and Stephens, these types of needs cannot be determined with specificity before they occur, Avista uses the best current information combined with its recent experience and historic budgets to establish future budget levels.

**Q. How does Avista budget for the 'Planned Projects' portion of the Substation Rebuilds program?**

A. As noted above, specific projects are developed in response to needs identified through the planning process, from which, specific project requests are evaluated and prioritized and are ultimately sequenced in time for implementation. The capital budget for this portion of the Substation Rebuilds program is “built up” from the aggregated project needs identified in prior planning for implementation in the current period.

**Q. Please describe the approach used by the Company to establish budgets for its Grid Modernization program?**

A. As a first step, Avista performed a comprehensive evaluation and prioritization of its electric feeders and has prepared detailed engineering reports (Feeder Baseline Studies)[43] for each of the feeders selected for such a rebuild. Detailed designs are prepared for feeders ultimately selected and construction is sequenced, often over a period of years for each individual feeder. The capital budget for Grid Modernization, like that for Substation Rebuilds, is then ‘built up’ from the design and construction cost estimates for the work to be performed in the time frames planned.

**Q. Are the annual budgets for Grid Modernization ‘open ended’ or are they constrained in some manner?**

A. The budgets are constrained by the amount of funding Avista believes is reasonable, as optimized with Wood Pole Management, and, like all other Avista capital projects, a budget once approved for Grid Modernization is often subject to revision, even within a construction year, to accommodate more-critical needs that may arise through the course of the year.[44]

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[43] In Exh. PADS-16, Public Counsel has included over 650 pages of these feeder reports, which were provided by Avista in response to PC-DR-110.

[44] The limit on the annual funding provided results from Avista’s overarching constraint on capital spending and the requirement to allocate available capital to highest-priority needs across the enterprise each year.

The funding for Avista's Substation Rebuilds and Grid Modernization programs so not constitute what they characterize as "Standing Budgets." They are not simply "buckets" to be filled every year without analysis and forethought.

## IV. PUBLIC COUNSEL FAILS TO APPRECIATE BASIC LIFECYCLE COST ANALYSIS, AND AS A RESULT, IT ERRONEOUSLY ALLEGES THAT AVISTA OVERINVESTS IN ELECTRIC INFRASTRUCTURE

**Q. Please summarize the criticisms alleged by witnesses Messrs. Alvarez and Stephens in alleging that Avista overinvests in electric plant to the detriment of its customers?**

A. Certainly. The witnesses claim that Avista's methodologies for determining when to replace electric assets is deeply flawed,[45] that it represents an overinvestment in service reliability,[46] is motivated by our desire to remove fully-depreciated assets in order to boost earnings,[47] and that such practices are harmful to customers because the benefits derived fail to exceed the cost they ultimately have to pay in rates.[48]

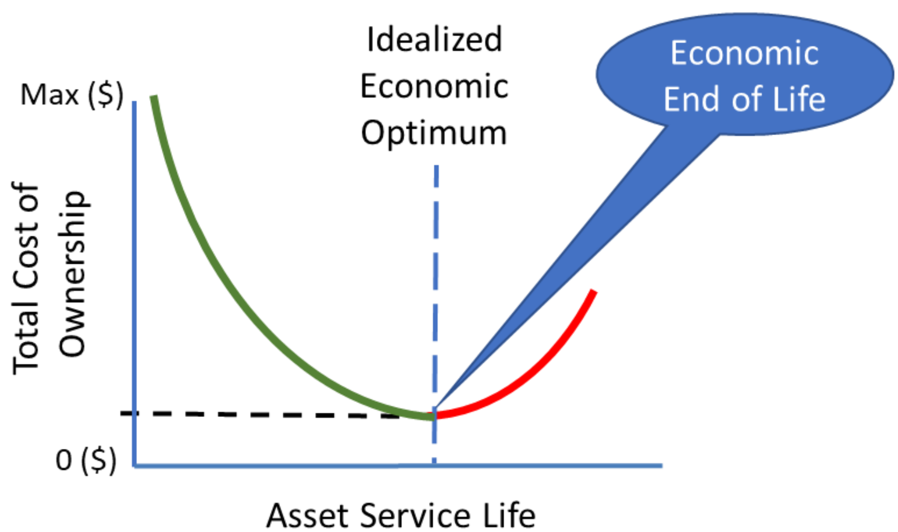
**Q. How did Avista answer the questions posed by the witnesses regarding how its lifecycle cost analysis is used to identify <u>when</u> to replace electric system assets?**

A. Initially, in response to data requests, we provided results of such lifecycle costs analyses, and explained the data used to develop the failure characteristics of assets and the installation, inspection, maintenance, and replacement costs, which together comprise the Total

[45] Exh. PADS-1T, page 41, line 12.
[46] Exh. PADS-1T, page 37, lines 1-7.
[47] Exh. PADS-1T, page 30, lines 3-7.
[48] Exh. PADS-1T, page 54, lines 7-9.

Cost of Ownership for an asset (or group of assets). We also provided a working model used by Avista to forecast electric system reliability and to evaluate the costs and benefits of different asset maintenance strategies. Avista demonstrated the use of this model in response to a request from Public Counsel to analyze the customer costs of a "Run-to-Fail" strategy for managing our electric distribution feeders.[49] We continued to provide numerous examples of lifecycle modeling components and explained their operation in response to specific data requests. We also provided voluminous data, as requested, which was relied upon by Avista for these analyses. We also provided the witnesses illustrative examples of representative lifecycle cost curves to explain the principles behind managing (and replacing) assets to achieve the Lowest Lifecycle Cost, which results in the Lowest Total Cost of Ownership for customers. I've listed one illustration below, as provided in response to PC-DR-307,[50] as Illustration No. 5.

**<u>Illustration No. 5 – Illustrative Lifecycle Cost Curve</u>**




[49] Which model, Avista's Reliability Strategy Analysis Tool, relies on the output of 47 different Availability Workbench lifecycle cost models to produce optimized least-cost strategies, as described in PC-DR-235, provided in Exh. JD/LL-2, pages 237-240.
[50] Provided in Exh. JD/LL-2, pages 321-324.

This example was provided in response to the question about how Avista defines the "Economic Optimum" for an asset. We explained that the optimum is that point on the curve when the lifecycle cost to customers is at its lowest point, as measured on the vertical axis labeled "Total Cost of Ownership."[51] The following narrative explaining this illustration is excerpted from our response to PC-DR-307 (a).[52]

> **Economic Optimum** is the idealized point of the lowest total cost of ownership for an asset. Total cost of ownership includes the initial investment, maintenance, and replacement costs, as well as risk costs associated with operation and failure in service (e.g. outage risk, safety risk, environmental risk, among others). In the illustrative example, [above] below, replacing the asset much prior to the economic optimum will not capture the full value of the initial investment, while replacing it much beyond the economic optimum will result in the encumbrance of uneconomic costs for maintenance or failure, as noted above. Replacement either too early or too late in this idealized example costs customers more money than targeting the economic optimum.

**Q. Did you provide any other explanations or information to help the witness better understand the principles and application of lifecycle costs analyses?**

A. We explained in detail and provided numeric examples of the technical reasons for the unique shape of the curve in the illustrative example, explaining what component costs make up the lifecycle curve, and including computations for many different examples. We also provided two other illustrative examples of lifecycle cost curves, one with a broader economic optimum, and one that typifies a classic 'Run to Fail' asset. We also explained why we sometimes use the term the "Economic End of Life" to describe how a replacement strategy for an asset can be variable, or even shift, as a result of where and how it is deployed in our system,

[51] The dashed line and "0 ($)" and "Max ($)" are added for the purpose of this discussion, to show the relationship between cost points on the curve and the Total Cost of Ownership.
[52] Ibid.

when the costs for replacement can be reduced beyond those initially estimated, or when risk costs increase above those initially estimated.[53]

**Q. Is Avista's application of "Economic End of Life" for determining when to replace equipment supported by any recognized professional organization or any standards?**

A. Yes, the term "economic end of life," as applied by Avista, is specifically recognized by that name as a fundamental approach for determining the end of life of an asset, as noted in the guidance manual[54] of the Institute of Asset Management. This guidance comports with the International Standards for Asset Management, PAS-55 and ISO 55000 series, which standards the Institute of Asset Management was instrumental in leading and supporting in their development and implementation. Avista has been a member of the Institute of Asset Management since 2006.

**Q. Did you explain to Public Counsel how the approach used by Avista reduced such replacement costs to create an Economic Optimum that is superior to the default Run to Fail?**

A. Yes, we provided several examples in numerous responses to the witnesses' data requests, noting such explanation in PC-DR-296 (a), excerpted below.[55]

> As we have noted before, these designations of run to fail or not run to fail, are not necessarily static for each asset. This is because the consequences of a failure in service for an asset may be dramatically different depending on its application and location in our system. Likewise, the costs of replacement are not static. As an

[53] We have provided a more detailed explanation of the lifecycle cost analyses provided to Public Counsel by Avista in Exh. JD/LL-2, pages 137, 140, 141, 147-148, 170-175, 213-221, 226-227, 230, 237-240, 256-257, 262-264, 282-283, 290-318, 321-309, 332, 333, 336-341, 342-365, 372-393, and others not specifically noted here.
[54] Institute of Asset Management, Subject Specific Guidance manual number 8, titled "Lifecycle Value Realisation," page 10.
[55] Exh. JD/LL-2, pages 301-303.

example of the latter, it would not be cost effective to send crews across our system solely to locate and replace distribution transformers based on a given age of the units. But it is cost effective to replace transformers based on a given age (and condition) of the units when a crew is already performing work on the pole where such a transformer is located. Furthermore, replacing a transformer based on age and condition, during a systematic program like wood pole management, is more financially viable because, as part of the transformer replacement, we're also inspecting and replacing as needed the cutout, lightning arrester, high and low-side connectors and wildlife guard, and capturing the energy efficiency savings provided by a new replacement transformer. The lifecycle costs analyzed in the Availability Workbench model take all of this into account in calculating the financial value associated with the transformer changeout program (avoidance of the risk costs associated with a failure in service for the transformer, cutout, arrester, high and low-side connectors, etc.; combined with the gain in energy efficiency; combined with the lower cost to install when other capital work is already being performed on that pole). As explained in response to PC-DR-295 and elsewhere, results of our lifecycle cost modeling demonstrate that replacement of a transformer and the attached equipment in the manner just described provides our customers a lower total cost of ownership, when financially compared with the alternative of allowing the transformer (and attached equipment) to fail in service.

**Q. Did you provide Public Counsel any analysis or evidence of the cost savings for customers based on this approach for Transformer Replacements?**

A. Yes, we did. Avista provided results of such a financial analysis in response to PC-DR-221, Attachment A, which is the Company's 2017 Wood Pole Management Program Review and Recommendations (see Exh. JD/LL-2, pages 2-94). The lifecycle cost analyses reported were based on the output of 172 different Availability Workbench models integrated together to provide optimized solutions for individual assets and programs including the transformer changeout work as part of the Wood Pole Management and Grid Modernization programs, which is identical to its application in Distribution Minor Rebuild.[56] Including transformer changeouts with the program reduced the total lifecycle cost to customers by $18.3 million in direct costs and by $46.9 million in risk costs, for a <u>combined reduction in lifecycle</u>

[56] And, also as noted in the Company's Distribution Feeder Management Plan, included as Exh. PADS-27.

costs to customers of $65.2 million, compared with the "Run-to-Fail" alternative of allowing the transformers and attached equipment, including the cutout,[57] to fail in service and returning to the feeder later to replace them one at a time.[58]

**Q. Have the costs for these replacements already been deemed prudent and included in rates approved by the Commission?**

A. Yes, they have.

**Q. Did you provide Public Counsel any example where revised risk costs justified the systematic replacement of an asset compared with the alternative of allowing them to fail in service?**

A. Yes, we provided two examples: high-risk cutouts manufactured by A.B. Chance ("Chance cutouts") and risky PCB distribution transformers. The circumstance for Chance cutouts was explained in numerous responses including our response to PC-DR-293,[59] which response to the request about Availability Workbench modeling is excerpted below.

> The forecast of high-risk cutouts, which as noted in response to PC-DR-292 are nearly all Chance cutouts, was developed from actual failures of these cutouts, based on known failures experienced by Avista, modes of failure and service life. The forecasts were performed using the Availability Workbench modeling to develop failure curves (and subsequent lifecycle cost modeling), which process has been described by the Company in numerous data requests, including PC-DR-118, PC-DR-121, PC-DR-122, PC-DR-223 Revised, PC-DR-221, PC-235, and notably in PC-DR-236 where Avista offered to provide the subject models and/or an online working session, PC-DR-294, PC-DR-295 PC-DR-296, and by reference in responses to PC-DR-298 through 305. The forecast failures shown for 2007-2014 for high-risk cutouts is a mathematically sound representation of expected failures based on known failure data and expected remaining units in service at the time the forecast was performed.

[57] Contrary to the assertion of witness Mr. Stephens (Exh. PADS-1T; page 64, lines 12-14), these analyses performed for replacement of transformers and cutouts is in no way based on the analyses performed for high-risk Chance cutouts, or Risky PCB Transformers, which we briefly discuss later in our testimony.
[58] Exh. JD/LL-2, pages 52-54.
[59] Exh. JD/LL-2, page 290.

**Q. Was this failure information used in lifecycle cost analyses to compare alternative strategies for managing these cutouts?**

A. Yes. As requested by Public Counsel, Avista provided all the data used in the failure analyses described above, which Weibull[60] analysis combined with all the lifecycle costs[61] for these cutouts was used to forecast the financial value for customers of Systematic Replacement compared with the alternative Run to Fail strategy. Results of the ten-year forecast (from year 2008) are provided in Table No. 1, below.[62]

**Table No. 1 – Financial Benefits for Customers of Systematic Replacement of High-Risk Cutouts Determined by Avista's Lifecycle Cost Analysis**

| Metrics | Run-to-Fail | Systematic |
|---|---|---|
| Cutout Failure Rate | 400 per year | 46 per year |
| Customer Cost | $2.2 million | $0.26 million |
| Minor Safety | 0.8 events | 1.3 events |
| SAIFI Impact | 0.05 added | 0.006 added |
| Avg Annual Capital Budget | $475,000 | $192,000 |
| Avg Annual O & M Budget | $268,000 | $32,000 |
| IRR (Lifecycle Cost) | 0.7% | 19.1% |
| Levelized ROE | $92,000 | $44,000 |
| Expected Value to Implement | $6.2 million | $4.6 million |

[60] As explained by Avista, one of the components of "lifecycle cost analysis" is the statistical description of the failure characteristics of an asset, often referred to as the Weibull function or curve, which failure analysis is combined with lifecycle costs for inspection, testing, repair, risks replacement to calculate the Total Cost of Ownership for an asset or group of assets, and to identify the lowest lifecycle cost for equipment replacement, as one example. The Weibull distribution is a continuous probability distribution named for the Swedish mathematician Wallodi Weibull who described it in detail in 1951.

[61] Including replacement costs and all the risk costs associated with the failure of these assets in service.

[62] Exh. JD/LL-2, pages 291-292.

The Planned Replacements alternative clearly provided customers the lowest costs and greater value in every respect.

**Q. Did the Company adopt this systematic replacement strategy?**

A. Yes, it was implemented.

**Q. Were these replacement costs previously deemed prudent and included for recovery in rates approved by the Commission?**

A. Yes, they were.

**Q. In testimony, does Public Counsel offer any alternative explanation to Avista's lifecycle cost analysis, as illustrated in the examples above?**

A. Yes, in spite of our detailed and exhaustive efforts to explain lifecycle cost analysis to deliver service at the lowest lifecycle cost, Mr. Alvarez suggests that lifecycle cost analysis is wrong because "… it is typically applied by unregulated businesses in competitive industries, not regulated utilities."[63] He goes on to explain how he believes a competitive business would interpret Avista's lifecycle cost illustration,[64] concluding that '…Avista's "Idealized Economic Optimum" for asset replacement does not apply to a competitive business."[65] He continues by describing how he believes a competitive business would go about determining when to replace assets,[66] which narrative morphs into a discussion about redundancy of infrastructure, risks, and utility planning principles, etc.,[67] and which discussion

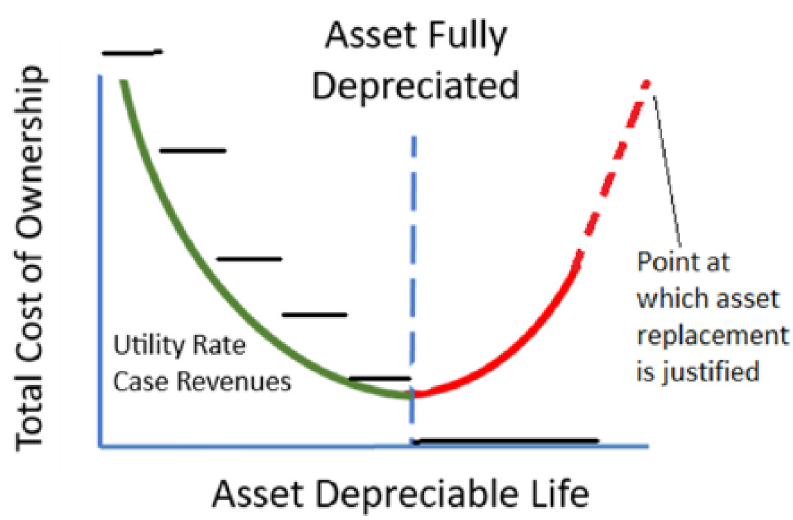
[63] Exh. PADS-1T, page 39, lines 3-5.
[64] Exh. PADS-1T; page 39, lines 5-12.
[65] Exh. PADS-1T; page 40, lines 1, 2.
[66] Exh. PADS-1T; page 40, lines 2-7.
[67] Exh. PADS-1T; page 40, lines 7-15.

he summarizes with the statement that regulated utilities' revenues are not "dependent on substation asset availability" but instead are based on net rate base.[68]

He then continues by explaining how a utility's regulated revenues decline with the depreciation of an asset, again using the modified lifecycle cost illustration provided by Avista, and he notes that a utility does not earn any return on a fully depreciated asset. He concludes by betraying his biased opinion that regulated utilities are motivated to replace assets as soon as possible once they are fully depreciated.[69] Finally, he erroneously concludes, again by modifying Avista's lifecycle cost illustration, that the only point in time when replacement of an asset is justified is when the lifecycle costs have accumulated to the point where they are equivalent to the initial installed cost of the asset, as he illustrated in Exh. PADS-1T, Figure 9, page 42, which is excerpted below and provided as Illustration No. 6.

**<u>Illustration No. 6 – Public Counsel's Alternative Interpretation of Lowest Lifecycle Costs based on Avista's Lifecycle Cost Illustration</u>**

*Figure 9: Point at which "total cost of ownership", if used, should indicate asset replacement*




[68] Exh. PADS-1T; page 41, lines 1, 2.
[69] Exh. PADS-1T; page 41, lines 5-7.

**Q. What can you conclude from the explanation offered by Mr. Alvarez, including his illustration?**

A. The point he has identified "when asset replacement is justified," is precisely the point when all the customer value provided by the asset over its life will have been forfeited, because it maximizes the Total Cost of Ownership paid by customers. His illustration achieves a cost to the customer, using a substation power transformer as an example, that is identical to the alternative of replacing the transformer every single year, over and over for 60 years.[70] In doing so, he has missed the fundamental point of "lowest lifecycle cost," defined as the point of lowest Total Cost of Ownership – i.e. the lowest point in the curve, which represents the lowest cost to customers. More importantly, the narrative of Mr. Alvarez, which draws from his knowledge of competitive industries, infrastructure risks, and depreciation accounting, suggests he does not appreciate the 'least cost' fundamentals of prudence in utility rate making in Washington.

**Q. Do these concepts raised in the testimony of Mr. Alvarez, such as asset depreciation or utility revenues, etc., have any place in Avista's lifecycle cost analysis, and if so how?**

[70] The typically highest cost in the Total Cost of Ownership, at the left-most upper end of the curve is equal to the initial cost of the asset placed in service in year one, divided by the number of years in service, which is equal to one. So, for a new transformer installed in year one at a cost of $1.0 M, the Total Cost of Ownership for that asset in year is one is $1.0 M. With each successive year of service in the life of that transformer, the Total Cost of Ownership typically declines based on the simplified example for Year 10 of that transformers' life in service. The Total Cost of Ownership for that transformer is now equal to $1.0 M/10 years, or $100,000. The simplified Total Cost of Ownership for that transformer in year 50 would be $1.0 M/50 year, or $20,000. The point in Mr. Alvarez's illustration, which he states as "asset replacement is justified," is the point where all of the accumulated costs for ongoing inspection, testing, maintenance, repair, outages, multiple other types of risk costs, and replacement costs, which would be incurred as required to keep that transfomer in service way, way past the point of its lowest lifecycle cost, will have reached the point where the Total Cost of Ownership, for each and every year that transformer has been in service, is $1.0 M. This cost is equivalent to that of installing a new transformer every single year. Clearly, no one would keep (or could keep) a transformer in service for a long-enough period of time to reach this extreme point in the Total Cost of Ownership.

A. No, neither depreciation of an asset, nor revenues from the asset, nor utility revenues in general, are included in any way in the lifecycle cost analysis. Lifecycle analysis simply determines how to manage an asset and when to replace it based on what is in the best financial interest of our customers – the lowest optimized cost. We are not being motivated by a desire to replace fully-depreciated assets so we can begin to earn a return on new investments, notwithstanding his jaundiced viewpoint.

**Q. Beyond the examples you provided above, how else has Avista attempted to explain that its approach does not constitute "Prospective Replacements"?**

A. We have made repeated attempts to demonstrate the error of this claim in response to numerous data requests, including for example, PC-DR-223 Revised, PC-DR-229, PC-DR-230, PC-DR-235, PC-DR-288 Revised, PC-DR-292, PC-DR-294, PC-DR-296, PC-DR-307 and PC-DR-308.[71] A representative response to the recurring theme of Public Counsel is provided in PC-DR-288 Revised (b)(iii), which excerpt is included below (emphasis added).

> Regarding the statement referring to "prospective replacement," the Company has at every instance noted its disagreement with Public Counsel's use of that phrase, including the use of "preemptive replacement," to describe how Avista replaces any equipment before it fails in service. The reason for our strong disagreement is that use of these phrases seeks to establish a premise that the default (and proper) strategy for replacement of assets is **only when they fail in service**. As we have stated in response to numerous requests, the Company replaces electric system assets when they are deemed to have reached the end of useful life. Further, we have explained and demonstrated that 'end of useful life' is determined through asset failure analysis, and evaluation of costs, benefits and risks in both simple analyses and very complex lifecycle cost modeling – all to identify the replacement strategy (and the ultimate designation of end of life) that allows us to deliver service to our customers at the lowest reasonable optimized cost… Accordingly, there is no 'one size fits all' definition of what constitutes the end of useful life for an asset. It's defined by the specific context and application for each asset, based on analysis of those specific

[71] Provided as Exh. JD/LL-2, pages 216-221, 231, 232, 237-240, 282-283, 289, 291-292, 301-303, and 321-329.

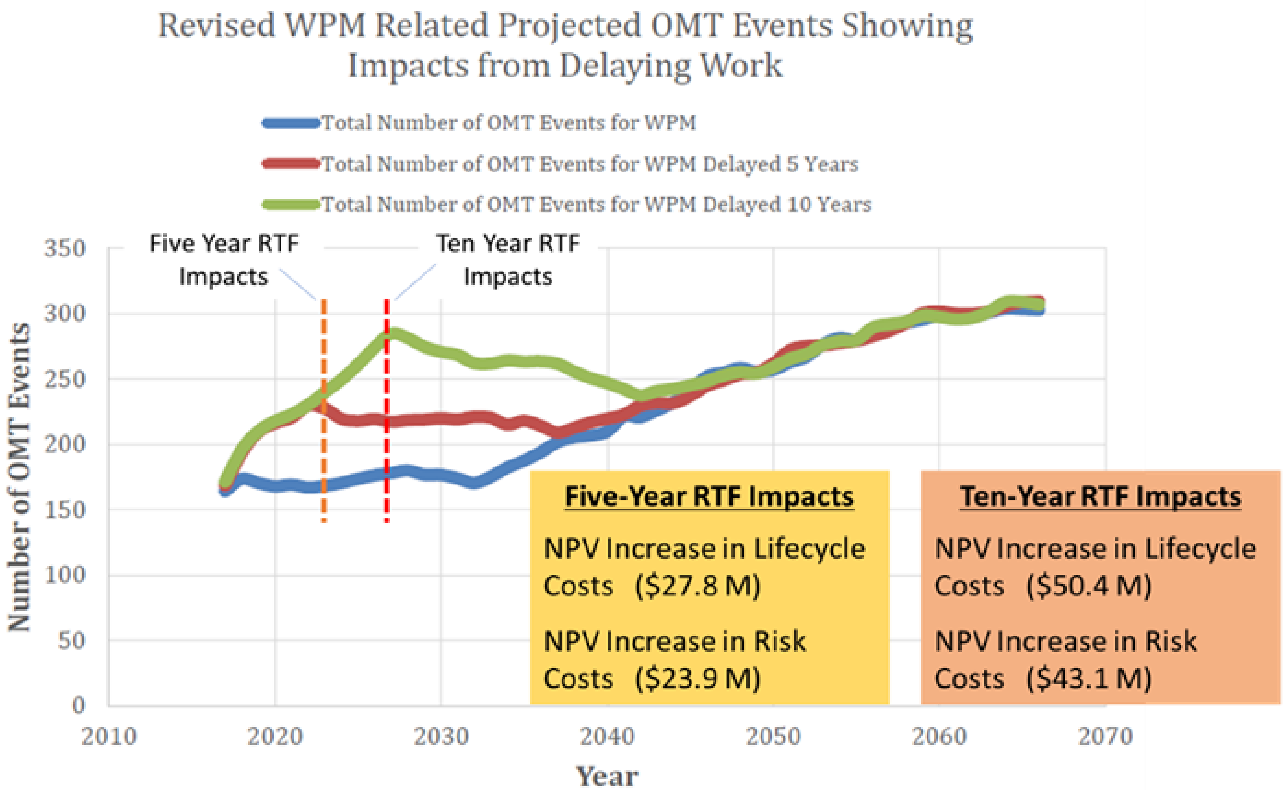
risks, consequences and costs associated with that equipment failing in service, the unique costs of replacement, in that particular application and context.

**Q. In their recommendations to the Commission, Public Counsel argues that "Avista should adopt "Run to Failure" as the default policy for distribution equipment."[72] Has the Company ever analyzed the lifecycle costs to customers if it were to adopt Public Counsel's recommendation as an alternative to its current practices, described above?**

A. Yes, we have performed such financial analysis of an alternative Run to Fail strategy, both at the request of Public Counsel,[73] and in material provided in response to other data requests, which report I have already noted in our summary above.[74] In addition to analyzing costs for the Wood Pole, Transformer, and Grid Modernization programs, the report includes results of financial analyses for a Run to Fail strategy, which results are excerpted below as Illustration No. 7.

[72] Exh. PADS-1T; page 66, lines 21, 22.
[73] In that analysis, referenced in PC-DR-235 (Exh. JD/LL-2, pages 237-240), Avista provided forecasts of outages, costs, and risk costs only through year 2030, which cost impacts we stated would carry well into the future beyond year 2030, and which costs were not reflected in that analysis.
[74] Exh. JD/LL-2, pages 2-94.

**<u>Illustration No. 7 – Financial Consequences of a Run to Fail Alternative for Avista's Wood Pole Management Program</u>**




We have added the red dashed lines with labels to the illustration to show the respective peaks in the forecast annual outages corresponding with a Five-Year Run to Fail period (red line) and a Ten-Year Run to Fail period (green line), both compared with Company's current practices shown in the blue line. <u>Both "run to fail" alternatives assume a return to Avista's Current Practices for Wood Pole Management at the end of each Run to Fail period</u>. As I have noted in the summary highlight boxes added to the figure, if Avista were to adopt a Five-Year Run to Fail period or a Ten-Year Run to Fail period, the expected financial consequences for our customers, expressed as an increase in total costs they would pay, would be $51.7 million and $93.5 million, respectively. <u>Clearly, the Run to Fail strategy recommended to the Commission</u>

by Public Counsel is out of touch with the reality of how best to manage our distribution assets and is not in our customers' best interest, financial or otherwise.

**Q. Did Public Counsel witnesses seek to better understand the Availability Workbench models?**

A. Yes, and no. Messrs. Alvarez and Stephens asked for detailed explanations of the modeling in numerous data requests, and when they requested copies of the models themselves in discovery, Avista explained it would be happy to provide the models to them and provide a tutorial if they held the necessary licenses to use the Availability Workbench application. We also offered to work through the models with them, as noted in our response to PC-DR-235 (a), excerpted below.

> In the event Public Counsel holds the necessary license for the Availability Workbench application, Avista would be happy to provide such models, as well as provide any tutorial that might be helpful in their review and evaluation. Avista is also happy to schedule a working session with Public Counsel to do a walkthrough of the models and the output that is used in the Reliability Strategy Analysis Model.

**Q. Did the witnesses take advantage of Avista's offer to provide greater visibility into and understanding of the models prior to filing their testimony?**

A. No, surprisingly they did not.

**Q. Didn't they request such online sessions in other areas involving AMI?**

A. Yes. In discovery, Public Counsel requested two online meetings with Avista (with screen sharing) to assess the Company's efforts to capture AMI-enabled benefits for Conservation Voltage Reduction and Outage Management. We believe both meetings were very useful and we appreciated the opportunity to share our progress. But for some reason, they elected not to take advantage of similar online sessions offered by Avista for its Availability

Workbench modeling, prior to filing their testimony.[75]

**Q. Has the Commission or Staff ever requested the opportunity to better understand the operation of these models?**

A. Yes, and Avista has provided such demonstrations for Commission Staff upon request. Neither the Staff, nor the Parties in any prior case have challenged the results produced in such analyses or the use of Availability Workbench modeling generally. Importantly, all the parties in this case, including Staff, had the same information provided to them as was provided to Public Counsel, yet Staff took no issues with our methodologies or investments.

**Q. What do you conclude from your review of this portion of Messrs. Alvarez and Stephens testimony?**

A. Because Public Counsel fails to appreciate the basics of lifecycle cost analysis, their assertion, that Avista is "Prospectively Replacing" assets much too early, is wrong and should be rejected by the Commission in evaluating the prudence of the Company's Distribution Grid Modernization and Substation Rebuilds programs.

## V. PUBLIC COUNSEL DISTORTS THE STATED OBJECTIVES OF THE COMPANY'S GRID MODERNIZATION PROGRAM AND HAS DISREGARDED REASONABLE EVIDENCE OF ITS PRUDENCE AND COST EFFECTIVENESS

**Q. Please summarize the criticisms alleged by Mr. Stephens regarding Avista's Grid Modernization program?**

A. While he alleges the program is overinvesting in "copious amounts of

[75] More recently, Public Counsel has requested an online session with Avista to discuss the Company's lifecycle cost analysis for overhead transformers.

Prospective equipment replacement,"[76] our central concern is how he simply dismisses the multiple, diverse and unique objectives[77] of Avista's Grid Modernization program,[78] which fundamentally distinguish it from the Company's other electric distribution maintenance programs such as Wood Pole Management, Worst Feeders and Distribution Minor Rebuild. His erroneous characterization depicts the Grid Modernization program as just another feeder reliability program,[79] from which premise he challenges its lack of reliability focus[80] and questions its cost effectiveness.[81]

**Q. What distinguishes Avista's Grid Modernization from the other programs you mentioned?**

A. Many of Avista's electric feeders have been in service for well over a century. In order to keep them serviceable, the Company has made new incremental investments over the years to replace end of life and damaged equipment or to upgrade the capacity as needed to accommodate load growth. The impact of these investments can be highly variable, with some feeders being essentially rebuilt and upgraded to 'new' over time because of their location and proximity to growth and development. But for the majority of our feeders, these incremental investments have been performed during emergency repair or feeder maintenance, both of which typically replace assets 'in-kind' and 'in-place.'[82] This in-kind and in-place replacement of individual assets provides the lowest incremental cost approach for maintaining the

[76] Exh. PADS-1T, page 34, lines 6-11.
[77] Exh. PADS-1T, page 61, lines 13-19.
[78] Public Counsel briefly acknowledged Grid Modernization having 13 related program metrics (Exh. PADS-1T, page 59, lines 1-3), but is dismissive because only two of the metrics involved reliability performance.
[79] Exh. PADS-1T, page 58.
[80] Exh. PADS-1T, page 59, lines 13-19; 62, lines 7,8.
[81] Exh. PADS-1T, page 60, lines 17-19; page 61, lines 6-10.
[82] In-kind and in-place refers to the practice of replacing a wood pole, for example, in the same location as the failed pole, without changing the conductor, the capacity, the location or the alignment and route of the feeder.

serviceability of our infrastructure. Avista's Wood Pole Management and Distribution Minor Rebuild programs are tailored around this practice of generally repairing or replacing equipment in-kind and in-place. While this is a prudent practice, maintenance programs by themselves cannot achieve the many other values provided in a Grid Modernization feeder rebuild.

Avista's Grid Modernization program is "opportunistic," and was designed to take advantage of a limited opportunities[83] to comprehensively review, redesign and upgrade a few feeders each year in order to capture a range of long-term value for our customers, including, for example, readiness for the integrated application of the grid edge technologies defining the future of every utility's electric distribution system.[84] Below, I've listed some of the improvements made to a feeder that is rebuilt under Grid Modernization, particularly those improvements[85] that typically cannot be achieved by in-kind and in-place maintenance.[86]

- ✓ Load balancing
- ✓ Reconductoring replaces high-loss conductors
- ✓ Resizing trunk conductors
- ✓ Resizing lateral conductors
- ✓ Improving voltage quality
- ✓ Improving and refining voltage regulation
- ✓ Evaluate and correct power factor
- ✓ Modifying existing alignment or undergrounding segments to avoid outage prone areas and reduce wildfire risk
- ✓ Modifying existing alignment to improve access to lines during an outage event
- ✓ Reconfiguring lines to create or strengthen feeder ties to improve flexibility and reliability
- ✓ Bring facilities more in line with applicable standards

[83] Because rebuilding a feeder is more costly than in-kind and in-place maintenance, Avista purposefully constrains the number of feeders rebuilt under the Grid Modernization program each year, in balance with the regular feeder maintenance it performs, in an effort to optimize overall benefits and costs for our customers.
[84] Please see Avista's response to PC-DR-141, provided as Exh. HR/LL-2, pages 31-32.
[85] Please see also Avista's response to PC-DR-110, provided as Exh. PADS-16.
[86] Importantly, these improvements have not been updated to reflect the very-tangible additional value of reducing the risk of Wildfire.

- ✓ Applying energy efficiency design strategies such as "right-sizing" transformers and conductor, and eliminating open-wire secondary districts
- ✓ Add remote operations to reduce operating costs, enhance employee safety and improve reliability

**Q. Mr. DiLuciano, are these multiple objectives described in the Company's Feeder Baseline Reports? If so, please briefly describe them?**

A. As a power engineer with experience in a range of technical and leadership roles, including as Director of Electrical Engineering for transmission, distribution and substations for Avista, I am really proud of these Feeder Baseline Reports. Each provides a "baseline engineering analysis" documenting the current state of a feeder, including such information as leading and lagging power factor, fuse sizing, conductor identification, outage analysis, and opportunities for feeder ties and automation. Importantly, the purpose of these reports, for feeders already selected through our comprehensive prioritization process, is to provide the analyses needed to assess, rank and prioritize actions that may be included in the final rebuild design. Each report includes criteria and measurements in three broad categories, which we briefly summarize below.

**(1)** <u>Overall Feeder Health</u>

- ✓ **Age Distribution of Poles and Equipment:** Please see the example in the table below.
- ✓ **Ratio of Overhead to Underground Circuits:** Underground facilities are less susceptible to a range of outage drivers such as weather, trees, and vehicle damage, as examples.

- ✓ **Results of Wood Pole Inspections:** Please see the example in the adjacent table. Note that only 4.2% of the poles to be replaced are based on the 60-year-old threshold criteria.
- ✓ **CEMI3 Performance:** History of customers experiencing three or more outages each year.
- ✓ **SAIFI Performance:** History of number of outages each year / number of customers served.

| | |
|---|---|
| Number of Poles on Feeder | 427 |
| Average Pole Age in Years | 36.4 (1984) |
| Year of Oldest Installed Pole | 1946 |
| Poles install between 1920-1929 | 0 (0%) |
| Poles install between 1930-1939 | 0 (0%) |
| Poles install between 1940-1949 | 1 (0.2%) |
| Poles install between 1950-1959 | 16 (3.7%) |
| Poles install between 1960-1969 | 91 (21.1%) |
| 60 Year Replacement Criteria | 18 (4.2%) |
| Yellow Tagged Poles (Re-enforceable) | 23 (5.4%) |
| Red Tagged Poles (Replace) | 1 (0.2%) |
| Average Pole Height | 41.5 |
| Average Pole Class | 4.0 |
| Class 4 Poles or Smaller | 311 (72.8%) |
| Class 5 Poles or Smaller | 101 (23.7%) |
| Estimated Total Pole Replacements | 332 (77.8%) |

**(2)** Overall Feeder Performance

- ✓ **Thermal utilization**: Typically limited by conductor or cable ampacity.
- ✓ **Efficiency:** Measures of line losses.
- ✓ **Voltage Regulation**: Assessment of regulator operation and settings to optimize performance and equipment longevity.
- ✓ **MAIFI**: Momentary outages each year divided by the number of customers served.
- ✓ **CAIDI**: Average outage restoration time.
- ✓ **Maximum Imbalance:** The highest of the seasonal imbalance values is used in the performance index.
- ✓ **Power Factor:** Power Factor is computed for winter and summer loading and the lower of the two is used for the performance index.

**(3)** Criticality of Load Service

- ✓ **Essential Service**: Count and percentage of essential service customers including Fire, Police, EMS, Hospitals/Clinics, Schools, Water Supply, Sewage Treatment, Government, Incarceration Facilities, National Defense, Telecommunication and Broadcasting.
- ✓ **Commercial Account Density**: The percentage of rate schedules 11, 21, and 25 as a percentage of all customers.
- ✓ **Customer Density**: Customers per line mile (trunk + lateral mileage).
- ✓ **Load Density:** The ratio of energy delivered to customers versus circuit mileage.

I believe our entire process, from feeder selection, which begins with comprehensive data gathered for every feeder in our system, our review and prioritization process,[87] our detailed Baseline Report evaluations and recommendations, and subsequent designs and construction,

[87] Please see also Avista's response to PC-DR-116, provided as Exh. JD/LL-2, pages 132-134.

represent an exceptional example of a thoughtful, comprehensive, prudent and cost-effective feeder review program.[88]

**Q. Please comment on the criticism of Mr. Stephens that Avista's Feeder Baseline Reports are flawed because they do not consider the impact of Vegetation Management on feeder reliability performance?**

A. As explained in our summary comments, the Feeder Baseline Reports are focused on the physical infrastructure of the feeders themselves and the reliability properties of the assets and their configurations. As such, the Baseline Reports are neither "Reliability Reports," nor are they intended to represent or include all the reliability facets of our distribution system. Further, Avista explained to Public Counsel how it uses lifecycle cost analyses to optimize Vegetation Management for all the feeders in its system, as demonstrated in our Reliability Strategy Analysis tool, provided to Public Counsel and discussed repeatedly in responses to numerous data requests as explained in Exh. JD/LL-2, pages 137, 140, 141, and 237-240. In Avista's approach, Vegetation Management is optimized for its feeders in the same manner that lifecycle cost analyses for feeder treatments are optimized and applied to individual feeder rebuild projects. The importance of vegetation management and its impact on reliability is not ignored by Avista.

**Q. What lifecycle cost information was provided to Public Counsel?**

A. As noted in our summary, we explained to Public Counsel that the types of programmatic work performed during a feeder rebuild, such as replacement of poles,

[88] Mr. Stephens notes his displeasure with the title "Grid Modernization" applied to Avista's program (Exh. PADS-1T; page 58, lines 14-16. In the Company's experience there is no standard definition of what constitutes "Grid Modernization," which is in fact, one of the shortcomings of such a title. It could be more aptly described as a Feeder Review Program.

transformers, cutouts, crossarms, and other attached equipment, have been systematically evaluated by lifecycle cost analyses and demonstrated to meet our least-cost objectives. Among the many quantitative examples we provided is the report I have already referenced, provided in Exh. JD/LL-2, pages 2-94, documenting the updated evaluation of lifecycle cost analyses for Transformer Replacements, Wood Pole Management and Grid Modernization. The analyses and recommendations are based on 172 individual Availability Workbench asset failure and lifecycle cost models evaluating different combinations of programs performed together under varying treatment cycle intervals. Results of the analyses for different alternatives include a 50-year forecast of program performance measured by Lifecycle Costs, Risk Reduction, Benefit to Cost Ratio, Internal Rate of Return and Risk Reduction Ratio, along with corresponding estimates of annual capital and O&M costs required to support the modeled alternatives. As I have already mentioned, the analyses were also used to optimize the level of investment Avista should plan for each of the programs in order to maximize their integrated cost effectiveness for our customers.

**Q. Would you please summarize those results as they relate specifically to Avista's Grid Modernization Program?**

A. Financial results demonstrate that a 60-year-old threshold for wood pole replacement during a Grid Modernization feeder rebuild is financially better for customers than an alternative replacement at 50 years of age. Essentially, the 60-year threshold, when applied during a feeder rebuild produces the lowest lifecycle cost for that application. The Company explained this in numerous responses to Public Counsel, such as noted in PC-DR-319, which excerpt is provided below.

> As described and supported by the Company in responses to numerous data requests, Avista has determined this age of replacement based on failure analysis, such as described and supported in response to PC-DR-318, and integrated lifecycle cost analyses, such as described in responses to PC-DR-221, PC-DR-222, PC-DR-223, PC-DR-294, PC-DR-295 and PC-DR-296, among others. As such, during a feeder rebuild, a cedar pole aged 60 years or greater has been determined to have reached its economic end of life, because replacing it during the rebuild project provides customers a lower lifecycle cost for that pole compared with the alternative of sending a crew later to replace it once it has failed in service.

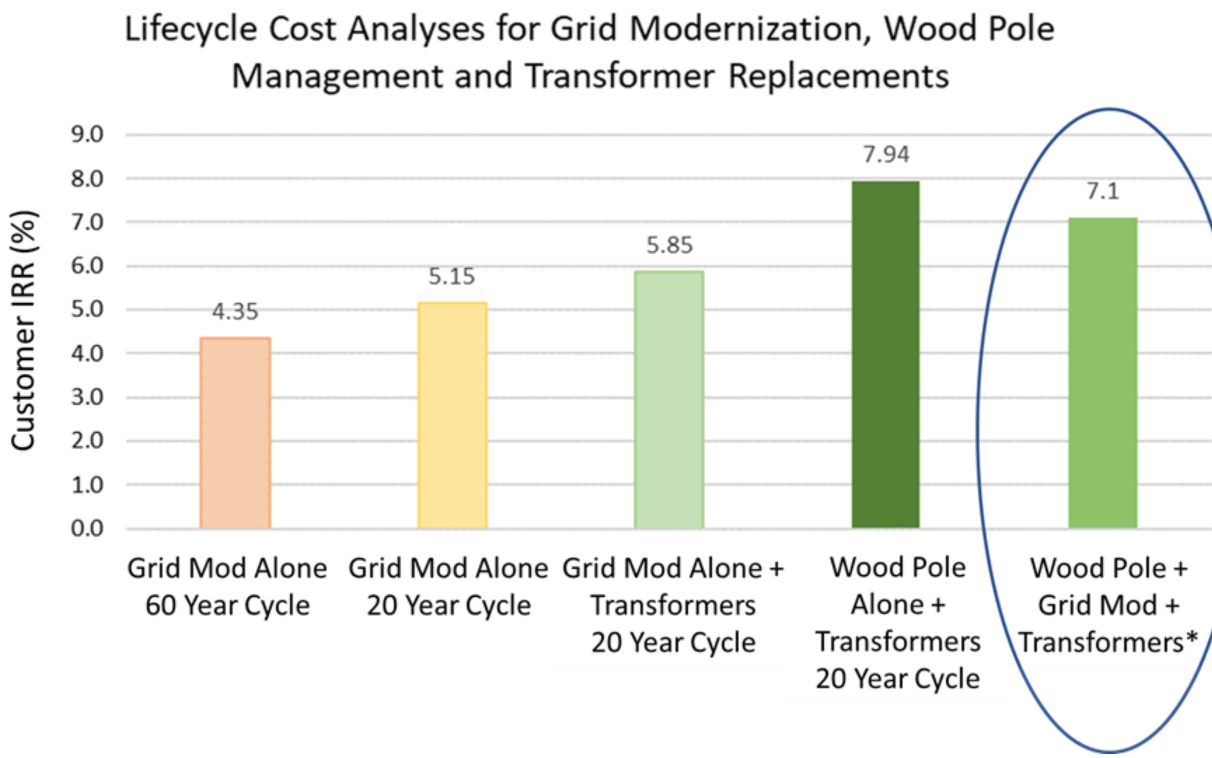
In response to the same request we provided wood pole replacement data, which summary table is excerpted below, showing that approximately 75% of the poles we replace are based on their failure to pass objective inspection and testing. Of the 25% replaced, which includes poles replaced during a feeder rebuild, the great majority, as noted in the table above showing the pole age distribution for an evaluated feeder,[89] were replaced not because they were older than 60 years, but because they failed to meet current design standards for the rebuilt feeder, as described in the Company's Distribution Feeder Management Plan.[90]

| End of Life Poles Replaced Based on Inspection and Testing in Grid Modernization and Wood Pole Management | End of Life Poles Replaced Based on Age and Other Feeder Rebuild Requirements | Total End of Life Poles Replaced |
|---|---|---|
| 8,392 | 2,770 | 11,162 |

The report also provides analyses of the cost effectiveness of the Grid Modernization program as optimized with the Company's Wood Pole Management and Transformer Replacement programs, which we have summarized below in Illustration No. 8.

[89] In our preceding discussion of the Feeder Baseline Reports.
[90] Exh. PADS-27.

**<u>Illustration No. 8 – Lifecycle Cost Analysis of Avista's Grid Modernization Program as Optimized with Wood Pole Management and Transformer Replacements[91]</u>**




While Grid Modernization with Transformer Replacements on a 20-year cycle interval does produce a respectable internal rate of return (5.85%), it would not, as I have stated, be a cost-effective substitute by itself for the feeder maintenance performed under the Wood Pole Management program (Grid Mod + Transformers = 5.85% IRR vs. Wood Pole + Transformers = 7.94%). Accordingly, Grid Modernization is not just another feeder maintenance program, as erroneously claimed by Public Counsel. The optimization of Grid Modernization with Wood Pole Management and Transformer Replacements, as currently practiced by the Company,

[91] *The optimized alternative is based on the current cycle interval of 20 years for Wood Poles and Transformers, and the current level of spending by the Company for feeders rebuilt under Grid Modernization, which rebuilds also include Transformer Replacements.

achieves the following objectives: 1) manage most of our infrastructure inspection, repair and replacements through the cost-effective maintenance achieved in the Wood Pole Management Program; 2) include Transformer Replacements as a cost-effective way to help reduce our customers' long-term costs, and 3) continue to make progress on our feeder rebuilds under Grid Modernization, in an optimized manner that meets our objectives at the lowest reasonable cost, while achieving an optimized favorable return on our customers' overall investment. As noted in the report, any Customer Internal Rate of Return exceeding 7% means that over the life of the asset, customers rates will be lower overall as a result of adopting this strategy.[92]

**Q. What conclusions can reasonably be drawn from the foregoing analyses?**

A. We would summarize results of our "lifecycle cost analyses" as follows:

1) Avista has provided robust analyses proving the cost effectiveness of its feeder maintenance and rebuild strategies, including for its Grid Modernization program.

2) The manner in which Avista determines the End of Life for its assets, whether run to fail or replaced in service as part of feeder maintenance or in a feeder rebuild project, is proven to deliver our customers the lowest reasonable lifecycle cost. The claims of wasteful "Prospective Replacement" made by Public Counsel are unsupported, baseless and without merit, and should not be relied upon by the Commission for evaluating the prudence of the Company's investments.

3) Avista's approach for managing its electric distribution infrastructure meets the Company's reliability and other objectives in a prudent, least-cost manner, especially when compared with the recommendation of Public Counsel that Avista should adopt a Run to Fail Strategy for electric distribution assets.

[92] Compared with the run to fail alternative, as noted in Exh. JD/LL-2, page 46.

## VI. PUBLIC COUNSEL'S CRITICISM OF AVISTA'S SUBSTATION REBUILDS PROGRAM FAILS TO ACKNOWLEDGE THE OPERATIONAL REALITIES OF THE COMPANY'S ELECTRIC SYSTEM AND RESULTS OF ITS LIFECYCLE COST ANALYSES

**Q. Did Public Counsel identify any approach it believed was acceptable for determining when to replace substation equipment?**

A. Yes, they noted: 1) when equipment fails an objective test or formal inspection; 2) when results of cost-benefit analysis are positive, and 3) when the asset fails in service.[93]

**Q. Do you agree with these approaches?**

A. Yes, as demonstrated by our practices described in our preceding testimony, where we regularly apply all three of these in feeder rebuilds, maintenance programs and in our Substation Rebuilds program. The instances where we disagree on a prudent approach for managing substation equipment, however, likely result from our different perspectives on the degree of redundancy in our system, and in the efficacy of lifecycle cost analysis for efficiently aggregating the work of inspections, testing, maintenance, repair and replacement of substation equipment.

**Q. Would you please characterize what you understand to be the approach recommended by Public Counsel for managing substation equipment?**

A. Certainly. We offer two primary observations: 1) Importantly, both Messrs. Alvarez and Stephens repeatedly espouse an underlying faulty assumption, central to their evaluation and critique – i.e. that every utility's substation is fully redundant, and as a result, customers typically don't experience an outage when work needs to be performed on substation

[93] Exh. PADS-1T; page 33, lines 12-15.

equipment, and 2) As a result of this faulty premise of "full redundancy," they assert that end of life for every piece of substation equipment can be fully determined and practically implemented by inspection, testing, refurbishment and replacement etc., <u>typically without resulting in an outage for customers</u> (i.e. there is simply no need for lifecycle costs analyses to determine end of life for assets).

**Q. Please describe how Public Counsel's assumption of "Full Redundancy" shapes their beliefs about how Avista should manage its substation equipment?**

A. Certainly. Their underlying premise is captured in the following quote:[94]

> All utilities design substations with full redundancy, called "N-1" design. In an N-1 design, each substation is designed to accommodate the loads of adjacent substations should one of those adjacent substations fail. Thus, the failure of a piece of equipment, and hence its availability risk, does not necessarily result in a service outage for customers.

The statement itself, as universally applied to all utility substations, ignores reality. And though it may sound seemingly innocuous, the implications of this assumption are significant and fundamental to their entire argument, as evidenced throughout their testimony. Based on this assumption, they allege Avista should be <u>running more equipment to failure</u> instead of "Prospectively Replacing" assets before they fail.

**Q. Please explain how Public Counsel applies this assumption?**

A. Essentially, Public Counsel argues that Avista should be able to take substation equipment out of service whenever the need arises, without causing interruptions in service for our customers.[95] The capability assumed by Public Counsel would allow us, ostensibly, to perform inspections, testing or maintenance and, particularly, to replace equipment that fails in

[94] Exh. PADS-1T; page 40, lines 7-9.
[95] Or at least very limited exposure to potential outages.

service without suffering the consequence of large service outages. Because they assert this to be true for all utilities' substations, including Avista's, they argue that there is no need to determine end of life replacements for equipment, other than objective testing and failure.

**Q. What is the other implication of this assumption?**

A. It leads the witnesses to conclude that there is only <u>one</u> proper determination of end of life, or economic optimum, for every piece of substation equipment, and they rely on this "static" determination when critiquing Avista's approach of using lifecycle cost analyses to help determine end of life for substation assets. Further, we believe their singular focus on how to optimally manage every piece of equipment distorts the practical reality that every piece of substation equipment is part of a common assembly that also needs to be managed and optimized as whole.

**Q. Do all Avista's substations have "Full Redundancy?"**

A. Absolutely not, and this is certainly not unique to Avista. Some of our substations are on radial transmission, and in addition, there are no interconnected "adjacent substations" that can pick up the customers in the event of an outage, whether due to equipment failure, other interruption, or the need to perform equipment inspection, testing, maintenance or replacement. We have other stations that may have two sources of transmission supply; however, just like the example above, any outage at the substation will result in a large customer outage because there are no interconnected adjacent stations to pick up the load. We also have stations that have nominal interconnections with other stations, but which are not sufficient to pick up the load of an entire station or bank. Finally, in our more urban settings, our substations are equipped to better take advantage of the capacity of adjacent substations, but even in these instances, there is not necessarily sufficient capacity to pick up all of the customers in the event of an outage. This range of capabilities, which in our experience is by no means unique to Avista, is based on what it would cost our customers to have such universal "full redundancy."

**Q. Did you attempt to explain these practical operational realities to Public Counsel during discovery?**

A. Yes, we did, as explained in numerous responses, including PC-DR-318 (a), which discussion is excerpted below.

> Avista performs failure analysis and lifecycle cost modeling to determine the effective end of life of assets in our system. End of life is typically defined as the economic end of life, such as illustrated and described in response to PC-DR-307, and as discussed in numerous other responses. As such, while we target replacement of assets at their economic end of life, the designation of circumstances that constitute end of life for many assets is not fixed or static… As we have also explained and supported in PC-DR-308 and PC-DR-309, among others, the economic end of life for an individual piece of equipment will also vary based on its location in our system and/or the integration of the varying asset lives, dates of install, failure characteristics and lifecycle costs of other types of equipment with which it is installed in a common assembly.

**Q. Have your responses also included examples of <u>how</u> one type of asset may be managed and replaced differently based on <u>where</u> it is deployed in the Company's system?**

A. Yes, we provided an example of this using results of lifecycle cost modeling for substation transformers in response to PC-DR-308 (b), which discussion is excerpted below (emphasis added).

> This is true even when considering the differences in economic optima for the same piece of equipment deployed in different substations across the Company's system, as explained further below… Through Availability Workbench modeling, Avista has determined groups of maintenance activities that optimize the lifecycle cost of major equipment in the substation, which list of maintenance activities is provided for power transformers, as an example, which includes: rewind transformer, replace

> cooling pumps, replace high and low voltage bushings, replace gaskets, process transformer oil, replace all cooling fans and fan motors, replace or calibrate gauges, and replace lightning arresters… Based on results of the above analyses, and based on the variability in economic end of life for transformers across the Company's system, the lowest optimized lifecycle costs for power transformers is achieved when the maintenance is performed within the time interval of 21 to 54 years, or in the alternative, when no maintenance is performed and the transformer is run to failure. Likewise, the optimized range in age for transformer replacement is 40 to 67 years, or in the alternative, upon failure of the unit in service. <u>As explained above, and in response to PC-DR-307, the reason our analysis results in alternatives for the replacement of a transformer is because of the differing consequence costs associated with transformer failure in substations across the Company's electric system..</u>.

**Q. Did you include results of any financial analyses in your responses?**

A. Yes, those illustrations and financial results are provided in Exh. JD/LL-2, pages 325-329. These results demonstrated our point that the practices asserted by Public Counsel of performing inspections, testing, maintenance, repair and replacement, according the age and individual lifecycle characteristics of each piece of equipment, would often require the Company to interrupt service to a large number of customers for each individual activity.[96] In our view this does not constitute an acceptable utility practice and does not produce the lowest lifecycle cost for customers.

**Q. So, how does the operational reality of Avista's system impact its determination of the economic end of life for some substation equipment?**

A. Because we work to minimize the number of instances we have to interrupt service for large numbers of customers, we use lifecycle cost analyses to determine optimum groupings of activities and frequencies to perform work, and to determine the optimized end of life for individual assets and grouped equipment in the station.

[96] For our substations that do not have Full Redundancy.

**Q. Are you trying to avoid customer outages at any cost?**

A. Certainly not. The outage cost to customers associated with each particular action is one of the many risk costs included and balanced in the lifecycle cost analysis.

**Q. How would you summarize this portion of your testimony?**

A. We believe our response to PC-DR-288 Revised (b)(iii),[97] which excerpt is provided below gives a succinct overview of the points I have made in this section of our testimony.

> Therefore, Avista does not preemptively or prospectively replace equipment, rather, we replace assets at a point in time and in a manner that delivers our customers the greatest overall value. Accordingly, there is no 'one size fits all' definition of what constitutes the end of useful life for an asset. It's defined by the specific context and application for each asset, based on analysis of those specific risks, consequences and costs associated with that equipment failing in service, (and) the unique costs of replacement, in that particular application and context.

**Q. Did you have any comment about the criticisms of Public Counsel regarding Avista's lifecycle cost analyses for Substation Rebuilds?**

A. We would simply like to reiterate that the statements of Messrs. Alvarez and Stephens, such as "…Avista's total cost of ownership curves assume that substation equipment should be replaced based on the likelihood of asset failure, which Avista determines almost exclusively by asset age,"[98] are simply incorrect and misleading. As noted in our responses throughout discovery, the Company determines the end of life based on lifecycle costs analysis, of which the failure characteristics of the asset, combined with the inspection, testing, maintenance, repair, replacement, and risk costs are all components of the calculation.

[97] Exh. PADS-11. (emphasis added)
[98] Exh. PADS-1T; page 42, lines 3-5.

**Q. Please respond to other criticisms of Public Counsel that Avista's practices deviate from industry standards for replacing substation equipment?**

A. Regarding several practices alleged by Mr. Stephens, we have the following observations:

> Compliance with NERC Transmission Standards and Avista's Construction Standards[99] – This criticism of witness Mr. Stephens that Avista misapplies federal transmission standards to distribution substations should be rejected by the Commission; he offers no evidence or interpretation to support this erroneous claim. Likewise, his broad and unsupported implication that Avista does not make use of commonsense mitigation strategies as part of its federal compliance should be rejected. Finally, we conclude that his blanket criticism that it is inappropriate for Avista to apply its own construction standards to the substations rebuilt under this program should likewise be rejected.[100]

> Avista Replaces Substation Equipment without Objective Tests or Cost Benefit Analysis[101] – The Commission should reject this criticism of Public Counsel on the basis that we do perform objective testing and because the Company has demonstrated its comprehensive lifecycle cost analysis used to determine the approach for managing substation equipment is in the best financial interest of our customers.

> Requirement to Install Communications Equipment and Relays[102] – This criticism should not be relied upon by the Commission because he offers no evidence, any analysis or interpretation, or other support for his statements that our practices are inappropriate or somehow wasteful.

> Avista Inappropriately Adds Higher Capacity Equipment to Accommodate Load Growth[103] - We likewise conclude that because he offers no evidence, any analysis or interpretation, or other support, that this criticism should be rejected by the Commission.

> Avista's Capacity Planning Threshold of 80 Percent Results in Wasteful Investment[104] - This criticism should be rejected by the Commission for evaluating the prudence of investments made in the Company's Substation Rebuilds program; his critique is overly broad and he provides no information or support of any kind for his conclusions. We will provide some additional background on this topic later in our testimony.

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[99] Exh. PADS-1T; pages 46, 47.

[100] These stations are substantially "new substations," for which Mr. Stephens asserts that Avista's standards should be applied (Exh. PADS-1T; page 47, lines 3, 4). When Avista is replacing equipment in a substation that is not being rebuilt as part of this program, these standards are not applied.

[101] Exh. PADS-1T; page 11-13.

[102] Exh. PADS-1T; page 47, lines17-21; page 48, lines 1-9.

[103] Exh. PADS-1T; page 45, lines 4-7; pages 51-53.

[104] Exh. PADS-1T; pages 51, 52.

**Q. Were there any specific concerns raised by Public Counsel that you would like to address?**

A. Yes, Mr. Stephens comments on the 91 air switches Avista replaced as part of its Substation Rebuilds project in 2018, noting that this level of replacement (out of the nearly 1,200 air switches in our system) is a large percentage for a single year. What's missing from his testimony is additional information about why the switches were replaced.[105] Of the 91 units replaced, 71 were removed as part of just two substation rebuild projects, Ninth and Central and Kamiah. Both of these substations still had wooden structures supporting the distribution busses (including the mounted air switches), which original circuits remained energized and in-service throughout the rebuild project. Some of these switches, like those only 19 years of age for instance, can be reinstalled as a replacement, and others, depending on age and obsolescence, are harvested for spare parts for the repair of same model switches located elsewhere. As it relates to the other switches, 17 of them had cap and pin insulators that were retired for obsolescence and safety risk.[106]

**Q. What about the Colville #2 Transformer?**

A. First, Mr. Stephens cites as "Empirical Data" a single study of transformers from Australia reporting an average time to failure of 79 years,[107] which value he then conflates as representing the average life for substation transformers across the entire industry.[108] He also fails to alert the reader that the 79 year average life applies to only "Distribution" transformers.

[105] Data requested by Public Counsel beginning with PC-DR-098 specifically requested information for each piece of substation equipment replaced in the period 2018-2020, including the capital cost and reason category for replacement, asset age, failed test, obsolete, etc., which response included over 500 individual entries, provided as Exh. PADS-15.
[106] For their known safety risk of failing in service.
[107] Exh. PADS-19; page 18.
[108] Exh. PADS-1T; page 50, lines 9, 10.

By the designation applied in the study, Colville #2 is not a distribution transformer. On that same page of the study,[109] the authors note the average age for "Subtransmission" transformers as 61 years, and "Transmission" transformers as 58 years.[110] These two data points compare favorably with Avista's own lifecycle data.[111]/[112] At any rate, the Colville #2 transformer, was in fact, several years older than the average age of 61 years for the applicable transformer class noted in the study provided by Public Counsel.

Finally, we would note that Avista's decision to replace the transformer, when we did, was based on a full range of factors, many of which we listed in our responses to discovery. Mr. Stephens attempts to highlight those individual factors in isolation, noting our agreement that each one of them, considered on its own, may not or would not constitute a reason to replace the unit. But Avista did not replace the Colville transformer only because it was well-beyond average age, or only because it was leaking oil, or only because the circuit switcher was underrated, or only because the relays lacked differential protection. Avista considered all these factors together, in combination, to decide on the best timing for replacing that unit.

**Q. Finally, would you please respond to the criticism of Public Counsel that Avista's '80 percent capacity' planning standard results in excess capital investment?**

[109] Exh. PADS-19, page 18.

[110] We found it interesting that the subject study provided by Public Counsel uses Weibull Failure Curve Data to describe the failure characteristics for these assets (based on age of the asset), which similar use by Avista is deemed by Public Counsel to be unreliable and "deeply flawed" (PADS-1T; page 41, lines 11, 12.).

[111] Avista has few transformers of the class referred to by the authors as "Distribution" transformers. By this we're referring to transformers supporting circuits considered in the study as "distribution," which are below 66kV, but which would not include the typical 'distribution transformers' connecting our customers to the distribution system.

[112] Also of interest to Avista is the transformer retirement age data relied upon in this study, which shows an average age of replacement for transformers more in the range of 50 years, noting the practical realities that many units are removed from service before they actually fail (PADS-19; page 7).

A. We have already noted above in our testimony that Mr. Stephens provides no factual support of any kind for his conclusion, in addition to completely contradicting his assumption of substation "Full Redundancy:" i.e. how do you pick up the load of an adjacent substation for lengthy periods of time to provide for inspection, testing, maintenance, repairs and equipment replacement, when the equipment that is supposed to pick up this significant added load is already loaded at or near 100% capacity? I would still like to address this question, however, to help the Commission understand our rationale and application of this standard. In response to PC-DR-211,[113] which excerpt is provided below, we explained to Public Counsel why the threshold of 80 percent makes sense in the context of how our system operates when we experience transmission and substation outages.

> Avista plans, designs, operates, and maintains its transmission system and substations to be capable of supporting loads during peak periods of heavy demand and, and specifically to avoid the next outage, referring to the need for contingency planning. In this regard, contingency planning refers to capacity that may be 'unused' in normal operating conditions, but that is fully utilized during unplanned outage events to maintain the electrical integrity of the system. This common utility philosophy and practice helps ensure customers don't experience major outage events that could occur without such contingency and capacity planning in electric transmission and substations.

**Q. Besides avoiding outages for customers, are there other reasons the Company believes it is prudent to provide such a contingency margin in its transmission and substation systems?**

A. Mr. Stephens notes in his broad generalization that substation equipment may 'operate for several hours at a time well beyond 100 percent of capacity,'[114] as if Avista was

[113] Exh. JD/LL-2, pages 194-195.
[114] Exh. PADS-1T; page 52, lines 13, 14.

somehow neither aware of this capability, nor had accounted for it in its planning process. Of course we do. Each of our transformers is rated for the percent exceedance in capacity and the time duration of that exceedance, which is allowable, without resulting in damage to the transformer that reduces its service life (loss of life). Further, in response to PC-DR-211, in Attachment A,[115] Avista provided its Operating Procedure for Transmission Operations pertaining to Transformer Alarms and Short-Term Loading. These procedures identify what Avista considers to be normal operation of its transformers, which is in the range of 80 to 90 percent loading, as well as overloading conditions that will result in damage to the insulation in the transformer resulting in loss of life to the unit. The document continues by defining short term ratings for Avista's major transformers by season of the year.

**Q. Is the operation of other equipment in the Company's transmission system subject to similar operating limits or facility ratings?**

A. Yes, this includes transmission conductors, substation conductors, transformers, relay protection devices, terminal equipment, and reactive power compensation devices. These "Facility Ratings" are referred to as SCADA variable limits (SVL), which provide the current capacity rating vs. ambient temperature for our major bulk electric system equipment. These facility ratings, including their calculation and application, meet our applicable compliance requirements under NERC Standard FAC-008-3, R3, R6 pertaining to our methodology for determining transmission facility ratings.

**Q. Is substation equipment immediately replaced when it reaches 80% capacity?**

[115] Provided in Exh. JD/LL-2, pages 96-99.

A. No, that threshold initiates a review, and when that points to the need for additional capacity, it triggers the evaluation, design, planning and budgeting processes that typically require several years to complete before construction is initiated.

**Q. Does Avista consider every piece of equipment that is loaded at 80 percent in need of replacement?**

A. No, of course not. As one example, a rural substation with limited forecasted load growth, and in particular, with no interconnected capability to pick up loads from another adjacent station, would not be a candidate for replacement based on this threshold alone.

**Q. Please summarize your conclusions as they relate to the criticisms of Public Counsel that Avista inappropriately uses "Standing Budgets" and "Prospective Replacements" of substation equipment to the detriment of its customers?**

A. As we have previously demonstrated, the witnesses' claims of such use of "Standing Budgets" is neither supported by any facts or evidence – it is a complete mischaracterization of our budgeting process. Similarly, we have shown how our practices and lifecycle-cost-analysis for evaluating substation asset inspections, testing, repair and replacements is consistent with the operational realities and capabilities of our electric system, and meets our obligations to provide service to our customers at a cost that is just, fair and reasonable. The claim of Public Counsel of wasteful "Prospective Replacement" is neither supported by any facts nor evidence provided by the witnesses, nor should it be relied upon by the Commission to evaluate the prudence of our investments. Finally, based on the foregoing, I recommend the Commission reject Public Counsel's proposed disallowance of $23.1 million for investments in its Grid Modernization and Substation Rebuilds programs.

**Q. Does this conclude your rebuttal testimony?**

A. Yes, it does.