

**EXH. NWA-1T
DOCKET UE-240004/UG-240005
2024 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-240004
Docket UG-240005**

PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF

NED W. ALLIS

ON BEHALF OF PUGET SOUND ENERGY

FEBRUARY 15, 2023

PUGET SOUND ENERGY

**PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF
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PUGET SOUND ENERGY

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1 **PUGET SOUND ENERGY**

2 **PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF**
3 **NED W. ALLIS**

4 **I. INTRODUCTION**

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

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

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

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

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

13 A. I sponsor the Depreciation Study performed for PSE’s gas assets submitted
14 herewith as Exh. NWA-3 (“Depreciation Study”). The Depreciation Study sets
15 forth the calculated annual depreciation accrual rates by account as of June 30,
16 2023 for all gas plant. June 30, 2023 is the last day of PSE’s test year for this rate
17 case.

1 **II. PSE’S DEPRECIATION STUDY**

2 **Q. Please define the concept of depreciation.**

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

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

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

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

20 **Q. What is the purpose of your Depreciation Study?**

21 A. The purpose of the Depreciation Study is to estimate the annual depreciation
22 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.

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

3 **Q. When was the last Depreciation Study performed?**

4 A. The last Depreciation Study was filed as part of Dockets UE-220066 and UG-
5 220067. That study incorporated electric, gas and common assets.

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

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

1 analyses have been performed in other states that have similar greenhouse gas
2 (“GHG”) emissions reduction goals.

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

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

17 A. The report, which is provided as Exh. NWA-3, is presented in nine parts. Part I,
18 Introduction, describes the scope and basis for the Depreciation Study. Part II,
19 Estimation of Survivor Curves, includes descriptions of the methodology of
20 estimating survivor curves. Parts III and IV set forth the analysis for determining
21 life and net salvage estimates. Part V, Calculation of Annual and Accrued
22 Depreciation explains the method, procedure, and technique used in the

1 calculation of depreciation. Part VI, Results of Study, presents a description of the
2 results and a summary of the depreciation calculations. Parts VII, VIII and IX
3 include graphs and tables that relate to the service life and net salvage analyses,
4 and the detailed depreciation calculations.

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

13 **Q. Please explain how you performed your Depreciation Study.**

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

19 For General Plant Accounts 376.5, 380.1, 391.1, 391.2, 393, 394, 395, 397, and
20 398, I used the straight line remaining life method of amortization. The account
21 numbers identified throughout my testimony represent those in effect as of June

1 30, 2023 or anticipated in the rate period based on information provided by PSE
2 management. The annual amortization is based on amortization accounting that
3 distributes the cost of fixed capital assets over the amortization period authorized
4 for each account and vintage.

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

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

11 **A. Service Life and Net Salvage Estimates**

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

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

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

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

10 **1. Service Life Estimates**

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

12 A. I analyzed the Company's accounting entries relating to plant additions, transfers,
13 and retirements recorded during the period 1987 through 2022. PSE's records also
14 include surviving dollar value by year installed for each plant account as of June
15 30, 2023.

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

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

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

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

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

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

20 Iowa-type curves are used to smooth and extrapolate original survivor curves
21 determined by the retirement rate method. I used Iowa curves and truncated Iowa

1 curves in this study to describe the forecasted rates of retirement based on the
2 observed rates of retirement and the outlook for future retirements.

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

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

13 A. I used the life span method to estimate the lives of significant facilities for which
14 concurrent retirement of the entire facility is anticipated. In this method, the
15 survivor characteristics of such facilities are described using interim survivor
16 curves and estimated probable retirement dates. The interim survivor curve
17 describes the rate of retirement related to the replacement of elements of the
18 facility, such as, for a building, the retirements of plumbing, heating, doors,
19 windows, roofs, etc., that occur during the life of the facility. The probable
20 retirement date provides the rate of final retirement for each year of installation
21 for the facility by truncating the interim survivor curve for each installation year
22 at its attained age at the date of probable retirement. The use of interim survivor

1 curves truncated at the date of probable retirement provides a consistent method
2 for estimating the lives of the several years of installation for a particular facility
3 because a single concurrent retirement for all years of installation will occur when
4 it is retired.

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

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

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

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

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

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

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

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

- 17 1. Observable trends reflected in historical data;
- 18 2. Potential changes in the type of property installed;
- 19 3. Changes in the physical environment;
- 20 4. Changes in management requirements;
- 21 5. Changes in government requirements; and
- 22 6. Obsolescence due to the introduction of new technologies.”²

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

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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.

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

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

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

8 **2. Net Salvage Estimates**

9 **Q. Please explain the concept of “net salvage.”**

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

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

1 **Q. Please describe how you estimated net salvage percentages.**

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

5 **B. Calculation of Remaining Life and Annual Depreciation Rates**

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

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

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

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

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

1 A. No. As I discuss in more detail in Section II.C, other methods were considered
2 that may better match the expected decline in gas throughput that will occur by
3 2050. These include the Units of Production method as well as an accelerated
4 method of depreciation. While my recommendation in the current study is based
5 on the straight line method, the Units of Production may actually provide a more
6 equitable approach to depreciation in the context of declining demand. I believe
7 this is an approach the Commission should consider in future depreciation studies.

8 **Q. Please describe amortization accounting.**

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

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

2 A. Amortization accounting is recommended for certain General Plant or General
3 Plant related accounts. These accounts are Accounts 376.5, 380.1, 391.1, 391.2,
4 394, 395, 397, and 398. These accounts represent a relatively small percentage of
5 PSE's depreciable plant as of June 30, 2023. The amortization periods and rates
6 for these accounts are the same as those approved in PSE's 2022 general rate
7 case.³

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

11 A. I will use Gas Plant Account 376.20, Mains - Plastic, as an example because it is
12 one of the largest depreciable groups. The retirement rate method was used to
13 analyze the survivor characteristics of this property group. Aged plant accounting
14 data were compiled from 1987 through 2022 and analyzed to best represent the
15 overall service life of this property. The life tables for the 1987-2022 and 2001-
16 2022 experience bands are presented on pages VII-102 through VII-107 of Exh.
17 NWA-3. The life tables display the retirement and surviving ratios of the aged
18 plant data exposed to retirement by age interval. For example, page VII-102
19 shows \$2,215,622 retired during age interval 0.5-1.5 with \$1,689,763,027
20 exposed to retirement at the beginning of the interval. Consequently, the

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

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

8 The net salvage analysis is presented on pages VIII-18 and VIII-19 of Exh. NWA-
9 3. The percentages shown on this page are based on the result of annual gross
10 salvage minus the cost to remove plant assets as compared to the original cost of
11 plant retired during the period 1998 through 2022. The 25-year period
12 experienced negative $\$36,698,659$ ($\$48,500 - \$36,747,159$) in net salvage for
13 $\$70,856,964$ plant retired. The result is negative net salvage of 52 percent
14 ($\$36,698,659 / \$70,856,964$), while the most recent five-year average is negative
15 105 percent. Therefore, based on the statistics for this account as well as the three-
16 year rolling averages and trend in recent years, the recommended net salvage for
17 gas mains is negative 50 percent. The recommended negative 50 percent net
18 salvage is generally consistent with the overall average net salvage of negative 52
19 percent.

20 The calculation of the annual depreciation related to original cost of Account
21 376.2, Mains - Plastic as of June 30, 2023, is presented on pages IX-31 and IX-32
22 of Exh. NWA-3. The calculation is based on the 45-R3 survivor curve, the 50

1 negative net salvage percent, the attained age, and the allocated book reserve. The
2 tabulation sets forth the installation year, the original cost, calculated accrued
3 depreciation, allocated book reserve, future accruals, remaining life and annual
4 accrual. These totals are brought forward to the table on page VI-9.

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

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

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

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

1 **C. Impacts of Washington State's Climate Change Laws**

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

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

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

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

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

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

7 I also expect there to be significant impacts on the electric grid, as widespread
8 electrification will significantly increase peak loads and result in a higher rate of
9 the replacement of assets due to capacity, resilience and reliability reasons.

10 However, the current Depreciation Study is focused on gas assets and my
11 testimony will focus on those impacts.

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

13 A. There are three main aspects of depreciation that could be impacted by significant
14 changes in gas consumption. The first is the useful lives of the Companies'
15 assets. Assets will have shorter service lives than has been the case historically.

16 For example, if a customer decides to fully electrify their energy usage, the
17 infrastructure providing gas service directly to that customer would be retired.

18 With widespread electrification, this would result in shorter service lives for
19 assets such as gas services, meters, and meter installations. Gas mains and
20 regulator stations would also be affected if gas throughput declines, as many of
21 these facilities could become obsolete. Other assets may also become obsolete if
22 they are no longer needed due to declines in gas throughput.

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

11 Lastly, the depreciation method used to allocate capital costs may need to be
12 reconsidered. Traditionally, almost all utilities have used the straight line method
13 of depreciation in which capital costs are allocated equally over the service lives
14 of the assets – depreciation is calculated so that equal amounts are recorded in
15 each year of an asset’s estimated service life. Straight-line depreciation works
16 well when utilities have fairly stable or increasing demand, as the annual
17 depreciation accruals tend to approximate the consumption of capital over the
18 assets’ useful lives. If, however, consumption were to decline significantly, a
19 question arises whether it is equitable to have equal depreciation charges today as
20 in the future when there will be less consumption. An alternative method to
21 consider is the Units of Production (“UoP”) method.
22

1 **Q. Please explain the UoP method further.**

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

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

16 A. Yes. The UoP method also addresses an issue that focusing only on asset lives
17 does not address. Consider a scenario in which a city street is served by a single
18 gas main. Each customer on that street would have their own gas service and
19 meter, although all are served by the same gas main. If, for example, half of the
20 customers electrify their energy usage and leave the gas system, the Company
21 would retire their services and meters, but the gas main would need to remain to
22 provide service to those customers who remain. Using straight line depreciation,

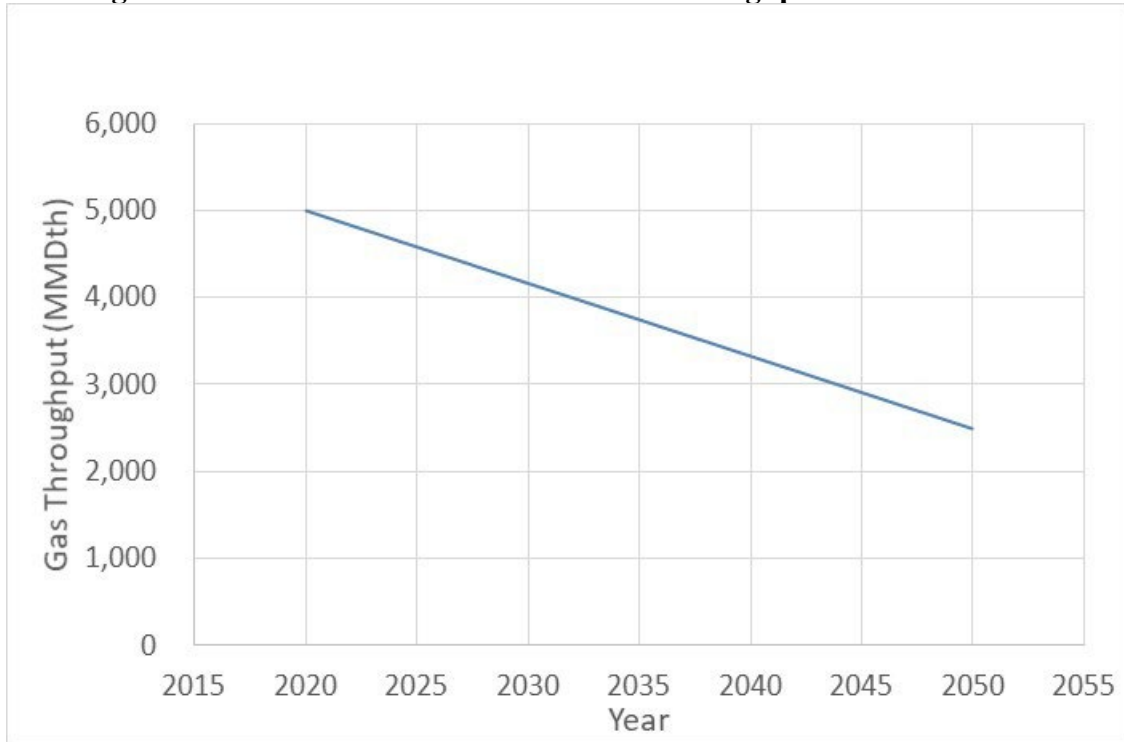
1 these remaining customers would pay a higher proportion of the cost of the gas
2 main than those that left the system. If, however, UoP were used, then
3 depreciation would be adjusted for the decline in throughput and costs would be
4 allocated more equally across the customer base—both those that leave and those
5 who remain.

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

7 A. To illustrate how the UoP method works, consider a simple example of a single
8 gas main with a cost of \$300,000, a 30-year service life and net salvage of zero.
9 Additionally, over the life of the main, gas consumption will decline by half,
10 meaning that half as much gas will flow through the main in thirty years than is
11 the case today. Gas consumption over the life of the main is illustrated in Figure
12 1 below.

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



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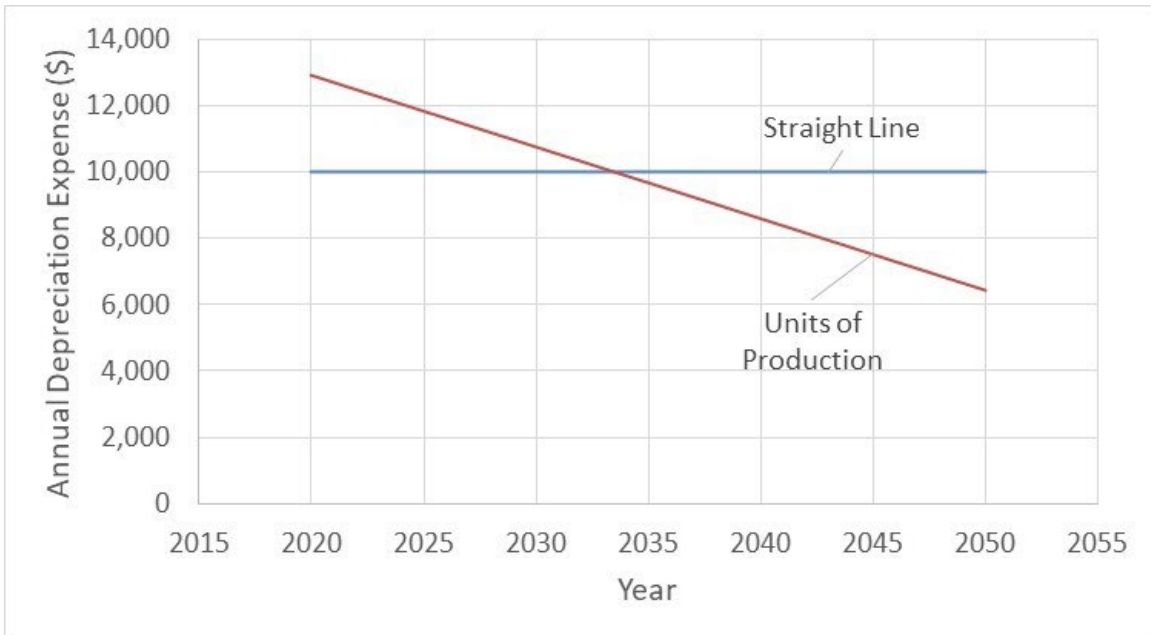
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Using the straight line method, the costs of the main would be allocated equally to each of the thirty years of service, meaning depreciation would be \$10,000 per year. For the UoP method, costs would be allocated in proportion to the consumption 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.

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



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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 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

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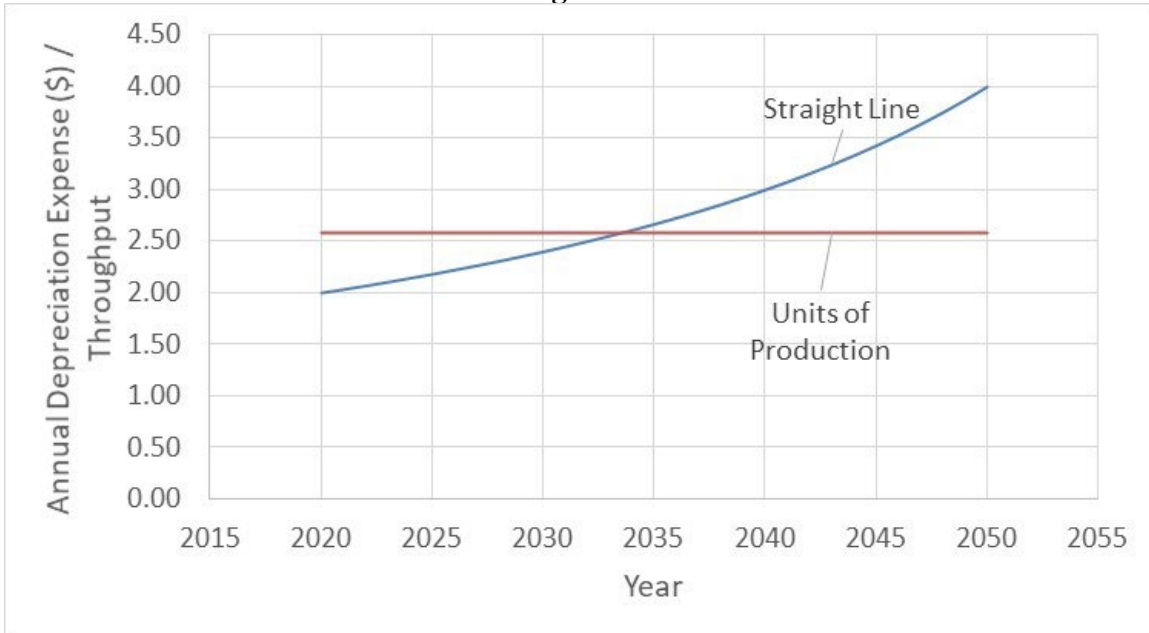
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⁴ Note that this is the case because consumption declines over the life of the asset. If the opposite were the case and consumption doubled over time, then the UoP method would result in lower accruals in the earlier years and higher accruals in the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

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

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



6
7 **Q. Would aligning depreciation with the current realities of decarbonization**
8 **provide a way to protect future customers?**

9 A. Yes. The UoP Method in particular provides a way to protect future customers
10 from exponentially increasing bills as customers leave the system. If the number
11 of customers declines significantly, straight-line depreciation (even with
12 shortened service lives) will result in an increasing cost per customer (since the
13 denominator, the number of customers, declines while the depreciation expense
14 remains constant). This poses many risks, both to utilities and remaining
15 customers, as the shrinking customer base will bear a disproportionate share of

1 costs and rates could even become unaffordable. Because the remaining
2 customers will be those least able to electrify (many of which are likely to be
3 disadvantaged customers), straight line depreciation will disproportionately harm
4 those least able to afford it.

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

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

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

18 These scenarios represent a significant shift in PSE's operations, affecting both
19 service lives and the utilization of its gas assets, and would have profound impacts
20 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.*

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

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

12 **Q. What has the Company proposed?**

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

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

21 A. No. Beyond the proposed 10-year shorter life scenario, estimates based on
22 historical experience and 5-year shorter lives were also analyzed. On a straight
23 line basis, I also performed a scenario where all costs were recovered by 2050. In
24 addition to these straight line approaches, alternate methods of recovering

1 depreciation costs were also considered based on the UoP method as well as an
 2 accelerated method referred to as Sum-of-the-Years-Digits.

3
 4 Table 1 below provides a summary of different scenarios considered and
 5 compares each to the depreciation expense that results from the Company’s
 6 current depreciation rates. The first scenario, labeled “Historical Experience,”
 7 shows the results of a study if depreciation is determined in a traditional way with
 8 service life estimates more consistent with the Company’s historical service life
 9 experience and using the straight line method, similar to the approach approved in
 10 PSE’s last study. The other scenarios in the table, which show the results of
 11 different approaches of incorporating Net Zero by 2050 impacts, include two
 12 scenarios with shorter service lives, labeled “5-Year Shorter Service Lives” and
 13 “10-Year Shorter Service Lives.” As the names imply, these scenarios
 14 incorporate varying degrees of shorter service lives for certain accounts.⁷ The
 15 “Recover by 2050” scenario shows the result of developing depreciation rates to
 16 recover all costs on a straight line basis by 2050. Next, I have shown Units of
 17 Production scenarios aligned with Scenarios discussed above. The UoP
 18 depreciation rates are very similar as a result and for brevity I have only shown
 19 two of these scenarios in the table below. Finally, the “SYD” column shows the
 20 results of using the accelerated method referred to as “Sum-of-the-Years-Digits.”
 21

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

FUNCTION	CURREN T DEPR.	HIST. EXP.	5-YEAR SHORTE R	10-YEAR SHORTE R	RECOVE R BY 2050	UoP - CCHP	UoP - HHP	SYD
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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

1 **Q. What do you recommend?**

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

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

18 A. Yes, but only the Sum-of-the-Years-Digits scenario. The shortening of service
19 life estimates in the Depreciation Study, and as shown above in Table 1, is not

1 accelerated depreciation. Accelerated depreciation describes methods of
2 depreciation in which depreciation is higher in the earlier years and lower in the
3 later years of an asset's life (when compared to the straight line method). The
4 straight line method and UoP Method are not considered accelerated depreciation
5 (although with declining production or consumption, the UoP Method is
6 technically accelerated when compared to the straight line method).

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

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

14 For this analysis, I used the expectation of a 59% decline in the size of the gas
15 system by 2050. This expectation aligns with the expected loss in customers from
16 the full electrification with air source heat pump scenario (from 882,960 in 2024
17 to 360,020 in 2050).⁸ To model the impacts, I have assumed that 59% of the
18 Company's assets will be retired when no longer providing service to (now fully
19 electrified) customers. Using a technique called Life Cycle Analysis, I can
20 combine the probabilities of retirement resulting from our survivor curve
21 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).

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

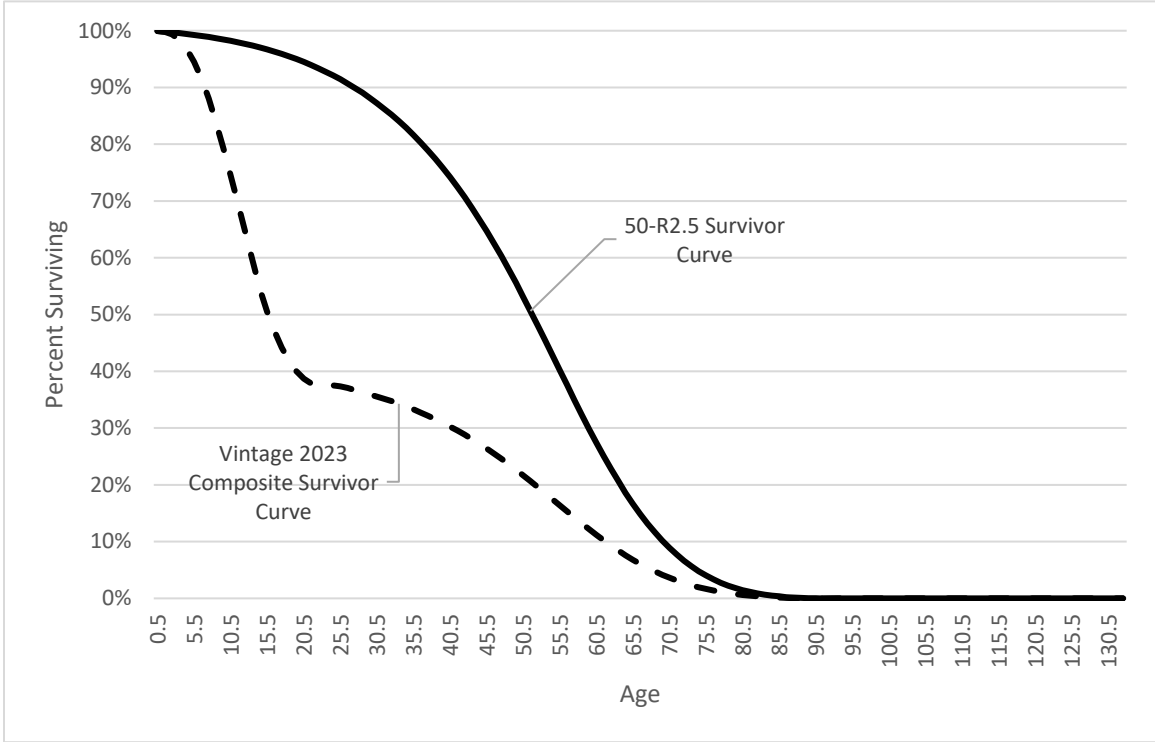
3 A. Consider, as an analogy, a scenario in which there is a 10% chance it will snow
4 today and a 10% chance it will rain. If these probabilities are mutually exclusive
5 (meaning that it will either rain, snow or do neither but will not snow and rain),
6 then we can combine them by multiplying the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

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

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

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



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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.

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

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

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

17 **Table 2: Comparison of Proposed Survivor Curves to Average Service Lives and**
 18 **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

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

7 **Q. What are the risks of using more of a “business as usual” approach such as**
8 **the “Historical Experience” scenario?**

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

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

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

14 For these reasons, the risks resulting from Net Zero by 2050 goals are most
15 appropriately dealt with by incorporating the potential for shorter asset lives into
16 depreciation rates today. The sooner the Commission incorporates these factors,
17 the lower the risk to future customers, the lower the potential for rate shock in the
18 future, and the lower total cost to customers over time. Deferring these decisions
19 will both increase the risk of dramatic impacts on future rates and will cost
20 customers, particularly low- and moderate-income customers, more in the long
21 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.

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

3 A. Yes. As the pathways to achieving Net Zero by 2050 further develop, the
4 Company will assess their impact on the depreciable lives of its gas assets. This
5 approach will allow the Company to adapt to future trends, regulations and
6 technological advances. The Company's proposal in this case is reasonable given
7 the current information and analyses available, but with additional information in
8 future studies there may be a need to modify the approach or recommended
9 depreciation rates.
10 Additionally, I expect Net Zero by 2050 to also impact electric assets by resulting
11 in a higher rate of replacements for capacity reasons (due to higher loads from
12 electrification of vehicles, heat and other uses) as well as reliability and resilience.
13 While the impacts may not be as dramatic as for the gas industry, these impacts
14 should be considered in future studies for electric assets.

15 **III. CONCLUSION**

16 **Q. Does that conclude your testimony?**

17 A. Yes, it does.