AVISTA CORP.
RESPONSE TO REQUEST FOR INFORMATION

JURISDICTION:	WASHINGTON	DATE PREPARED:	06/18/2021
CASE NO.:	UE-200900 & UG-200901	WITNESS:	DiLuciano/La Bolle
REQUESTER:	Public Counsel	RESPONDER:	Larry La Bolle
TYPE:	Data Request	DEPT:	Transm Ops/System Planning
REQUEST NO.:	PC – 352	TELEPHONE:	(509) 495-4710
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SUBJECT: Joint Rebuttal Testimony Exh. JD/LL-1

REQUEST:
Please refer again to the Rebuttal Testimony of Larry D. La Bolle and Joshua D. Diluciano, Exh. JD-LL-1T, at 9, Illustration No. 2, as well as to Avista's response to Public Counsel Data Request No. 326, subpart (c), which indicates that historical asset installation costs, as well as historical asset operations and maintenance costs, are used to calculate the total cost of ownership (which is in turn used to identify the economic end-of-life age for various equipment types).

a) Provide a detailed explanation of why historic costs and spending, as incorporated in economic end-of-life analysis, should be used in the decision to replace equipment which is operating safely and reliably.
b) Identify where in Avista's asset replacement decision process the cost to purchase and maintain a new asset is compared to the cost of continuing to operate and maintain the existing asset. If Avista does not conduct such a cost comparison when deciding to replace an asset, please explain why it does not.
c) If Avista does compare the cost to purchase and maintain a new asset to the cost of continuing to operate and maintain an existing asset in its asset replacement decision process, provide the cost comparison completed on Colville substation transformer #2.

RESPONSE:

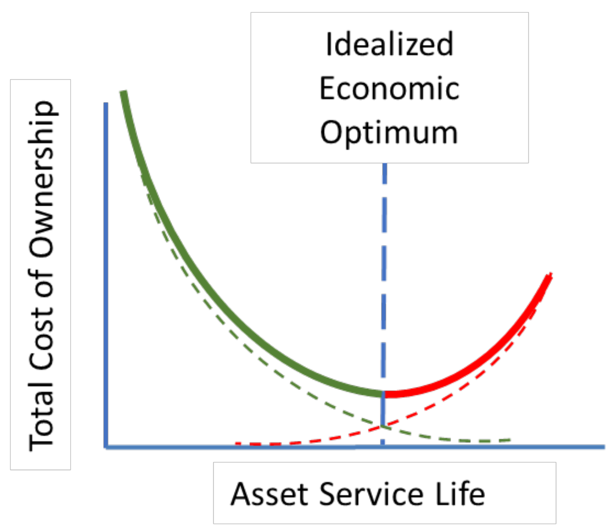
a) As we have explained in prior responses, Illustration No. 2 represents the idealized lifecycle cost analysis for an asset from start to finish. As such, it includes the initial cost and all the inspection, testing, maintenance, repair and risk costs, as illustrated in our response to PC-DR-351. This illustration was created, of course, to portray and explain the concepts of failure and lifecycle cost analysis, and the economic optimum for asset replacement. This type of analysis (including the full lifecycle costs) is useful, as one small example, for making a decision about what particular asset might be the best choice for an application compared with another.

   We have explained in responses to numerous requests, including in our online meeting on June 7, 2021, that in our Availability Workbench lifecycle cost analysis, we model 'fleets' or 'populations' of assets, which include the costs of those assets represented in the present time and the expected costs looking forward in time. As such, it is not necessary to include the initial installation cost, as an example, for a transformer installed 20 years ago. For the purpose of forward analysis, that historic installation is a sunk cost. In the population lifecycle cost analysis, the primary costs of interest are those representing the remaining financial value in each member of the population (based on expected life looking forward), along with the expected costs for inspection, testing, maintenance, repair and risk costs. As such, historic install costs (from the period preceding the initiation of lifecycle costs analysis) are not included in this analysis, per se, because they are not necessary to identify the economic optimum strategy for replacing an asset. Historic costs can be included in the analysis, but as just stated, their inclusion would not change the answer regarding the determination of the economic end of life for an asset.

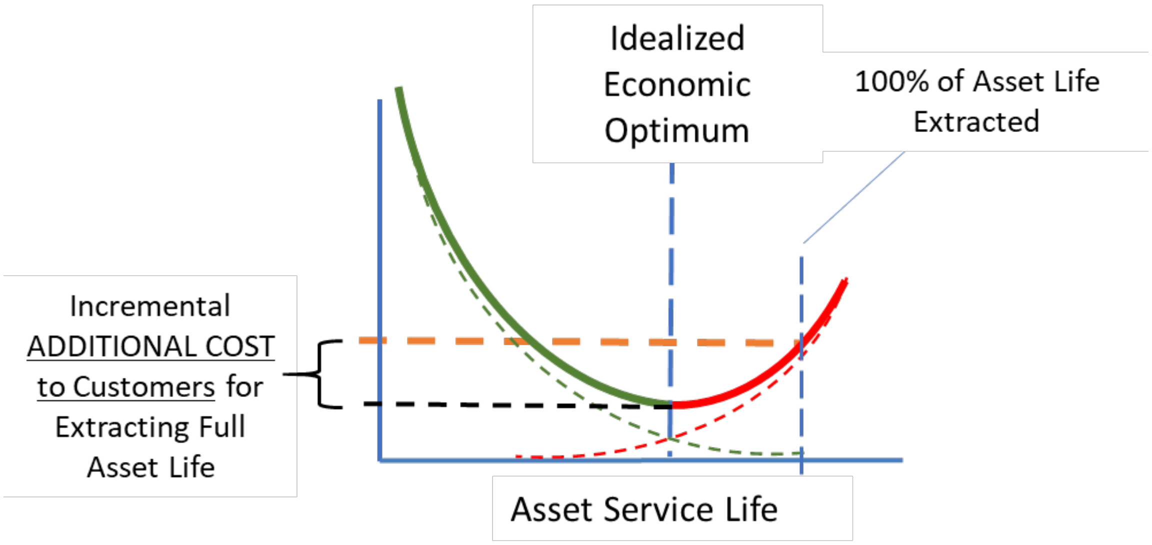
That said, the failure and lifecycle cost analyses conducted by Avista using the Availability Workbench model, is impossible to perform without voluminous historic data. These historic data are used to develop the Weibull failure curve for an asset, which is used to help determine the remaining potential physical life of an asset installed 20 years ago (as in the example above), is used to develop the expected reliability for an asset in each year, to determine failure modes, the likelihood of various consequences associated with each failure mode, inspection, testing and maintenance history for asset types, and on it goes. Use of this historic data is what allows you to forecast the future costs for the population of assets being modeled on a forward basis, and to determine the economic end of life. Finally, the installation costs for new assets that are added to the population after the initiation of the lifecycle analysis process begins, are included in the lifecycle costs, though as explained above, the historic install cost is not part of the forward analysis for determining economic end of life (i.e. the decision when to replace equipment).

Public Counsel seems to center on the idea that if you replace an asset before it has failed in service, and by doing so you have failed to extract **all** of the potential physical service life from the asset, then you have simply made the **wrong** decision. Yes, ideally, you would extract 99.99% of the service life from <u>all</u> assets before you replaced them. But, there are a range of factors that have a direct financial bearing on the decision about "<u>how much life from an asset is the right amount to capture</u>," measured from the benchmark of providing our customers the lowest reasonable rates for the service we provide.

The adjacent illustration, provided in response to PC-DR-351, was used to depict the financial value for the remaining service life in an asset at the point of the economic optimum. There is residual value in this illustration because the initial cost of the asset through the lifecycle, represented by the green dashed line, has not yet reached zero (bottom of the total cost of ownership axis) at the point of replacement. As also explained in PC-DR-351, inspection, testing, maintenance, repair and risks costs are represented by red dashed line, which costs are summed with annual costs in the green dashed line for each year of the lifecycle to create the lifecycle cost curve, represented by the solid green and red lines.



While there is residual financial value in the asset at the point of the economic optimum, that value is now overcome by the increasing inspection, testing and maintenance costs expected to occur, along with the risk costs of failure. As we explained in response to PC-DR-338 Revised, even though the asset could have years of physical life remaining, replacing it at its economic optimum <u>reduces the cost customers pay, compared with the alternative of squeezing out the remaining serviceable life</u> and replacing it upon failure. This concept is illustrated below where the black dashed line intersects the total cost of ownership axis at the point of the economic optimum, while the orange dashed line depicts the additional cost customers would have to pay in order to run this particular asset to failure (extract 100% of its potential service life).



The issue is not whether all the potential life has been extracted from an asset at the point of its Economic Optimum. The asset being replaced at its Economic Optimum has served its function and purpose, and is now being removed from service and replaced in a manner that provides customers the lowest cost of service, the lowest rates, compared with the alternative of attempting to extract all the service life from the asset.

b) The answer to this subject question is the fundamental essence of the failure analysis and lifecycle cost modeling performed by Avista using the Availability Workbench application. That question is the purpose of this analysis distilled to its simplest form, to help decide whether to keep something in place or to replace it based on what option provides our customers the lowest reasonable lifecycle cost.

The Company has provided numerous examples, explanations, illustrations and results of analyses, including the explanations above, showing where and how we regularly compare the cost to purchase and maintain a new asset with the cost of continuing to operate and maintain the existing asset. Recent examples have been provided in response to PC-DR-336 Revised/Supplemental, provided in our online meeting with Public Counsel on June 7, 2021, and as presented in response to PC-DR-348. In these analyses, we provided results of Availability Workbench lifecycle analysis demonstrating the financial benefits for our customers of replacing electric distribution assets at their Economic End of Life when part of a feeder maintenance or rebuild program. The Customer Internal Rates of Return for modeled alternatives are provided below for Transformer Replacements[1] conducted as part of Wood Pole Management Feeder Maintenance or a Feeder Rebuild under Distribution Grid Modernization. Results of these analyses demonstrate that it is more cost effective to replace assets, in each context, in the manner performed by Avista, compared with the alternative of keeping them in service until they fail.

[1] Which, as we have continually stated, includes the cutout, connectors, lightning arrester,

Transformer Alternative	Range in Customer Internal Rate of Return[2]
Wood Pole Management Program	
Run to Fail	-1.01% to 0.68%
Avista's Current Practice - Replacement based on Condition[3]	**14.46%** to **15.91%**
Grid Modernization Feeder Rebuild	
Run to Fail	1.46% to 2.88%
Avista's Current Practice - Replacement based on age 1980 or Older	**10.62%** to **12.47%**

c) The Colville #2 Transformer was included in the Power Transformer lifecycle cost analysis discussed in response to PC-DR-308 Revised part (b), where the optimized range in age for transformer replacements was 40 years to 67 years. The Colville #2 Transformer was 67 years old at the time of its replacement in service. But as noted by Avista in Exh. JD/LL-1T, there were several other risks considered by the Company, that were not included among the risk costs in the lifecycle cost analysis presented in PC-DR-308, which were factored into the decision to replace this unit at the time we did.

[2] Based on the results modeled for each of Avista's feeder classifications: Urban, Suburban and Rural.

[3] As an example of functional failure based on condition, Avista has determined, as discussed in our online meeting with Public Counsel on June 7, 2021, that a wood pole that fails strength testing, even though it is still standing and holding the conductor in the air, has reached the point of "functional failure." This designation reflects the fact that the pole is no longer capable of meeting the range of service conditions, such as high winds, experienced on our system. We have likewise determined the same for transformers that are leaking oil or have been damaged; they no longer meet our service requirements because they are prone to imminent failure. The same is true for broken insulators, insulators and components that are damaged, or where failing polymer material lacks the impedance to meet standards of avoiding flashover.