EXH. NWA-1T
DOCKET UE-230004/UG-230005
2022 PSE GENERAL RATE CASE
WITNESS: NED W. ALLIS

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PUGET SOUND ENERGY,** **Respondent.**	**Docket UE-230004** **Docket UG-230005**

PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF

NED W. ALLIS

ON BEHALF OF PUGET SOUND ENERGY

FEBRUARY 15, 2024

PUGET SOUND ENERGY

PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF
NED W. ALLIS

CONTENTS

PUGET SOUND ENERGY

PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF NED W. ALLIS

LIST OF EXHIBITS

PUGET SOUND ENERGY

PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF NED W. ALLIS

I. INTRODUCTION

Q. Please state your name, business address, and position.

A. My name is Ned W. Allis. My business address is 207 Senate Avenue, Camp Hill, Pennsylvania 17011. I am Vice President of the firm of Gannett Fleming Valuation and Rate Consultants, LLC ("Gannett Fleming"). I am testifying on behalf of Puget Sound Energy ("PSE" or "the Company").

Q. Have you prepared an exhibit describing your Professional qualifications?

A. Yes, I have. It is Exh. NWA-2.

Q. What is the nature of your testimony in this proceeding?

A. I sponsor the Depreciation Study performed for PSE's gas assets submitted herewith as Exh. NWA-3 ("Depreciation Study"). The Depreciation Study sets forth the calculated annual depreciation accrual rates by account as of June 30, 2023 for all gas plant. June 30, 2023 is the last day of PSE's test year for this rate case.

II. PSE'S DEPRECIATION STUDY

Q. Please define the concept of depreciation.

A. The Federal Energy Regulatory Commission's Uniform System of Accounts for gas utilities defines depreciation as:

> Depreciation, as applied to depreciable gas plant, means the loss in service value not restored by current maintenance, incurred in connection with the consumption or prospective retirement of gas plant in the course of service from causes which are known to be in current operation and against which the utility is not protected by insurance. Among the causes to be given consideration are wear and tear, decay, action of the elements, inadequacy, obsolescence, changes in the art, changes in demand and requirements of public authorities, and, in the case of natural gas companies, the exhaustion of natural resources.[1]

Q. Please identify the Depreciation Study you performed for PSE.

A. The study is a report entitled, "2023 Depreciation Study - Calculated Annual Depreciation Accruals Related to Gas Plant as of June 30, 2023." This report sets forth the results of the Depreciation Study for PSE. The study was prepared and the analyses that underlie the report were conducted under my direction and supervision.

Q. What is the purpose of your Depreciation Study?

A. The purpose of the Depreciation Study is to estimate the annual depreciation accruals related to gas plant in service for financial and ratemaking purposes and

[1] 18 C.F.R. 201 (Gas FERC Uniform System of Accounts), Definition 12.

determine appropriate average service lives and net salvage percentages for each plant account.

Q. When was the last Depreciation Study performed?

A. The last Depreciation Study was filed as part of Dockets UE-220066 and UG-220067. That study incorporated electric, gas and common assets.

Q. Please explain why a new study has been performed for gas assets.

A. While it has only been two years since the last Depreciation Study, more information is now available about the future outlook for gas assets than was true in the previous rate case. More precisely, there is more clarity about the impact of goals to establish net zero greenhouse gas emissions by 2050, as supported by Washington state legislation such as The Climate Commitment Act ("CCA"), enacted by the Washington State Legislature in 2021, and the Clean Energy Transformation Act ("CETA"), enacted in 2019. In addition, the change to PSE's line extension policy in the 2022 general rate case, combined with the state's adoption of new building codes, effectively eliminates new customer growth on the gas system as described in the testimony of Josh Jacobs, Exh. JJJ-1T. As I will discuss in more detail, the combined goals established by these laws and policies, which I will refer to as Net Zero by 2050, will result in significant changes in the gas system. Since the last Depreciation Study, the Company has performed analyses of potential pathways to achieve these goals and, moreover, similar analyses have been performed in other states that have similar greenhouse gas ("GHG") emissions reduction goals.

Given what we know about the future pathways available, the rate at which the Company's gas investments are recovered through depreciation needs to increase to incorporate the realities of shorter service lives and reduced gas throughput that will result from Net Zero by 2050. Moreover, the sooner this increase is implemented the less costly it will be to customers, particularly remaining gas customers. As a result, the Company has decided to update its gas Depreciation Study to incorporate the expected impacts of Net Zero by 2050. While several different depreciation approaches were considered, the proposal in the Depreciation Study to shorten service lives for many accounts by 10 years represents a gradual approach that balances the short- and long-term impacts to different generations of customers and will help to mitigate the risk of stranded costs that could result from widespread electrification of energy uses currently served by gas.

Q. Please describe the Depreciation Study you conducted for PSE.

A. The report, which is provided as Exh. NWA-3, is presented in nine parts. Part I, Introduction, describes the scope and basis for the Depreciation Study. Part II, Estimation of Survivor Curves, includes descriptions of the methodology of estimating survivor curves. Parts III and IV set forth the analysis for determining life and net salvage estimates. Part V, Calculation of Annual and Accrued Depreciation explains the method, procedure, and technique used in the calculation of depreciation. Part VI, Results of Study, presents a description of the results and a summary of the depreciation calculations. Parts VII, VIII and IX include graphs and tables that relate to the service life and net salvage analyses, and the detailed depreciation calculations.

The tables on pages VI-4 through VI-5 present the estimated survivor curve, the net salvage percent, the original cost as of June 30, 2023, the book depreciation reserve, and the calculated annual depreciation accrual and rate for each account or subaccount. The section beginning on page VII-1 presents the results of the retirement rate analyses prepared as the historical bases for the service life estimates. The section beginning on page VIII-1 presents the results of the net salvage analysis. The section beginning on page IX-1 presents the depreciation calculations related to surviving original cost as of June 30, 2023.

Q. Please explain how you performed your Depreciation Study.

A. I used the straight line remaining life method of depreciation, with the average service life procedure. The annual depreciation is based on a method of depreciation accounting that seeks to distribute the unrecovered cost of fixed capital assets over the estimated remaining useful life of each unit, or group of assets, in a systematic and rational manner.

For General Plant Accounts 376.5, 380.1, 391.1, 391.2, 393, 394, 395, 397, and 398, I used the straight line remaining life method of amortization. The account numbers identified throughout my testimony represent those in effect as of June

30, 2023 or anticipated in the rate period based on information provided by PSE management. The annual amortization is based on amortization accounting that distributes the cost of fixed capital assets over the amortization period authorized for each account and vintage.

Q. How did you determine the recommended annual depreciation accrual rates?

A. I did this in two phases. In the first phase, I estimated the service life and net salvage characteristics for each depreciable group, that is, each plant account or subaccount identified as having similar characteristics. In the second phase, I calculated the composite remaining lives and annual depreciation accrual rates based on the service life and net salvage estimates determined in the first phase.

A. Service Life and Net Salvage Estimates

Q. Please describe the first phase of the Depreciation Study, in which you estimated the service life and net salvage characteristics for each depreciable group.

A. The service life and net salvage study consists of compiling historic data from records related to PSE's plant, analyzing these data records to obtain historic trends of survivor and net salvage characteristics, obtaining supplementary information from PSE's management and operating personnel concerning practices and plans as they relate to plant operations, and interpreting the above data as well as estimates used by other gas utilities to form judgments of average service life and net salvage characteristics.

Q. What factors did you consider in your estimates of service life and net salvage?

A. The primary factors I considered to estimate service life are the statistical analyses of data, current PSE policies and outlook, and survivor curve estimates from prior depreciation studies. The primary factors I considered to estimate the future net salvage are analyses of historical cost of removal and salvage data, expectation regarding future removal requirements, and markets for retired equipment and materials. For more discussion of the factors used to estimate service lives and net salvage percentages, see Parts III and IV of Exh. NWA-3.

1. Service Life Estimates

Q. What historic data did you rely on to estimate service life characteristics?

A. I analyzed the Company's accounting entries relating to plant additions, transfers, and retirements recorded during the period 1987 through 2022. PSE's records also include surviving dollar value by year installed for each plant account as of June 30, 2023.

Q. What method did you use to analyze this service life data?

A. I used the retirement rate method for all accounts. This is the most appropriate method when aged retirement data are available because it determines the average rates of retirement actually experienced by PSE during the period of time covered by the study.

Q. Please explain how you used the retirement rate method to analyze PSE's service life data.

A. I applied the retirement rate method to each different group of property in the study. For each property group, I used the retirement rate method to form a life table which, when plotted, shows an original survivor curve for that property group. Each original survivor curve represents the average survivor pattern experienced by the several vintage groups during the experienced band studied. The survivor patterns do not necessarily describe the life characteristics of the property group; therefore, interpretation of the original survivor curves is required in order to use them as valid considerations in estimating service life. I used the Iowa-type survivor curves to perform these interpretations.

Q. What is an "Iowa-type Survivor Curve" and how did you use such curves to estimate the service life characteristics for each property group?

A. Iowa-type curves are a widely-used group of generalized survivor curves that contain the range of survivor characteristics usually experienced by utilities and other industrial companies. The Iowa curves were developed at the Iowa State College Engineering Experiment Station through an extensive process of observing and classifying the ages at which various types of property used by utilities and other industrial companies have been retired.

Iowa-type curves are used to smooth and extrapolate original survivor curves determined by the retirement rate method. I used Iowa curves and truncated Iowa curves in this study to describe the forecasted rates of retirement based on the observed rates of retirement and the outlook for future retirements.

The estimated survivor curve designations for each depreciable property group indicate the average service life, the family within the Iowa system to which the property group belongs, and the relative height of the mode. For example, the Iowa 38-R2.5 indicates an average service life of thirty-eight years; a right-moded, or R, type curve (the mode occurs after average life for right-moded curves); and a moderate height, 2.5, for the mode (possible modes for R type curves range from one to five). Graphs of the Iowa curves are provided in Part II of Exh. NWA-3.

Q. What approach did you use to estimate the lives of significant structures and gas storage facilities?

A. I used the life span method to estimate the lives of significant facilities for which concurrent retirement of the entire facility is anticipated. In this method, the survivor characteristics of such facilities are described using interim survivor curves and estimated probable retirement dates. The interim survivor curve describes the rate of retirement related to the replacement of elements of the facility, such as, for a building, the retirements of plumbing, heating, doors, windows, roofs, etc., that occur during the life of the facility. The probable retirement date provides the rate of final retirement for each year of installation for the facility by truncating the interim survivor curve for each installation year at its attained age at the date of probable retirement. The use of interim survivor curves truncated at the date of probable retirement provides a consistent method for estimating the lives of the several years of installation for a particular facility because a single concurrent retirement for all years of installation will occur when it is retired.

Q. Is the life span method widely used in the industry?

A. Yes. The life span method is widely used in the industry for property such as power plants and gas storage facilities. Both I and others at my firm have used the life span method in performing depreciation studies presented to many public utility commissions across the United States and Canada, and the life span method has been used in previous studies for PSE.

Q. Have there been any changes to the probable retirement dates for gas storage facilities estimated in the current Depreciation Study due to changes in law or other reasons?

A. No. The estimated retirement dates for liquefied natural gas ("LNG") and underground storage facilities are the same as those in the previous Depreciation Study and used for the Company's current depreciation rates. Each of these retirement dates occur prior to 2050, with the exception of the new Tacoma LNG facility, and are, therefore, consistent with the considerations related to the future of the gas industry I discuss further in Section II.C.

Q. Are there other considerations that inform the results of the Depreciation Study?

A. Yes. As I will discuss in more detail in Section II.C, full implementation of Net Zero by 2050 will result in the future of the Company's gas operations being very different from the past. Changes such as these must be considered when estimating depreciation in order to equitably and fairly align depreciation expense with the utilization and useful lives of the Company's assets. Because these will be different in the future than in the past, reliance only on historical data would be both inappropriate and inaccurate.

Q. Do authorities on depreciation support that depreciation must incorporate expectations about the future and not only the analysis of the past?

A. Yes. For example, *Public Utility Depreciation Practices*, published in 1996 by the National Association of Regulatory Utility Commissioners, explains that "depreciation analysts should avoid becoming ensnared in the mechanics of the historical life study and relying solely on mathematical solutions," making clear that judgment must be used to estimate the future rather than sole reliance on analysis of historical data. NARUC further explains that "several factors should be considered in estimating property life. Some of these factors are:

1. Observable trends reflected in historical data;
2. Potential changes in the type of property installed;
3. Changes in the physical environment;
4. Changes in management requirements;
5. Changes in government requirements; and
6. Obsolescence due to the introduction of new technologies."[2]

[2] National Association of Regulatory Utility Commissioners, *Public Utility Depreciation Practices*, 1996, p. 129.

The impacts of Net Zero by 2050 would fall under this list, since it is a change in government requirements and will result in obsolescence due to the introduction of new technologies (such as air or ground-source heat pumps).

NARUC also explains that these forces, and changes in the future, should be considered when forecasting service lives on page 128:

> The use of informed judgment can be a major factor in forecasting. A logical process of examining and prioritizing the usefulness of information must be employed, since there are many sources of data that must be considered and weighed by importance. For example, the following forces of retirement need to be considered: Do the past and current service life dispersions represent the future? Will scrap prices rise or fall? What will be the impact of future technological obsolescence? Will the Company be in existence in the future? The analyst must rank the factors and decide the relative weight to apply to each. The final estimate might not resemble any one of the specific factors; however, the result would be a decision based on a combination of the components.

Additionally, the Uniform System of Accounts definition provided earlier in my testimony specifically lists causes such as inadequacy, obsolescence and requirements of public authorities as factors to consider.

Q. Have you considered these factors when making your recommendations?

A. Yes. As I will discuss further in Section II.C, my recommendations incorporate changes that will occur to the gas system as the state decarbonizes over the next three decades.

2. <u>Net Salvage Estimates</u>

Q. Please explain the concept of "net salvage."

A. Net salvage is a component of the service value of capital assets that is recovered through depreciation rates. The service value of an asset is its original cost less its net salvage. Net Salvage is the salvage value received for the asset upon retirement less the cost to retire the asset. When the cost to retire exceeds the salvage value, the result is negative net salvage.

Inasmuch as depreciation expense is the loss in service value of an asset during a defined period (e.g., one year), it must include a ratable portion of both the original cost and the net salvage. That is, the net salvage related to an asset should be incorporated in the cost of service during the same period as its original cost so that customers receiving service from the asset pay rates that include a portion of both elements of the asset's service value: the original cost and the net salvage value.

Q. Please describe how you estimated net salvage percentages.

A. I estimated the net salvage percentages incorporating the historical retirement, cost of removal, and gross salvage data for the period 1998 through 2022 and considered estimates for other gas companies.

B. Calculation of Remaining Life and Annual Depreciation Rates

Q. Please describe the second phase of the process used in the Depreciation Study to calculate composite remaining lives and annual depreciation accrual rates.

A. After estimating the service life and net salvage characteristics for each depreciable property group, I calculated the annual depreciation accrual rates for each group based on the straight line remaining life method, using remaining lives weighted consistent with the average service life procedure. The annual depreciation accrual rates were calculated as of June 30, 2023.

Q. Please describe the straight-line remaining life method of depreciation.

A. The straight line remaining life method of depreciation (also referred to as the straight-line method and remaining life technique) allocates the original cost of the property, less accumulated depreciation, less future net salvage, in equal amounts to each year of remaining service life.

Q. Is the straight line method the only method considered for the Depreciation Study?

A. No. As I discuss in more detail in Section II.C, other methods were considered that may better match the expected decline in gas throughput that will occur by 2050. These include the Units of Production method as well as an accelerated method of depreciation. While my recommendation in the current study is based on the straight line method, the Units of Production may actually provide a more equitable approach to depreciation in the context of declining demand. I believe this is an approach the Commission should consider in future depreciation studies.

Q. Please describe amortization accounting.

A. In amortization accounting, units of property are capitalized in the same manner as they are in depreciation accounting. Amortization accounting is used for accounts with many units, but small asset values. Depreciation accounting is difficult for these assets because periodic inventories are required to properly reflect plant in service. Consequently, retirements are recorded when a vintage is fully amortized rather than as the units are removed from service. That is, there is no dispersion of retirements. All units are retired when the age of the vintage reaches the amortization period. Each plant account or group of assets is assigned a fixed period, which represents an anticipated life during which the asset will provide its full benefit. For example, in amortization accounting, assets that have a 15-year amortization period will be fully recovered after 15 years of service and taken off the Company's books, but not necessarily removed from service in the field. In contrast, assets that are taken out of service before 15 years remain on the books until the amortization period for that vintage has expired.

Q. For which PSE plant accounts is amortization accounting recommended?

A. Amortization accounting is recommended for certain General Plant or General Plant related accounts. These accounts are Accounts 376.5, 380.1, 391.1, 391.2, 394, 395, 397, and 398. These accounts represent a relatively small percentage of PSE's depreciable plant as of June 30, 2023. The amortization periods and rates for these accounts are the same as those approved in PSE's 2022 general rate case.[3]

Q. Please use an example to illustrate the development of the annual depreciation accrual rate for a particular group of property in the Depreciation Study.

A. I will use Gas Plant Account 376.20, Mains - Plastic, as an example because it is one of the largest depreciable groups. The retirement rate method was used to analyze the survivor characteristics of this property group. Aged plant accounting data were compiled from 1987 through 2022 and analyzed to best represent the overall service life of this property. The life tables for the 1987-2022 and 2001-2022 experience bands are presented on pages VII-102 through VII-107 of Exh. NWA-3. The life tables display the retirement and surviving ratios of the aged plant data exposed to retirement by age interval. For example, page VII-102 shows $2,215,622 retired during age interval 0.5-1.5 with $1,689,763,027 exposed to retirement at the beginning of the interval. Consequently, the

[3] *WUTC v. Puget Sound Energy,* Dockets UE-220066/UG-220067.

retirement ratio is 0.0013 ($2,215,622 /$1,689,763,027) and the survivor ratio is 0.9987 (1-0.0013). The percent surviving at age 0.5 of 99.99 percent is multiplied by the survivor ratio of 0.9987 to derive the percent surviving at age 1.5 of 99.86 percent. This process continues for the remaining age intervals for which plant was exposed to retirement during the period 1987-2022. The resultant life tables, or original survivor curves, are plotted along with the estimated smooth survivor curve, the 45-R3 on page VII-147.

The net salvage analysis is presented on pages VIII-18 and VIII-19 of Exh. NWA-3. The percentages shown on this page are based on the result of annual gross salvage minus the cost to remove plant assets as compared to the original cost of plant retired during the period 1998 through 2022. The 25-year period experienced negative $36,698,659 ($48,500 - $36,747,159) in net salvage for $70,856,964 plant retired. The result is negative net salvage of 52 percent ($36,698,659 / $70,856,964), while the most recent five-year average is negative 105 percent. Therefore, based on the statistics for this account as well as the three-year rolling averages and trend in recent years, the recommended net salvage for gas mains is negative 50 percent. The recommended negative 50 percent net salvage is generally consistent with the overall average net salvage of negative 52 percent.

The calculation of the annual depreciation related to original cost of Account 376.2, Mains - Plastic as of June 30, 2023, is presented on pages IX-31 and IX-32 of Exh. NWA-3. The calculation is based on the 45-R3 survivor curve, the 50 negative net salvage percent, the attained age, and the allocated book reserve. The tabulation sets forth the installation year, the original cost, calculated accrued depreciation, allocated book reserve, future accruals, remaining life and annual accrual. These totals are brought forward to the table on page VI-9.

Q. What are the primary factors that result in changes in depreciation rates for the Depreciation Study?

A. The primary reason for the change in depreciation rates is the need to better align with the future outlook for the Company's assets and with Net Zero by 2050. After considering several different scenarios, I recommend shortening the service lives for several accounts. While, overall, this recommendation results in an increase in depreciation, this is both appropriate and necessary in the context of obsolescence and declining gas demand resulting from the electrification resulting from current policies and the requirements to achieve Net Zero by 2050.

Q. In your opinion, are the depreciation rates set forth in the Depreciation Study the appropriate rates for the Commission to approve in this proceeding?

A. Yes. These rates appropriately reflect the rates at which the value of PSE's assets should be recovered through depreciation expense over their useful lives. These rates are an appropriate basis for setting gas rates and to use for looking at depreciation and amortization expense going forward.

C. Impacts of Washington State's Climate Change Laws

Q. How will the CCA and CETA impact Puget Sound Energy's gas utility operations?

A. Both of these laws, and Net Zero by 2050 in general, will significantly impact PSE's gas operations. The CCA introduces a cap-and-invest program that puts a price on greenhouse gas emissions. This program establishes aggressive statewide GHG emissions limits, with reductions of 45% by 2030 and 95% (and Net Zero) by 2050. Under CETA, which requires 100% clean energy by 2045, PSE will transition power generation from natural gas to more renewable energy sources. This shift involves substantial investments in green technologies and infrastructure modifications.

Q. **How will the building codes and the implementation of the line extension policy impact customer counts?**

A. The new building codes make it virtually certain that all new construction will be electric-only. And the elimination of PSE's line extension margin allowance has the effect of allowing those costs to extend service will be fully borne by the new customer. Together, these policies are expected to reduce growth in PSE's gas customers to virtually zero growth.

Q. What is the broader impact of Washington's climate laws on the utility sector?

A. The CCA sets stringent statewide GHG emission reduction targets, eventually resulting in Net Zero emissions by 2050. Because the combustion of methane results in GHG emissions, there will eventually have to be significant reductions in gas usage in order to meet these targets. Assets will also be obsolete as customers electrify with new technologies, resulting in such assets being retired earlier than they otherwise would, which will shorten service lives.

I also expect there to be significant impacts on the electric grid, as widespread electrification will significantly increase peak loads and result in a higher rate of the replacement of assets due to capacity, resilience and reliability reasons. However, the current Depreciation Study is focused on gas assets and my testimony will focus on those impacts.

Q. How will Net Zero by 2050 impact depreciation expense for gas assets?

A. There are three main aspects of depreciation that could be impacted by significant changes in gas consumption. The first is the useful lives of the Companies' assets. Assets will have shorter service lives than has been the case historically. For example, if a customer decides to fully electrify their energy usage, the infrastructure providing gas service directly to that customer would be retired. With widespread electrification, this would result in shorter service lives for assets such as gas services, meters, and meter installations. Gas mains and regulator stations would also be affected if gas throughput declines, as many of these facilities could become obsolete. Other assets may also become obsolete if they are no longer needed due to declines in gas throughput.

The second aspect that will be affected is cost of removal. Under normal utility operations, cost of removal often occurs for replacement projects. When gas mains and services are replaced, pipe is typically retired in place (although there are costs to cut, cap and purge any gas from the pipe). However, it is possible these costs could be different in the future if, for example, portions of the gas system are electrified as a whole and specific assets are required to be removed, rather than retired in place. It may also be more costly to retire and decommission obsolete mains and services than the retirement costs associated with replacement projects in which various costs (such as equipment and paving) may be shared between the addition of the new asset and cost of removal.

Lastly, the depreciation method used to allocate capital costs may need to be reconsidered. Traditionally, almost all utilities have used the straight line method of depreciation in which capital costs are allocated equally over the service lives of the assets – depreciation is calculated so that equal amounts are recorded in each year of an asset's estimated service life. Straight-line depreciation works well when utilities have fairly stable or increasing demand, as the annual depreciation accruals tend to approximate the consumption of capital over the assets' useful lives. If, however, consumption were to decline significantly, a question arises whether it is equitable to have equal depreciation charges today as in the future when there will be less consumption. An alternative method to consider is the Units of Production ("UoP") method.

Q. Please explain the UoP method further.

A. The UoP method is an accepted method recognized by depreciation authorities that allocates capital costs equally to UoP – or consumption – rather than in equal amounts to each year. When this method is used, depreciation accruals may vary over an asset's life based on the consumption that occurs each year. Thus, for example, if throughput were to decline by 50 percent by 2050, depreciation accruals today would be twice as high as in 2050, all else equal. If the decline in consumption is, for example, due to a similar decline in customers, this would mean for the UoP method, each generation of customers would pay a similar share of the Company's capital costs on a per customer basis. Under such a scenario, if straight line depreciation were used, then future generations would pay a higher share of capital costs on a per customer basis, because the accruals in future years would be spread over fewer customers.

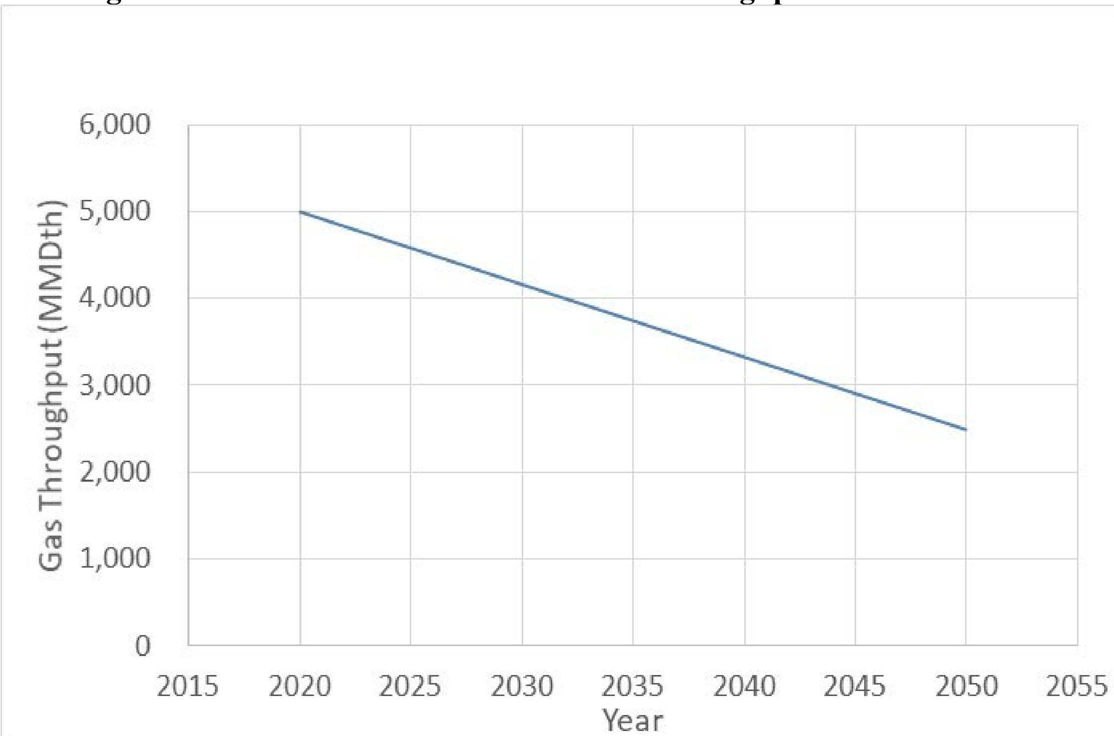
Q. Does the UoP method address concerns that are not addressed by only focusing on service lives?

A. Yes. The UoP method also addresses an issue that focusing only on asset lives does not address. Consider a scenario in which a city street is served by a single gas main. Each customer on that street would have their own gas service and meter, although all are served by the same gas main. If, for example, half of the customers electrify their energy usage and leave the gas system, the Company would retire their services and meters, but the gas main would need to remain to provide service to those customers who remain. Using straight line depreciation, these remaining customers would pay a higher proportion of the cost of the gas main than those that left the system. If, however, UoP were used, then depreciation would be adjusted for the decline in throughput and costs would be allocated more equally across the customer base—both those that leave and those who remain.

Q. Please provide an example to show how the UoP method works.

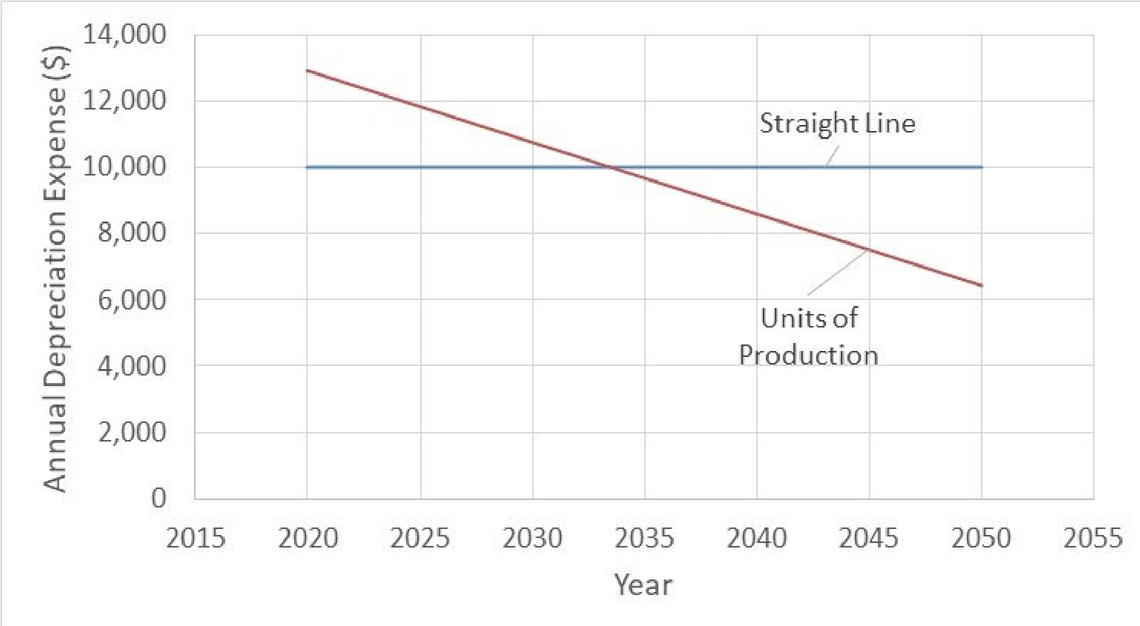
A. To illustrate how the UoP method works, consider a simple example of a single gas main with a cost of $300,000, a 30-year service life and net salvage of zero. Additionally, over the life of the main, gas consumption will decline by half, meaning that half as much gas will flow through the main in thirty years than is the case today. Gas consumption over the life of the main is illustrated in Figure 1 below.

Figure 1: Illustration of Reduction in Gas Throughput Over Life of Main



Using the straight line method, the costs of the main would be allocated equally to each of the thirty years of service, meaning depreciation would be $10,000 per year. For the UoP method, costs would be allocated in proportion to the consumption for each year. Accordingly, since consumption declines over the life of the main, depreciation would follow a similar pattern. This is illustrated in Figure 2 below.

Figure 2: Illustration of Annual Depreciation Expense Based On Straight Line Method And UoP Method Using Gas Throughput Decline Shown In Figure 1

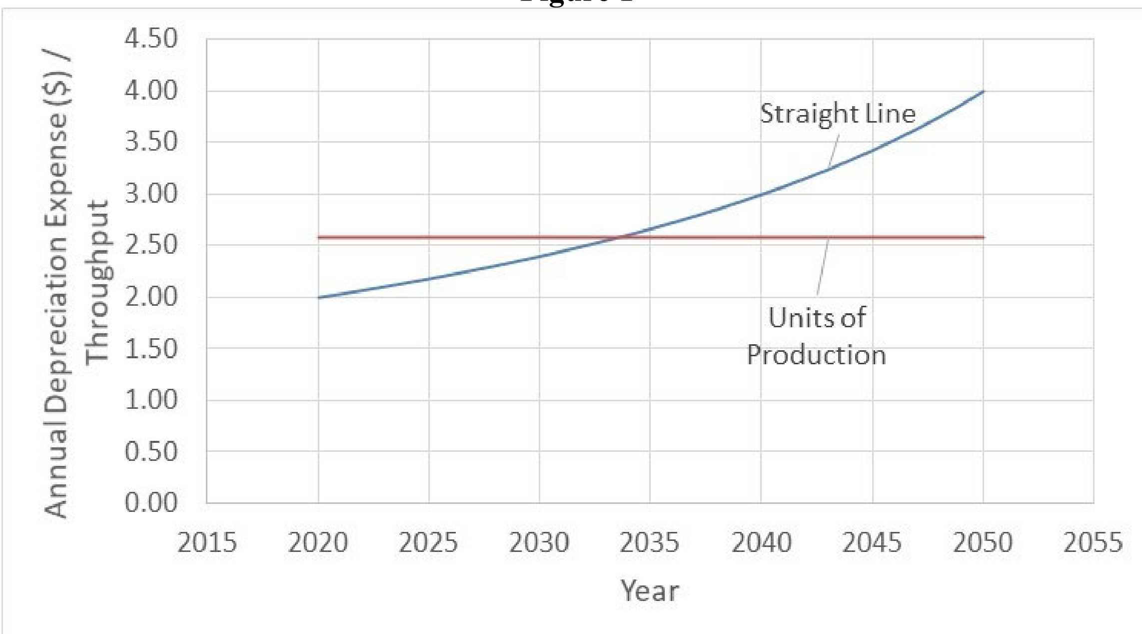


When considering only the annual amounts, UoP results in higher depreciation in the earlier years and lower depreciation in the later years when compared to the straight line method.[4] However, when comparing accruals to gas consumption a different picture emerges. Figure 3 shows the annual accruals on a per unit of consumption basis. Because consumption in 2050 is half the amount in 2050 as in 2020, the straight line depreciation is twice as high in 2050 than in 2020 on a per unit basis. In contrast, the UoP method results in equal depreciation amounts each year on a per unit basis. From this standpoint, the UoP method provides a more equal allocation of costs than the straight line method (which results in higher accruals on a per unit basis in later years). If the decline in consumption

[4] Note that this is the case because consumption declines over the life of the asset. If the opposite were the case and consumption doubled over time, then the UoP method would result in lower accruals in the earlier years and higher accruals in the later years compared to the straight-line method.

were similar to the decline in the number of customers, then the UoP would also result in equal charges on a per customer basis over the life of the assets.

Figure 3: Illustration of Annual Depreciation Expense On A Per Unit Basis Using Straight Line Method And UoP Method Using Gas Throughput Decline Shown In Figure 1



Q. Would aligning depreciation with the current realities of decarbonization provide a way to protect future customers?

A. Yes. The UoP Method in particular provides a way to protect future customers from exponentially increasing bills as customers leave the system. If the number of customers declines significantly, straight-line depreciation (even with shortened service lives) will result in an increasing cost per customer (since the denominator, the number of customers, declines while the depreciation expense remains constant). This poses many risks, both to utilities and remaining customers, as the shrinking customer base will bear a disproportionate share of costs and rates could even become unaffordable. Because the remaining customers will be those least able to electrify (many of which are likely to be disadvantaged customers), straight line depreciation will disproportionately harm those least able to afford it.

If, however, UoP depreciation is used, then depreciation will be aligned with the decline in gas demand. This will mitigate future customer rates, thereby not only protecting future customers but also resulting in a fairer and more equitable approach in which each generation of customers pays their fair share of the costs of constructing the gas system.

Q. Has PSE performed analyses of the long-term pathways to targeted electrification?

A. Yes. PSE has developed four scenarios in its targeted electrification study.[5] Under each scenario, gas throughput would decline materially.[6] For example, for the Air Source Heat Pump Scenario #1, gas throughput would decline 74% for PSE by 2050. Overall, each of these scenarios result in significant changes that could materially reduce service lives (since assets will be retired as the system is downsized) and utilization of the Company's assets.

These scenarios represent a significant shift in PSE's operations, affecting both service lives and the utilization of its gas assets, and would have profound impacts on both the gas and electric systems.

[5] Dockets 220066-67 & UG-210918, PSE's Decarbonization Study Compliance Filing, Attachment A (Dec. 21, 2023) (GRC Stipulation O – Updated Decarbonization Study).

[6] *Id*.

Q. Have you reviewed similar analyses performed for other utilities that face similar GHG emissions reductions targets?

A. Yes. The results of PSE's analyses are generally consistent with others I have seen for other jurisdictions or utilities that face similar Net Zero laws. Further, in analyses I have reviewed, even in hybrid scenarios in which gas continues to be used (typically with alternative fuels like hydrogen and renewable natural gas), overall gas throughput still declines materially from current usage. As a result, I think it is reasonable to expect that, as a minimum, gas consumption will decline in the coming decades and depreciation approaches need to be reconsidered. Importantly, the longer utilities and commissions wait to implement these needed changes, the more costly they will be to customers.

Q. What has the Company proposed?

A. For gas assets, I propose to shorten the service lives of several accounts by as much as 10 years to incorporate the future outlook for the service lives in the context of Net Zero by 2050. The Company's current average service life estimates for assets such as gas mains are as long as 60 years. Based on PSE's planning scenarios, these asset lives will either be significantly shorter in the future or the assets will be utilized less as throughput declines.

Q. Is your proposal the only approach you have considered or analyzed when preparing the Depreciation Study?

A. No. Beyond the proposed 10-year shorter life scenario, estimates based on historical experience and 5-year shorter lives were also analyzed. On a straight line basis, I also performed a scenario where all costs were recovered by 2050. In addition to these straight line approaches, alternate methods of recovering depreciation costs were also considered based on the UoP method as well as an accelerated method referred to as Sum-of-the-Years-Digits.

Table 1 below provides a summary of different scenarios considered and compares each to the depreciation expense that results from the Company's current depreciation rates. The first scenario, labeled "Historical Experience," shows the results of a study if depreciation is determined in a traditional way with service life estimates more consistent with the Company's historical service life experience and using the straight line method, similar to the approach approved in PSE's last study. The other scenarios in the table, which show the results of different approaches of incorporating Net Zero by 2050 impacts, include two scenarios with shorter service lives, labeled "5-Year Shorter Service Lives" and "10-Year Shorter Service Lives." As the names imply, these scenarios incorporate varying degrees of shorter service lives for certain accounts.[7] The "Recover by 2050" scenario shows the result of developing depreciation rates to recover all costs on a straight line basis by 2050. Next, I have shown Units of Production scenarios aligned with Scenarios discussed above. The UoP depreciation rates are very similar as a result and for brevity I have only shown two of these scenarios in the table below. Finally, the "SYD" column shows the results of using the accelerated method referred to as "Sum-of-the-Years-Digits."

Table 1: Comparison of Annual Depreciation Expense Resulting from Various Scenarios for Gas Plant ($, millions)

FUNCTION	CURRENT DEPR.	HIST. EXP.	5-YEAR SHORTER	10-YEAR SHORTER	RECOVER BY 2050	UoP - CCHP	UoP - HHP	SYD

[7] I note that in each scenario the lives are not all uniformly shortened by the same amount, e.g., 10-years shorter. However, for the larger accounts, such as mains and services, the degree to which lives have been shortened corresponds to the scenario name.

			SERVICE LIVES	SERVICE LIVES				
UNDERGROUND STORAGE	$1.9	$2.2	$2.2	$2.2	$2.2	$2.8	$2.7	$4.1
OTHER STORAGE	$6.5	$6.5	$6.5	$6.5	$9.7	$12.5	$11.6	$12.7
DISTRIBUTION	$158.9	$160.1	$185.7	$229.4	$243.7	$294.8	$276.6	$310.8
GENERAL	$2.0	$2.1	$2.1	$2.1	$2.3	$3.2	$3.2	$2.7
TOTAL	**$169.3**	**$170.8**	**$196.4**	**$240.2**	**$257.8**	**$313.3**	**$294.1**	**$330.3**

Q. What do you recommend?

A. I recommend the 10-Year Shorter Lives scenario shown in Table 1, which considers the results of the scenarios shown above, as well as the factors that will potentially impact the service lives of the Company's assets. In my judgment, this results in a gradual movement towards the eventual level of depreciation that will be needed, as I believe the UoP Scenarios may most closely align depreciation with the utilization of the Company's assets, while mitigating rate impacts on future customers. However, because UoP is a change in depreciation method, and may be too great a transition for the Commission to make at this time, my recommendation in this case represents a compromise and is based on the straight line method of depreciation currently in use and focuses on the impacts on service lives. That is, I have not proposed to change the depreciation method, nor have I proposed accelerated depreciation. Instead, I have merely recommended to more closely align the service life estimates with the outlook for the assets studied in the face of a significant change to the gas system amid an energy transition that will occur over the next three decades.

Q. Are any of the scenarios shown in Table 1 accelerated depreciation?

A. Yes, but only the Sum-of-the-Years-Digits scenario. The shortening of service life estimates in the Depreciation Study, and as shown above in Table 1, is not accelerated depreciation. Accelerated depreciation describes methods of depreciation in which depreciation is higher in the earlier years and lower in the later years of an asset's life (when compared to the straight line method). The straight line method and UoP Method are not considered accelerated depreciation (although with declining production or consumption, the UoP Method is technically accelerated when compared to the straight line method).

Q. In addition to qualitative expectations about the future, what statistical support do you have for the 10-year Shorter Service Lives scenario?

A. In addition to incorporating information from various PSE gas planning projections, we have also analyzed the direct impact of downsizing the gas system on service lives. To do so, I have used a technique called Life Cycle Analysis to determine the combined impact of normal retirements and retirements that will occur as the gas system is geographically downsized.

For this analysis, I used the expectation of a 59% decline in the size of the gas system by 2050. This expectation aligns with the expected loss in customers from the full electrification with air source heat pump scenario (from 882,960 in 2024 to 360,020 in 2050).[8] To model the impacts, I have assumed that 59% of the Company's assets will be retired when no longer providing service to (now fully electrified) customers. Using a technique called Life Cycle Analysis, I can combine the probabilities of retirement resulting from our survivor curve estimates with the retirements that will occur as customers leave the system.

[8] Dockets 220066-67 & UG-210918, PSE's Decarbonization Study Compliance Filing, Attachment A (Dec. 21, 2023) (GRC Stipulation O – Updated Decarbonization Study).

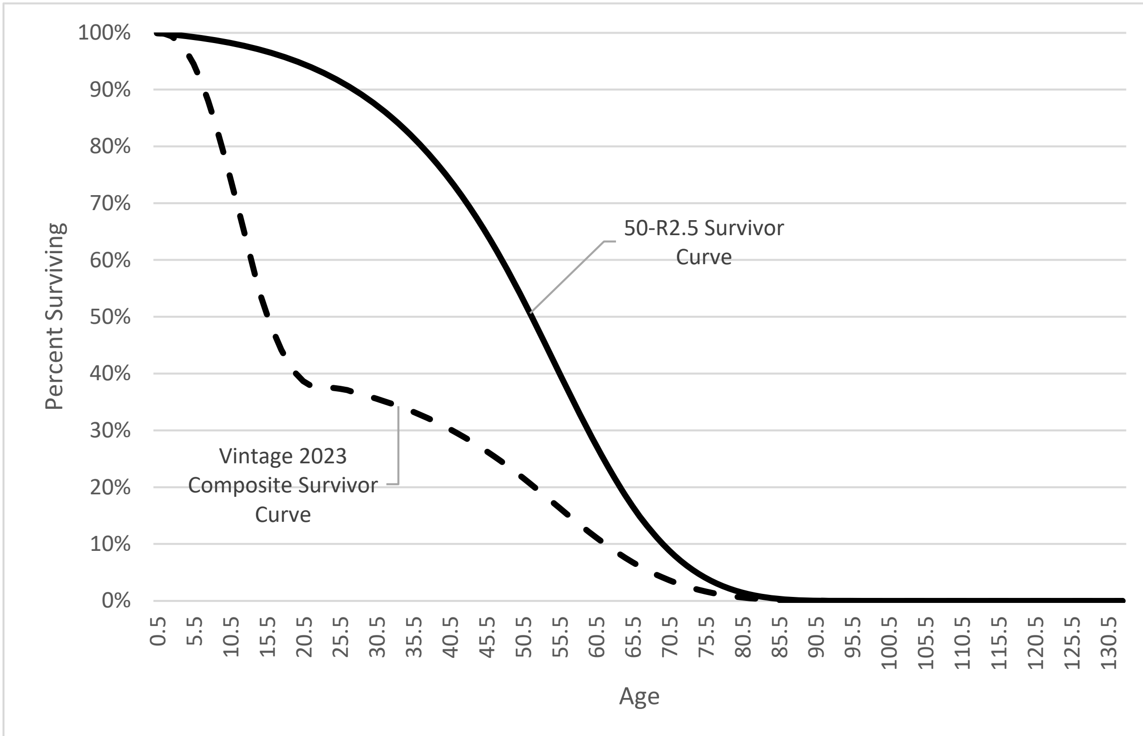
Q. Please explain how these probabilities of retirement are combined to develop an overall Life Cycle curve.

A. Consider, as an analogy, a scenario in which there is a 10% chance it will snow today and a 10% chance it will rain. If these probabilities are mutually exclusive (meaning that it will either rain, snow or do neither but will not snow and rain), then we can combine them by multiplying the probabilities of surviving.

More precisely, there is a 90% chance that it will not snow today. If it does not snow, then there is a 90% chance it also will not rain. The total probability of it neither snowing nor raining, then, is the 90% probability of it not snowing multiplied by the 90% chance of it not raining, or 81%. That is, there is an 81% chance that it will neither snow nor rain today.

The same concept can be applied to utility plant and survivor ratios for each year. The combined probability of survival from different causes of retirement (e.g., normal wear and tear as well as obsolescence due to the CCA) for a given age is similar to the calculation of the probability that it will neither rain or snow today. If there is a 1% chance of retirement due to normal wear and tear and a 1% chance of retirement due to obsolescence, then the combined probability of surviving to the next age is 98.01% (or 99% x 99%). Figure 1 below shows the results of applying the same mathematical techniques to the combined retirements resulting from downsizing the gas system by 59% by 2050 with the 50-R2.5 survivor curve estimate for the 2023 vintage for Account 380.20, Services - Plastic.

Figure 4: Composite Life Cycle Curve for Vintage 2023 Based on 50-R2.5 Survivor Curve and Gas System Retirements



The solid black line shows the 50-R2.5 survivor curve estimate. The dashed line shows the result of combining this estimate with retirements from downsizing the gas system. Once these retirement ratios are combined and a composite Life Cycle curve is developed, average service lives and remaining lives can be calculated using the same methods as for an Iowa survivor curve.[9]

For this vintage, the impact of downsizing the gas system over the next three decades is to reduce the average service life (which is equal to the area under the composite survivor curve shown in Figure 1) from 50 to 33.9 years.

[9] More precisely, the average service life is the area under the full survivor curve and the remaining life is the area from a given age to the end of the curve, divided by the percent surviving at that age.

By applying the same technique to each vintage within the account and incorporating the current balances, we can then calculate an overall average service life and average remaining life for the entire account. For plastic services, the result is shortening the 50-year average service life estimate from the 50-R2.5 survivor curve to a 33.9 year average service life, meaning that the ASHP scenario will result in a reduction in average service life of around 16 years for this account.

Q. Please summarize this analysis for each account for which you propose a shorter service life.

A. The table below shows the results of this analysis for each account for which we propose an adjustment due to Net Zero by 2050. As the table shows, this analysis is generally supportive of the 10-year Shorter Service Lives scenario I propose and would actually support even shorter lives. For example, the overall average service life based on my proposal for these accounts is approximately 42.7 years, which is longer than the 35.6 year average service life resulting from the composite life cycle curves calculated for each account.

Table 2: Comparison of Proposed Survivor Curves to Average Service Lives and Remaining Lives from Life Cycle Analysis for Gas Plant Accounts

Account	Survivor Curve	Life Cycle ASL	Life Cycle ARL	Proposed Survivor Curve
376.2, MAINS - PLASTIC	55-R3	36.1	24.9	45-R3
376.4, MAINS - WRAPPED STEEL	60-R2	40.5	25.5	50-R2.5
378.0, MEAS. AND REG. STATION EQUIPMENT	43-R2.5	31.0	19.9	35-R3
380.2, SERVICES - PLASTIC	50-R2.5	33.9	22.9	40-R3
380.3, SERVICES - WRAPPED STEEL	50-R2.5	41.9	15.6	40-R3
381.0, METERS	42-R2	29.6	20.0	30-R3
382.0, METER INSTALLATIONS	46-S2	32.3	20.3	35-R3
383.0, HOUSE REGULATORS	50-R3	36.1	21.2	35-R3
384.0, HOUSE REGULATOR INSTALLATIONS	50-R3	37.7	20.3	35-R3

Another way of considering this analysis is that the ASHP scenario will result in shortening the lives of the major gas assets by more than 15 years, on average. Our proposal recognizes the shortening of service lives that will result from retirements that will occur to a smaller gas system under the ASHP scenario although, as noted above, my estimates are relatively conservative when compared to the results of the Life Cycle analysis.

Q. What are the risks of using more of a "business as usual" approach such as the "Historical Experience" scenario?

A. Such an approach involves several risks. The first risk is the potential for future customers to bear the impact of cost recovery associated with infrastructure that is not used to meet their energy needs, causing intergenerational inequity. If depreciation rates are too low today, future customers will have to pay an excessive share of the cost of the Company's assets as a transition to other energy sources takes place. Further, there is the risk that customers will leave the system as they electrify their energy usage, which would push additional costs to the future customers that remain. These risks are related. If depreciation is higher in the future and customers have left the system, there will be fewer customers to pay the remaining costs of the Company's assets, further compounding the intergenerational inequity resulting from depreciation rates being too low today. Finally, there are additional equity concerns because the customers who remain may be disproportionately low- and moderate-income customers who are not able to electrify their energy usage as easily as customers with more resources. That is, if the recognition of the Net Zero by 2050's impact on depreciation is deferred to future cases, there is a risk that the customers who bear a disproportionate share of the costs of decarbonization will be those least able to afford these costs.

Q. Are there similar risks if depreciation rates are set too high today?

A. No. The risks are not symmetric. If depreciation rates are set too high today – and if in the future assets live longer and customers have not left the system – then depreciation rates will be adjusted through the use of the remaining life technique.[10] That is, customers will pay lower costs for depreciation in the future. Additionally, rate base will be lower than it otherwise would have been, further reducing costs for customers. In contrast, if depreciation rates are too low today – and if customers electrify and leave the gas system – then the impact on future customers will be much greater because there will likely be fewer customers to pay the remaining capital costs. They will also have to pay a higher return on rate base, further compounding the issue. Lastly, they will likely have to bear the costs of assets that are retired without being fully recovered, which is also inequitable.

For these reasons, the risks resulting from Net Zero by 2050 goals are most appropriately dealt with by incorporating the potential for shorter asset lives into depreciation rates today. The sooner the Commission incorporates these factors, the lower the risk to future customers, the lower the potential for rate shock in the future, and the lower total cost to customers over time. Deferring these decisions will both increase the risk of dramatic impacts on future rates and will cost customers, particularly low- and moderate-income customers, more in the long run.

[10] Because the Company has reserve variations for both electric and gas service, this likely means that there would be smaller reserve variations to address in the future.

Q. Will the Company continue to assess the impact of Net Zero by 2050 in future depreciation studies?

A. Yes. As the pathways to achieving Net Zero by 2050 further develop, the Company will assess their impact on the depreciable lives of its gas assets. This approach will allow the Company to adapt to future trends, regulations and technological advances. The Company's proposal in this case is reasonable given the current information and analyses available, but with additional information in future studies there may be a need to modify the approach or recommended depreciation rates.

Additionally, I expect Net Zero by 2050 to also impact electric assets by resulting in a higher rate of replacements for capacity reasons (due to higher loads from electrification of vehicles, heat and other uses) as well as reliability and resilience. While the impacts may not be as dramatic as for the gas industry, these impacts should be considered in future studies for electric assets.

III. CONCLUSION

Q. Does that conclude your testimony?

A. Yes, it does.