EXH. MAC-1CT
DOCKETS UE-22___/UG-22___
2022 PSE GENERAL RATE CASE
WITNESS: MARK A. CARLSON

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PUGET SOUND ENERGY,** **Respondent.**	**Docket UE-22____** **Docket UG-22____**

PREFILED DIRECT TESTIMONY (CONFIDENTIAL) OF

MARK A. CARLSON

ON BEHALF OF PUGET SOUND ENERGY

REDACTED VERSION

JANUARY 31, 2022

PUGET SOUND ENERGY

PREFILED DIRECT TESTIMONY (CONFIDENTIAL) OF MARK A. CARLSON

CONTENTS

PUGET SOUND ENERGY

PREFILED DIRECT TESTIMONY (CONFIDENTIAL) OF MARK A. CARLSON

LIST OF EXHIBITS

PUGET SOUND ENERGY

PREFILED DIRECT TESTIMONY (CONFIDENTIAL) OF MARK A. CARLSON

I. INTRODUCTION

Q. Please state your name, business address, and position with Puget Sound Energy.

A. My name is Mark A. Carlson. My business address is 355 110th Ave. NE, Bellevue, WA 98004. I am the Director Generation and Natural Gas Storage with Puget Sound Energy ("PSE" or "the Company").

Q. Have you prepared an exhibit describing your education, relevant employment experience, and other professional qualifications?

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

Q. Please summarize the purpose of this prefiled direct testimony.

A. My testimony describes production operation and maintenance ("O&M") expense presented by PSE for recovery in this proceeding. My testimony explains how PSE determined the production O&M expense and the purpose behind these expenses. I also address capital expenditures of major maintenance events that occurred in 2020 and 2021 and events expected in the 2022 through 2025 timeframe.

II. RATE YEAR PRODUCTION O&M EXPENSE

A. Overview

Q How has PSE prepared its rate year production O&M expense for this proceeding?

A. In the 2017[1] and 2019[2] general rate cases and in the 2020 power cost only rate case[3] ("PCORC"), PSE utilized test year production O&M expense with certain pro forma adjustments to develop the rate year production O&M. In this proceeding, PSE departed from previous methodology and instead used the forecasted O&M expense from the Company's five-year O&M budget as the basis for the rate year Production O&M included in this filing. PSE used this approach to facilitate its submission of a multiyear rate plan.

Q Please briefly describe the process used to develop the five-year production O&M budget used as a basis in this filing.

A. The annual process begins with all plant managers reviewing and updating their labor plan to reflect staffing levels anticipated in the rate years. Staffing usually remains constant from year to year. This proceeding's five-year budget includes no significant changes in staffing levels from the current staffing at the plants.

Next, the plant managers identify non-labor expenses anticipated in the rate years, which are 2023 through 2025 for this proceeding. Most of these expenses are

[1] *WUTC v. Puget Sound Energy*, Dockets UE-170033/UG-170034, Order 08 (Dec. 5, 2017).
[2] *WUTC v. Puget Sound Energy*, Dockets UE-190529, *et al*., Order 08 (July 8, 2020).
[3] *WUTC v. Puget Sound Energy*, Docket UE-200980.

fairly consistent from year to year (aside from inflation) and are based upon a historic level of generation. These items include water and chemicals consumed during generation operations, ongoing, programmatic equipment maintenance, and a base level of corrective maintenance.

To this, the plant managers add specific maintenance activities over and above the previous base work that they identify as necessary for the safe and reliable operation of the generation facilities. Such maintenance includes major maintenance events and other activities such as refurbishment of pumps, compressors, condensers, cooling towers, etc. The plant managers prioritize this work at the plant level, and then both plant management and directors review and prioritize the work at the fleet level. Lower priority work is deferred into future years.

Q Are there other inputs to the budget process?

A. Yes. A significant portion of the production O&M budget is based on contracts with third parties. O&M expense associated with Colstrip Units 3 and 4 is the largest of these contractual obligations. PSE also has agreements for the operation of the Frederickson 1 Generating Station, maintenance of the Goldendale and Mint Farm combustion turbines, maintenance of the wind turbines at PSE's wind facilities, and contractual payments for royalties and land rentals at these same wind facilities. These contractual obligations will be discussed later in this testimony.

Q Does the projected O&M in this filing incorporate pro forma adjustments that are like those included in prior rate filings?

A. Yes. In prior rate proceedings, PSE applied certain pro forma adjustments to the historic test year to reflect anticipated rate year O&M. These adjustments included: 1) rate year amortization of major maintenance events, 2) Fredrickson 1 rate year budgeted O&M, 3) budgeted hydro license expense, and 4) adjustments to rent, royalty, and maintenance fees to reflect wind generation assumptions. In this proceeding, the same adjustments have been incorporated into the five-year budget used as the basis for rate year O&M expense.

Q. Are there risks associated with PSE's transition from using test year O&M expense to forecasted O&M expense to determine the rate year O&M expense in this proceeding?

A. Yes. As stated above and outlined in the testimony of PSE witness Joshua A. Kensok, Exh. JAK-1T, O&M projections in the multiyear rate plan are derived from a historical cost basis with a combination of cost escalations applied to broad cost categories (3.5 percent for labor, 2 percent for outside services), discrete adjustments for known and measurable items that are not otherwise captured in the escalations (new facilities contracts, O&M associated with new capital projects, etc.), offset by quantifiable project benefits and assumed productivity. This forecasting methodology, while comprehensive, does not capture the inherent risk of externalities present in our current operating environment, principally the effect of COVID-19 on the supply chain and its

inflationary impact to the cost of goods and services core to PSE's business. The Commission may well observe that historically PSE has had periods of stable price growth, which were further mitigated by the reduction in costs in recent years due to the economic impacts to PSE's business of COVID-19. However, this historical trend of low cost growth should not be considered indicative of future costs given these external pressures.

Q. What is PSE's production O&M expense for the rate years in this proceeding?

A. The rate year production O&M costs are $130.4 million, $131.2 million, and $138.8 million, for the rate years 2023, 2024, and 2025, respectively. Please see Exh. MAC-3 for a summary of rate year production O&M expenses.

B. Thermal-Coal Resource Production O&M Expense

Q. What are the sources of production O&M expense for the Colstrip Steam Electric Station ("Colstrip")?

A. For its 2019 general rate case and the 2020 PCORC,[4] PSE elected to use test year O&M expense as the basis for developing rate year production O&M expense for Colstrip Units 3 and 4 rather than budget amounts because there was considerable uncertainty regarding the final operating budget at the time of filing those proceedings. As discussed in the testimony of Ronald J. Roberts, Exh. RJR-1CT,

[4] Docket UE-200980.

Colstrip's plant manager, Talen Montana ("Talen MT"), develops the proposed operating budgets for Colstrip for the next operating year and presents the budgets to the Project Committee[5] by September 1 of each year. The Project Committee then votes on approval of the proposed budget before November 1 of each calendar year. The owner's vote implements the budget for the following year. Each owner's share of the budget is based on its ownership share of the units. Upon request, Talen MT provides the owners a five-year operations and maintenance outlook and ten-year Asset Retirement Obligation and capital plan. In November 2021, Talen MT provided a 2022 through 2026 business plan for Colstrip Units 3 and 4. PSE has elected to use the 2022 -2026 business plan for Colstrip Units 3 and 4 provided by Talen MT to develop the Colstrip production O&M expense in this proceeding.

Q. What is PSE's role regarding the operating budgets for the Colstrip units?

A. PSE actively participates in the decision-making process related to the Colstrip operating budgets. Although PSE does not have a majority ownership share and thus cannot pass the budget unilaterally, PSE representatives review the budgets developed by Talen MT and provide input. Additionally, PSE and other owner representatives meet monthly with Talen MT to review plant operations. Projects may be added or removed throughout the year as appropriate.

[5] The Project Committee is the committee, established by the Colstrip Units 3 and 4 Ownership and Operations Agreement, that facilitates efficient management of Colstrip Units 3 and 4. It is comprised of representatives of each owner in the facility.

Q. What was the amount of non-overhaul related Colstrip production O&M expense included in the rate years for this proceeding?

A. PSE's share of non-overhaul related Colstrip production O&M expense included in the rate year is $21.2 million, $21.6 million, and $21.1 million for the rate years 2023, 2024, and 2025, respectively. For comparison, non-major production O&M expense for Colstrip Units 3 and 4 was $19.5 million in PSE's 2020 PCORC.

Amounts included for Colstrip O&M in this proceeding do not include any provision for management reserve. PSE has not included any non-overhaul production O&M expense for Colstrip Units 1 and 2 because those units were permanently retired on January 5, 2020. Please see Exh. MAC-4C for Colstrip Units 3 and 4 non-overhaul O&M expense pursuant to the Talen MT Five Year Plan.

Q. What overhaul costs are included in production O&M expense for Colstrip?

A. With respect to overhaul costs incurred for the Colstrip units through 2021, PSE has included production O&M expense in this proceeding in accordance with the methodology outlined in the Settlement Stipulation approved in PSE's 2014 PCORC.[6] This is consistent with prior rate proceedings. For this filing, PSE also seeks recovery of 36 months' amortization of the $4.0 million incurred for the overhaul of Colstrip Unit 4 in 2020 ($1.3 million in years 2023, 2024, and

[6] *WUTC v. Puget Sound Energy*, Docket UE-141141, Order 04, Appx. A (Nov. 3, 2014).

2025) which was previously deferred as authorized in PSE's 2019 GRC.[7] PSE also included 36 months' amortization of the $2.6 million incurred for the overhaul of Colstrip Unit 3 in 2021 ($658,000 in 2023 and 2024, and $329,000 in 2025).

In 2018 Talen MT adopted a four-year interval for unit overhauls. Accordingly, Unit 4 will be due for an overhaul in the spring of 2024, and Unit 3 will be due for an overhaul in the spring of 2025. PSE included $4.5 million in amortization expense ($1.5 million in 2024 and $3 million in 2025) for the overhaul of Unit 4 scheduled for the spring of 2024 and $4.6 million of amortization expense for the overhaul of Unit 3 in 2025. Please see Exh. MAC-5C for amortization of major maintenance associated with Colstrip Units 3 and 4.

It should be noted that at this time there is no agreement among the owners as to when Units 3 and 4 will discontinue operation. It is possible that PSE may be contractually required to fund its share of a full overhaul of Unit 4 in 2024 and Unit 3 in 2025. The accelerated amortization of the 2020, 2024, and 2025 events is necessary because the Clean Energy Transformation Act ("CETA") prohibits recovery of PSE's coal related production expense after December 31, 2025.[8] As discussed in Exh. RJR-1CT, PSE will make every effort to limit spending on

[7] *See WUTC v. Puget Sound Energy,* Dockets UE-190529/UG-190530, Order 08 at ¶ 256 (July 8, 2020).

[8] RCW 19.405.030.

Colstrip to the degree possible while honoring the terms of its contractual obligations.

C. Simple- and Combined-Cycle Combustion Turbine Generation Facilities Production O&M Expense

1. Non-Major Production O&M Expense for PSE's Simple- and Combined-Cycle Combustion Turbine Facilities

Q. What is the basis for the calculation of non-major production O&M expense for PSE's owned and jointly-owned generation stations?

A. As discussed previously, PSE used the O&M expense as forecasted in its five-year budget to represent a normal level of operating expense for PSE's owned and operated gas fired turbines. For PSE's jointly-owned gas fired turbine, the Frederickson 1 Generating Station, each annual budget and five-year plan is updated annually by the plant operator, Atlantic Power Operations Inc. The budget and plan are then approved by the Joint Ownership Committee, which is comprised of members from both PSE and Atlantic Power Operations Inc.

Q What is the amount of non-major maintenance production O&M expense related to simple and combined cycle combustion turbines included in this filing?

A. The non-major maintenance production O&M expense included in this proceeding is $47.2 million, $46.4 million, and $48.3 million for the rate years 2023, 2024, and 2025, respectively. Please see Exh. MAC-3 for a comparison of 2023 through 2025 rate year O&M to the 2020 PCORC rate year O&M.

2. Major Maintenance of PSE's Simple- and Combined-Cycle Combustion Turbine Facilities

Q. What is the basis for major maintenance events and expenditures included in this filing for PSE's simple- and combined-cycle combustion turbine facilities?

A. In general, if the cost of a major maintenance event performed at any of PSE's gas-fired generating facilities is $500,000 or greater, PSE defers and amortizes the costs incurred over the period until the next scheduled equivalent major maintenance event for that facility. The deferred amount will not be treated as a regulatory asset. If a major maintenance event does not meet the $500,000 threshold, PSE includes the cost of the major maintenance in production O&M expense as incurred. This is the same methodology PSE has used since its 2014 PCORC.

PSE has included amortization associated with events that have occurred to the extent that the associated amortization occurs within the rate years of this filing. PSE has also included in rate year production O&M expense amortization expense associated with events that are expected to occur through the end of rate year 2025. This is a change from prior practice where amortization associated with major maintenance events occurring only prior to the evidentiary hearing were included in production O&M. This change was made to accommodate the multiyear rate plan, pursuant to RCW 80.28.425 and is intended to divide costs that are subject to refund from those are not.

Q. What is the cost for major maintenance associated with PSE's owned and jointly-owned simple- and combined-cycle combustion turbine facilities included in this proceeding?

A. PSE's rate year major maintenance expense is $7.1 million, 6.2 million, and 5.3 million for the rate years 2023, 2024, and 2025, respectively, compared to $5.1 million in the 2020 PCORC. Please see Exh. MAC-5C for amortization of major maintenance associated with PSE's owned and jointly-owned simple- and combined-cycle combustion turbine facilities included in the rate years in this proceeding.

D. Capital Charges Associated with Simple- and Combined-Cycle Combustion Turbine Generation Facilities Major Maintenance

Q Please discuss the capital charges related to the Fredonia Units 3 and 4 Hot Gas Path inspections performed in 2020.

A. Hot Gas Path ("HGP") inspections were completed in November 2020 on Fredonia Units 3 and 4. An HGP inspection includes inspection or replacement of components in the combustion and power turbine sections. No scheduled major maintenance had been performed on Fredonia Units 3 and 4 since they were placed in service in 2001.

Capital charges incurred for these events totaled $7.4 million and $11.6 million for Units 3 and 4, respectively. These units were shipped off site and underwent shop repair and replacement of the turbine sections by the original equipment

manufacturer ("OEM"). Capital charges were less for the Unit 3 HGP inspection because one of the combustion turbines for Unit 3 had undergone partial unscheduled overhauls in 2017 and 2019 due to bearing failures. Thus, the scope of the HGP inspection for Unit 3 was reduced in 2020 (these units have two combustion turbines driving a common generator). Please see Exh. MAC-6 for a summary of the Fredonia Units 3 and 4 HGP capital charges

Q. Please discuss the HGP inspection performed at Goldendale in 2021 and the HGP inspection planned at Mint Farm in 2022.

A. As discussed in the direct testimony of Ronald J. Roberts, Exh. RJR-1CT, in Docket UE-170033, PSE extended contracts with General Electric International ("GE International") in 2015 to perform major maintenance on the combustion turbines at the Mint Farm and Goldendale Generating Stations through approximately 2037.[9] The scheduled major maintenance events to be performed by GE International are defined as HGP inspections and Major Inspections ("MI"), these inspections alternate after approximately every 32,000 hours of operation. This interval is contractual and is based on OEM recommended maintenance intervals.

The scope of an MI includes all the work performed during an HGP inspection, plus inspections of the compressor section, casings, frames/diffusers, rotor, bearings, auxiliaries, etc., as well as a generator major inspection. Scope and

[9] *See WUTC v. Puget Sound Energy,* Docket UE-170033/UG-170034, Exh. RJR-1CT at 66:21-64:4 (Jan. 13, 2017).

performance guarantees for each event are identified within each contract. The Goldendale HGP inspection was performed in October 2021. The Mint Farm HGP inspection is scheduled for the spring of 2022.

In return for these services, PSE pays GE International a fee based upon the number of hours each combustion turbine is run. This fee is paid quarterly for each contract. A portion of the fee, 21.6 percent, is allocated to current O&M expense; 27.5 percent is allocated to prepaid maintenance expense, and the balance, 50.9 percent, is allocated to prepaid capital. At the time of each major maintenance event, the amounts that have accumulated in the prepaid accounts since the last event are transferred to a deferred major maintenance expense account, in the case of the prepaid maintenance expense, and to a capital work order in the case of amounts accumulated in the prepaid capital accounts. Amounts transferred to the deferred major maintenance expense account is then amortized to major maintenance expense as discussed previously. The Goldendale Service Agreement is provided as Exh. MAC 7C; the Mint Farm Long Term Service Agreement is provided as Exh. MAC-8C, and a letter of agreement regarding both contracts is provided as Exh. MAC-9C.

Q. Are there other capital charges associated with the HGP events in addition to the allocation of the hourly fees discussed above?

A. Yes. The contracts discussed above include the purchase of upgraded components for each of the combustion turbines. At that time, PSE also purchased a third set of HGP components shared between Mint Farm and Goldendale, to serve as ready

spares in case of an equipment casualty and to facilitate continued operation of the units while parts removed during a major maintenance event were refurbished for later reuse. GE International offered the third set of parts at a substantial discount as an incentive to purchase the set in 2016 instead of 2020. Please see Amendment 1 to the Goldendale and Mint Farm contracts, Exh. MAC-7C and MAC-8C, respectively. Upon delivery, the third set of parts was placed into inventory and was installed in the Goldendale combustion turbine during the 2021 HGP inspection. The parts removed from the Goldendale combustion turbine will be refurbished by GE International and then returned to inventory. Those parts will then be installed into the Mint Farm combustion turbine during the 2022 HGP inspection. The value of the parts returned to inventory will be treated as salvage value and will be offset against the capital charges incurred during the HGP event.

Q. What were the capital charges associated with the Goldendale HGP inspection?

A. Capital expenditures incurred for the 2021 Goldendale HGP inspection was $22.5 million; as noted in Table 1 below.

Table 1

Table 1 -Goldendale HGP -Capex	Actual Charges
Accumulated Prepaid Fees -Capital Portion	REDACTED VERSION
Material & Material OH	REDACTED VERSION
Other Direct Charges –crane rental, scaffolding, etc,	$425,912
Subtotal	**$19,542,777**
Construction Overhead	$2,901,396
Allowance for Funds Used During Construction	$93,587
Total Capital Charges	**$22,537,759**
Salvage Credit for parts returned to inventory in 2023	REDACTED VERSION
Net Capital Charge 2021 HGP	**$12,947,187**

Q. What are the anticipated capital charges associated with the Mint Farm HGP inspection?

A. The 2022 Mint Farm HGP inspection is expected to cost $20.4 million. These costs will be partially offset by salvage value of the refurbished parts when they are returned to inventory: $[redacted] million in 2022 and [redacted] million in 2023. Please see Table 2 below for detail of Mint Farm HGP capital charges.

SHADED INFORMATION IS DESIGNATED AS CONFIDENTIAL PER WAC 480-07-160

REDACTED VERSION

Table 2

Table 2 -Mint Farm HGP -Capex	Budgeted Capex
Accumulated Prepaid Fees -Capital Portion	$ REDACTED VERSION
Material & Material OH	$ REDACTED VERSION
Other Direct Charges –crane rental, scaffolding, etc,	$592,573
Subtotal	**$16,678,209**
Construction Overhead	$3,754,797
Allowance for Funds Used During Construction	$0
Total Capital Charges	**$20,433,006**
Material Credit for parts returned to inventory in 2022	(REDACTED VERSION
Net Capex Charges in 2022	**$14,782,906**
Salvage Credit for parts returned to inventory in 2023	(REDACTED VERSION
Net Capital Charge 2022 HGP	**$10,602,539**

Q. Did the Goldendale HGP inspection come in under budget?

A. Yes. Actual charges for the 2021 Goldendale HGP were $22.5 million, which was $1.4 million under budget. Prepaid capital, materials, and other direct charges were $527,000 under budget. This variance was primarily due to an over estimation of the expected accumulated balance of prepaid capital at the time of the event. The balance of the underrun, $848,000, was due to actual construction overhead assessed to the construction work order being less than budget. The construction overhead rate assessed to capital work orders is adjusted from time to time to reflect differences in allocable overhead costs and the amount of

construction activity from assumptions used when setting the budgeted construction overhead rate.

Q Please comment on the capital charges included in the five year plan for Fredonia HGP inspections in 2024 and 2025.

A. PSE has included $6.7 million and $26.9 million in 2024 and 2025, respectively, for a HGP inspection of Fredonia unit 1 in 2024 and HGP inspections of Fredonia Units 2, 3 and 4 in 2025, ($6.7 million for Fredonia Unit 2 and $10.1 million each for Units 3 and 4). The OEM recommends that HGP inspections be performed every 800 starts in the case of the Fredonia Units 1 and 2 combustion turbines and every 25,000 service hours in the case of the Fredonia Units 3 and 4 combustion turbines. Based upon the condition of the units as observed during the major inspection of Unit 1 in 2019 (after nine years of operation) and the HGP inspections of Units 3 and 4 performed in 2020 (after nineteen years of operation), PSE has determined that it would be prudent to conduct maintenance inspections for these units every five years. This interval may be extended depending on actual operating hours and starts and evaluation of observed condition of the units via borescope inspections and vibration analysis.

Q. Are there other major maintenance events that would be performed in 2024 or 2025 if these events were deferred?

A. Yes. PSE is well experienced in the dynamic nature of its business and is prepared for the unexpected. PSE operates with limited flexibility, which allows it to

respond to necessary maintenance deferrals or to otherwise adjust to changing circumstances. Consistent with this general operating posture, the scheduling of major maintenance within the fleet is a fluid process, with several units anticipated to be due for major maintenance within the 2023 through 2025 time frame. PSE continually monitors performance parameters of the units, as well as trends in plant dispatch, and adjusts the timing of major maintenance events within the generating fleet. This is performed in coordination with other corporate functions to reflect changing operating conditions, financial management constraints, etc. However, PSE does not compromise on its commitment to maximize safety, reliability, and regulatory compliance while minimizing the risk of equipment casualties.

E. Hydro Resource Generation Production O&M Expense

Q. How has PSE prepared its forecast of hydroelectric production O&M expense for the rate years in this filing?

A. PSE used the O&M expense as forecasted in its five-year budget to represent a normal level of operating expense for PSE's hydroelectric facilities.

Q. What is PSE's forecast of hydro production O&M expense for the rate years in this filing?

A. The forecast for rate year hydro production O&M expense is $19.0 million, $19.1 million, and $19.7 million, for the rate years 2023, 2024, and 2025, respectively.

Please see Exh. MAC-3 for a comparison of hydro production O&M expense included in this proceeding to that included in the 2020 PCORC.

Q. Please describe the basis of rate year FERC license costs associated with the Baker Hydroelectric Project and the Snoqualmie Falls Hydroelectric Project included in production O&M expense.

A. O&M associated with FERC license costs included in rate years 2023, 2024, and 2025 reflect license O&M costs in the five year budget for those years. These amounts reflect the escalated costs of ongoing license activities and specific license costs as stipulated in the Baker and Snoqualmie License Agreements. These include, but are not limited to: multiple annual funding obligations to the United States Forest Service, the Upper Skagit, Sauk-Suiattle, and Swinomish Indian Tribes and the City of Concrete for various activities such as habitat enhancement and restoration, terrestrial studies, recreation programs and cultural enhancement programs. The funding obligations are specified in Table 2 of article 602 of the license agreement. Please see Exh. MAC-10, for detail of hydro license O&M expense included in this proceeding. Please see Exh. MAC-11 and Exh. MAC-12 for the terms of the Baker and Snoqualmie operating licenses, respectively.

F. Wind Resource Production O&M Expense

Q. What is PSE's forecast of wind generation production O&M expense for the rate years in this filing?

A. The forecast for rate year wind production O&M expense is $31.0 million, $31.3 million, and $32.1 million for the rate years 2023, 2024, and 2025, respectively. Please see Exh. MAC-3 for a comparison of wind production O&M expense included in this proceeding to wind production O&M expense included in the 2020 PCORC.

Q. In previous proceedings, PSE has made adjustments to test year O&M, rent, royalty and production based maintenance fees to reflect generation assumptions consistent with those included in the power cost calculation. Does the rate year O&M included in this filing reflect similar assumptions?

A. Yes. Rents, royalties and maintenance fees included in the five-year budget used as the basis for this filing incorporated generation assumptions provided in the long-term forecasts prepared by Vaisala Corporation ("Vaisala"). The Commission approved use of the Vaisala forecasts in PSE's 2019 general rate case, subject to a wind collaborative with Commission Staff. As a result of the collaborative process, PSE and Commission Staff agreed that the Vaisala long-term forecasts are the most reasonable representation of wind for use in estimating power costs. Please see the testimony of Paul K. Wetherbee, Exh. PKW-1CT, for discussion of this collaborative.

Q. Please explain the nature of PSE's wind rent and royalty expense.

A. Wind turbine production rents and royalties represent variable dollar per megawatt-hour fees paid under contract to project stakeholders and land owners upon which the wind turbines are sited. Rent and royalty expenses included in this filing amount to [REDACTED] million, [REDACTED] million, and [REDACTED] million for the rate years 2023, 2024, and 2025, respectively. These expenses are compared to royalty expenses of [REDACTED] million included in the 2020 PCORC.

Consistent with the treatment in PSE's 2019 general rate case and 2020 PCORC, PSE has pro formed the royalty costs based on the wind generation as included in projected power costs and contracted rates. Please see Exh. MAC-13C for a comparison of wind rents, royalties, and maintenance fees included in this proceeding to wind royalty and maintenance fees included in the 2020 PCORC.

Q. Do the wind turbine production royalty payments reflect contract increases?

A. Yes. In accordance with the terms of PSE's development and land lease agreements with project stakeholders, the annual royalty rate paid per megawatt-hour of energy production is subject to an annual adjustment for inflation.

Q. How is routine and corrective maintenance provided for the wind turbines?

A. PSE's wind turbines at the Hopkins Ridge, Wild Horse, and the Wild Horse Expansion Wind Projects are maintained by the manufacturer, Vestas, in accordance with the terms of the current service agreements. See Exh. MAC-14C

for the Vestas service agreement. Siemens Gamesa Renewable Energy ("Siemens") is responsible for all maintenance services at the Lower Snake River Phase I Wind Project. The Siemens contract materials are provided as Exh. MAC-15C.

III. CONCLUSION

Q. Does this conclude your prefiled direct testimony?

A. Yes, it does.