EXH. RJR-1CT
DOCKETS UE-22___/UG-22___
2022 PSE GENERAL RATE CASE
WITNESS: RONALD J. ROBERTS

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

RONALD J. ROBERTS

ON BEHALF OF PUGET SOUND ENERGY

REDACTED VERSION

JANUARY 31, 2022

PUGET SOUND ENERGY

PREFILED DIRECT TESTIMONY (CONFIDENTIAL) OF RONALD J. ROBERTS

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PUGET SOUND ENERGY

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I. INTRODUCTION

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

A. My name is Ronald J. Roberts. My business address is 355 110th Ave. NE, Bellevue, WA 98009-9734. I am the Vice President of Energy Supply of 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. RJR-2.

Q. What are your duties as Vice President of Energy Supply of PSE?

A. I am responsible for all electric generation facilities and natural gas storage facilities owned by PSE, as well as PSE's electric generation and transmission development, load serving operations and the energy supply merchant function. I also oversee Puget LNG, a subsidiary of Puget Energy.

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

A. The purpose of my testimony is to discuss three key topics related to PSE's Energy Supply function in sufficient detail to provide the Commission confidence in PSE's approach to planning for Energy Supply. In Section II, I discuss the methodical approach PSE applies to acquiring natural gas energy resources to meet our customers' needs. As I explain in Section II, PSE begins by completing a comprehensive evaluation of projected customer demands, changing economic and demographic features of its service territory, and existing resources that will materially contribute to meeting customer needs. This exercise involves sophisticated modeling and scenario analysis that PSE relies on so that adequate energy supplies will be available throughout each planning period, including during extraordinary peak demand events that could otherwise create significant hardships for customers.

In Section III, I discuss the background and need for the Tacoma Liquefied Natural Gas Project (the "Tacoma LNG Project"). I describe how PSE determined the need for a natural gas peaking resource, the alternatives considered, and how PSE assessed the economics benefits of completing the Tacoma LNG Project.

In Section IV, I discuss PSE's remaining contractual obligations related to the Colstrip Steam Electric Station ("Colstrip"). PSE's involvement in the Colstrip facility began in the early 1970s and the Company is in the process of winding down its investment to comply with Washington State policy objectives and the

Clean Energy Transformation Act ("CETA"). As I discuss in Section IV, PSE is making every effort to limit spending on Colstrip to the degree possible without violating the terms of our existing and long-standing contracts.

Q. Please summarize your testimony related to the Tacoma LNG Project.

A. My testimony concerning the Tacoma LNG Project provides:

1. Background on the need for the Tacoma LNG Project, including a description of the determination of need for a cost-effective natural gas peaking resource, the evaluation of alternative resources and a financial analysis of the selected cost-effective peaking resource.

2. An overview of the properties of liquefied natural gas ("LNG") and the production, storage and use of LNG.

3. An overview of the Tacoma LNG Project.

4. A description of the development and construction phases of the project, including key decision points and the involvement of PSE's management and the PSE Board of Directors in those decisions.

5. An explanation of all costs incurred during development and construction of the project, all costs related to operation of the Tacoma LNG Project, and the methodology for allocating costs between the regulated utility gas service and the non-regulated transportation fuel gas service, which was established in the Settlement Agreement agreed to by all parties in Docket UG-151663 and later adopted in Order 10 of the same docket.

Furthermore, Section III contains PSE's request that the Commission find the Tacoma LNG Project and all associated costs to develop, construct, and operate the project are prudent and recoverable.

Q. Please summarize your testimony related to Colstrip.

A. Section IV of my testimony describes PSE's partial ownership of Colstrip and operational issues related to the facility. This includes a discussion of the Colstrip Units 3 and 4 budgeting process, the selection and approval of Colstrip capital investments, and decommissioning and remediation for all four of the Colstrip generating units.

II. PSE'S APPROACH TO ENERGY SUPPLY PLANNING

Q. Please describe the considerations you and your team take to secure appropriate and cost-effective Energy Supply.

A. PSE plans resource and capital investments for Energy Supply well in advance of anticipated needs. The Energy Supply planning function projects future demand for natural gas and electricity based on evaluations of economic, market, and demographic trends. The forecasts our planning experts develop inform the design of procurement processes that are used to secure resources or pursue construction projects that will enable PSE to provide the most cost-effective energy resources. Under certain circumstances PSE may pursue ownership interests in electricity generation or gas delivery infrastructure, or contract for those resources, in order to provide reliable and cost-effective energy service.

First, PSE assesses the need for resources based on two elements: a forecast of customer demand and a forecast of resources available to meet that demand. PSE

plans to meet the needs of its firm and interruptible natural gas customers, but not transport customers, who acquire their own gas supply and rely only on PSE to deliver it. The Company then compares the existing natural gas resources to the peak and energy demand forecasts, to determine if additional natural gas resources are needed. Reliability is very important for gas utilities because if resources are not adequate to meet customer demand under very cold weather conditions, firm load must be curtailed. Unlike an electric utility, when firm natural gas load is curtailed, it may take a long time to restore service. PSE's gas planning standards are explained more fully at pages 9-14 through 9-16 in the 2021 IRP.[1]

Second, PSE examines resource alternatives reasonably expected to be available to meet its future forecasted needs. In the IRP, this includes a comprehensive assessment of energy efficiency measures that are reflected in the conservation potential assessment. Along with energy efficiency assessments, PSE develops assumptions for the cost of future supply-side resources, including the natural gas commodity, pipeline contracts to move the gas to the PSE distribution system and storage alternatives.

Third, the resource needs and resource alternatives are analyzed to determine the lowest reasonable cost set of resources to meet the needs. PSE uses the Sendout model, as described more in the 2021 IRP, Appendix I: Natural Gas Analysis

[1] PSE's 2021 IRP is available here https://pse-irp.participate.online/2021-irp/reports

Results. Results of this analysis are used to support long-term contracting or resource development decisions.

Q. What circumstances could justify the need to invest in new natural gas delivery infrastructure such as an LNG facility?

A. When peak natural gas demand is forecasted to exceed supply, PSE must be prepared to take actions required to continue providing reliable service. The expectation of a sustained level of demand for natural gas that cannot be met with existing gas resources would require PSE to evaluate all reasonable opportunities to secure natural gas to meet customer needs. When cost effective conservation is insufficient to meet future demand, the Company must either secure the rights to additional pipeline capacity or acquire an on-system peaking resource such as the Tacoma LNG Facility.

Q. What goes into PSE's evaluations during this type of procurement activity?

A. The Energy Supply organization is guided by the Commission's prudence standards. PSE assesses the resource need and alternatives, then performs analysis and evaluations that allow its board of directors to make fully informed, reasonable decisions. Last, PSE retains documents and information that demonstrate the resources selected are lowest reasonable cost.

Q. What is the ultimate objective of the approach PSE uses to secure Energy Supply resources?

A. The Company is focused on pursuing the best interests of customers and executing Energy Supply procurements that meet or exceed the standard of prudent utility conduct. PSE's intent is that decisions related to the procurement of natural gas and electric Energy Supply resources be made in a methodical manner, informed by the best information that is available to the Company at that time and consistent with the Commission's prudence standards. PSE is deliberate and thoroughly evaluates all alternatives so that its investment course is objectively sound, based on the facts and context within which decisions are made.

Q. What is PSE's understanding of the Commission's prudence standard?

A. In PSE's 2003 Power Cost Only Rate Case proceeding, Docket UE-031725, the Commission reaffirmed the standard it applies in a prudence review.

> The test the Commission applies to measure prudence is what a reasonable board of directors and company management would have decided given what they knew or reasonably should have known to be true at the time they made a decision. This test applies both to the question of need and the appropriateness of the expenditures. The company must establish that it adequately studied the question of whether to purchase these resources and made a reasonable decision, using the data and methods that a reasonable management would have used at the time the decisions were made.[2]

[2] *WUTC v. Puget Sound Energy*, Docket UE-031725, Order 12 at ¶ 19 (Apr. 7, 2004).

In addition to this reasonableness standard, the Commission has cited several specific factors that inform the question of whether a utility's decision to construct or acquire a new resource was prudent. These factors include:

- First, the utility must determine whether new resources are necessary;[3]
- Once a need has been identified, the utility must determine how to fill that need in a cost-effective manner. When a utility is considering the purchase of a resource, it must evaluate that resource against the standards of what other purchases are available, and against the standard of what it would cost to build the resource itself;[4]
- The utility must analyze the resource alternatives using current information that adjusts for such factors as end effects, capital costs, impact on the utility's credit quality, dispatchability, transmission costs, and whatever other factors need specific analysis at the time of a purchase decision;[5]
- The utility should inform its board of directors and/or management about the purchase decision and its costs. The utility should also involve the board of directors and/or management in the decision process;[6] and
- The utility must keep adequate contemporaneous records that will allow the Commission to evaluate its actions with respect to the decision process. The Commission should be able to follow the utility's decision process; understand the elements that the utility used; and determine the manner in which the utility valued these elements.[7]

As the Commission has recently affirmed, the prudence analysis is not based on hindsight but is determined at the point in time when a company made its decision. Once that point in time is identified, "the Commission can consider whether the Company's decision was prudent *at the time* it was made, in light of

[3] *See e.g.*, *WUTC v. Puget Sound Power & Light Co.*, Docket UE-921262, *et al.*, Nineteenth Supplemental Order at 11 (Sept. 27, 1994).
[4] *Id.* at 11.
[5] *Id.* at 2, 33-37, 46-47.
[6] *Id.* at 37, 46.
[7] *Id.* at 2, 37, 46.

what the Company knew or reasonably should have known."[8]

Q. Has PSE adhered to the Commission's prudence standards in development of the Tacoma LNG Project?

A. Yes. As I discuss at length in Section III of my testimony, PSE's management of the Tacoma LNG Project has adhered closely to the Commission's standards. Over the course of developing and constructing the Tacoma LNG Project, PSE managers examined and reexamined the best information that was known at the time concerning its future need for natural gas and the cost of alternatives to meet that need. PSE was therefore able to make an informed investment in the Tacoma LNG Facility to meet customer natural gas demands long into the future.

Q. Has PSE adhered to the Commission's standards in the decisions it has made in the context of the Colstrip facility?

A. Yes. I discuss the history of PSE's involvement with the Colstrip facility at length in Section IV of my testimony. I also address PSE's plans to wind down its involvement in Colstrip to comply with Washington State policies and the best interests of customers.

[8] *WUTC v. Avista,* Dockets UE-200900 *et. al,* Order 08/05, ¶ 267 (Sept. 27, 2021).

III. PSE'S DECISION TO DEVELOP AND CONSTRUCT THE TACOMA LNG PROJECT WAS PRUDENT

Q. Please briefly describe the Tacoma LNG Project.

A. The Tacoma LNG Project is a dual-use project located at the Port of Tacoma, adjacent to the Hylebos waterway. The project is capable of liquefying approximately 250,000 gallons of LNG per day and storing 8 million gallons of LNG on site. The Tacoma LNG Facility is capable of injecting 66,000 Dth/day of vaporized gas and diverting 19,000 Dth/day of gas into PSE's distribution system to provide 85,000 Dth/day of peak-day supply for customers. That is enough gas to serve the design peak day gas requirements of approximately 85,000 homes.

As a dual-use project, the Tacoma LNG Project will also be used to dispense LNG to other end-use customers primarily as transportation fuel by the maritime and trucking industries. For example, PSE identified TOTE Maritime ("TOTE") as a potential customer in light of its round-trip Tacoma-to-Anchorage container ship sailings. As further described in this testimony and in Exh. RJR-3, TOTE ultimately became an anchor customer.[9] By serving dual uses that will share the costs to develop, construct and operate the project, the Tacoma LNG Project is a cost-effective way to help meet the peak-day resource needs of PSE's gas utility customers.

[9] Also further discussed herein and in Exh. RJR-3, Puget LNG, a non-regulated subsidiary of PSE's parent, Puget Energy, Inc., is undertaking all non-regulated activities at the Tacoma LNG Facility, including non-regulated sales of LNG to TOTE.

Q. What does PSE mean when it uses the phrase "Tacoma LNG Facility"?

A. PSE uses the term "Tacoma LNG Facility" to refer to the following:

- buildings, gas processing, storage and support equipment, and foundations located on PSE's leased site at the Port of Tacoma;
- underground LNG fuel line connecting the LNG tank to TOTE's berthing area, marine fueling system and in-water platform at TOTE's site;
- LNG tanker truck loading racks;
- the lease from the Northwest Seaport Alliance; and
- the ground lease from the Port of Tacoma.

Q. What does PSE mean when it uses the phrase "Tacoma LNG Project"?

A. PSE uses the term "Tacoma LNG Project" to refer to the following:

- the development, construction and operation of the Tacoma LNG Facility;
- improvements to PSE's gas distribution system needed to support the Tacoma LNG Facility;
- regulatory approval to operate the Tacoma LNG Facility to provide peaking capability for PSE's regulated core gas utility customers; and
- commercial contracts to sell LNG to non-utility customers for use as fuel as a non-regulated service.

Q. What determination is PSE seeking for the Tacoma LNG Project in this proceeding?

A. PSE seeks a determination by the Commission that PSE's decision to build the Tacoma LNG Project to serve as a natural gas peaking resource for PSE's customers, as set forth in detail in my testimony and exhibits, was prudent, and

that all costs associated with the regulated portion of the project are prudent and should be included in rates.

A. Overview of LNG

1. Description and use of LNG

Q. What is LNG?

A. LNG is liquefied natural gas. The liquefaction process first requires pre-treatment of the natural gas stream to remove impurities such as water, carbon dioxide and excessive heavy hydrocarbons. By removing these impurities, solids will not be formed as the natural gas is refrigerated. The pretreated natural gas becomes liquefied at a temperature of approximately –260 degrees Farenheit (–160 degrees Celsius) and it is then ready for storage and shipping. LNG is sometimes also referred to as liquid methane.

Q. What are the properties of LNG?

A. LNG is colorless, odorless, non-toxic, non-flammable, non-explosive, and non-corrosive. At atmospheric pressure LNG boils and gives off natural gas vapor (methane), which may be flammable at certain concentrations in air. The LNG itself, however, will not ignite or explode. The density of LNG is about 3.9 pounds per gallon, compared to the density of water, which is about 8.3 pounds per gallon. Thus, because it is lighter than water, if LNG is spilled on water, it floats on top of the water and vaporizes rapidly.

Q. If LNG is non-flammable how is it used for fuel?

A. LNG in its liquid state will not burn. To use LNG as a fuel, it must first be warmed and returned to its vapor (gaseous) state just like the natural gas used for furnaces, water heaters, and stoves in homes and businesses. In its gaseous form, LNG can be mixed with air and ignited in the pistons of an engine, just like diesel or gasoline.

Q. What are the benefits of LNG as compared to natural gas vapor?

A. The chief advantage of LNG is that it allows for the storage and transportation of large volumes of natural gas when a pipeline is not available. LNG takes up only 1/600th of the volume required for a comparable amount of natural gas at room temperature and normal atmospheric pressure. It would not be practical to store natural gas in its vapor form for later use during winter peaks (known as "peak shaving") or as fuel for a ship, locomotive, or other use such as long-haul trucking, unless a large underground storage facility, such as Jackson Prairie, was available. Condensing the natural gas to liquid form allows it to be stored in a much smaller space.

Q. What is the difference between LNG and CNG?

A. As described above, LNG is treated natural gas that has been cooled to a liquid state with a corresponding 1/600th reduction in volume. Compressed natural gas ("CNG") is natural gas that remains in gaseous form but is stored at high pressure

resulting in a reduction in volume of approximately 1/100th as compared to non-compressed natural gas. CNG is commonly used as a fuel for buses, garbage trucks, and small cars and trucks that travel short distances and are considered "return to base" vehicles that are refilled at the end of each day. In contrast, LNG is better suited for high-horsepower applications such as ships, locomotives, or long-haul trucks that have greater fuel requirements and typically travel much greater distances. The additional size reduction of LNG allows these vehicles to carry natural gas without allocating huge amounts of space for fuel storage.

Q. What experience does PSE have that lends itself to the operation of an LNG facility?

A. PSE has significant experience with natural gas and natural gas storage. PSE has operated an LNG peak shaving facility in Gig Harbor for two decades. PSE uses the Gig Harbor facility to: store up to 140,000 gallons of LNG, which it purchases from other utilities; vaporize the LNG back to a gaseous state; and inject the natural gas into the local distribution system to augment the pressure on cold days. In recent years the Gig Harbor facility has been used over 30 times per winter.

PSE also operates and co-owns the Jackson Prairie gas storage facility in Lewis County, which is the largest natural gas storage facility in the Pacific Northwest and provides 25 percent of the region's peak day gas demand. PSE also operates a fleet of natural gas-fired power plants, which are similar to the LNG plant in

terms of requiring operations and maintenance planning, employee training, and safety programs.

2. LNG Facilities

Q. How common are LNG facilities?

A. There are over 100 LNG facilities in the United States. In addition to PSE's facility in Gig Harbor, there are five nearby facilities in the Pacific Northwest. Williams Northwest Pipeline owns a facility in Plymouth, Washington. Fortis BC Energy owns two facilities in British Columbia—one in Vancouver and one on Vancouver Island. Northwest Natural Gas owns two facilities in Oregon—one in Portland and one in Newport.

Q. How does the Tacoma LNG Facility compare to LNG export terminals?

A. LNG export facilities are much larger (100 to 200 times larger) than the Tacoma LNG Facility. Export terminals are referred to as "world-scale" plants, whereas the Tacoma LNG Project would be considered a small-scale facility. World-scale plants sit on much larger footprints and often generate their own electricity with on-site or nearby power plants solely dedicated to the plant. In contrast, the Tacoma LNG Facility will take electricity from Tacoma Power (the local utility) via existing transmission lines in the adjacent street.

Q. Describe how LNG will be made at the Tacoma LNG Facility.

A. Natural gas will enter the Tacoma LNG Facility from PSE's distribution system and will be further pressurized and then filtered to remove impurities. The natural gas stream will be cooled in a refrigeration system until it condenses into a liquid. It will then be stored on site in an insulated tank at essentially atmospheric pressure.

Q. What are the main components of the Tacoma LNG Facility?

A. The largest feature of the Tacoma LNG Facility is an eight million gallon, full containment concrete tank. This tank consists of an interior nickel steel tank, surrounded by a concrete outer tank, with insulation between the two vessels. Most of the rest of the Tacoma LNG Facility is called the liquefaction train, which consists of a large refrigeration system and associated piping, fans, and compressors to treat and cool the gas stream. The Tacoma LNG Facility also contains smaller ancillary equipment such as a control building, electrical substation, and equipment to return the LNG to the natural gas distribution system.

Q. How is the LNG returned to the PSE distribution system?

A. LNG is pumped from the storage tank and run through a heat exchanger in a hot water bath (the "vaporizer"). This warms the LNG from -260 degrees to +60 degrees Farenheit where it becomes a vapor that is then odorized and sent back

into the PSE distribution system via the same pipe used to provide gas for the liquefaction process. The Tacoma LNG Facility will not make LNG on days that it is returning gas to the PSE distribution system.

B. Overview of the Tacoma LNG Project

Q. Please describe why PSE developed the Tacoma LNG Project.

A PSE developed the Tacoma LNG Project to achieve the following objectives:

1. To provide PSE's gas system with a cost-effective resource to meet peak-day loads.

2. To provide LNG as a transportation fuel to large maritime and trucking customers as well as industrial users in the region, through its affiliate Puget LNG.

Q. Please describe how PSE will use the Tacoma LNG Project to provide additional peaking capability for PSE's core gas customers.

A. LNG plants have a long history as a natural gas resource used by utilities to manage peak-day loads. Natural gas is liquefied over the summer months and stored in large cryogenic tanks. During peak winter days, the liquefied gas is vaporized and injected into the distribution system. The Tacoma LNG Project will allow PSE to avoid purchasing 365-day pipeline capacity to meet a peak demand for a few days that may only occur once every few winters. PSE compared the cost of the peak-day resource provided by the Tacoma LNG Project to other available peak-day resource alternatives and determined that the Tacoma LNG

Project was among the most cost-effective resource option under a wide range of scenarios.[10]

Q. Please describe the use of the Tacoma LNG Project to provide LNG as a transportation fuel to large maritime and trucking customers as well as industrial users in the region.

A. The Tacoma LNG Project will also help meet the demand for LNG as a fuel by regional maritime, heavy duty trucking and industrial customers. The development of an LNG facility to provide fuels for the transportation market is consistent with the regional and state efforts of the Puget Sound Clean Air Agency and the Washington Department of Ecology to establish strategies and programs aimed at reducing impacts to the Puget Sound air shed. In order to meet the demands of the maritime market and advance the United States' implementation of international treaty obligations to reduce emissions from vessel traffic, the Tacoma LNG Facility is located on the water at the Port of Tacoma and is capable of filling TOTE ships and other vessels or bunker barges with LNG for use as a fuel. The Tacoma LNG Facility is also capable of filling LNG tanker trucks that will supply regional truck fleets and industrial customers.

[10] The analyses supporting these comparisons is in the 2015 IRP, a 2016 re-analysis, the 2017 IRP, a February 2018 re-evaluation, and the 2019 IRP, all of which are discussed later in this testimony and in a narrative timeline included as the Second Exhibit to my Prefiled Direct Testimony, Exh. RJR-3.

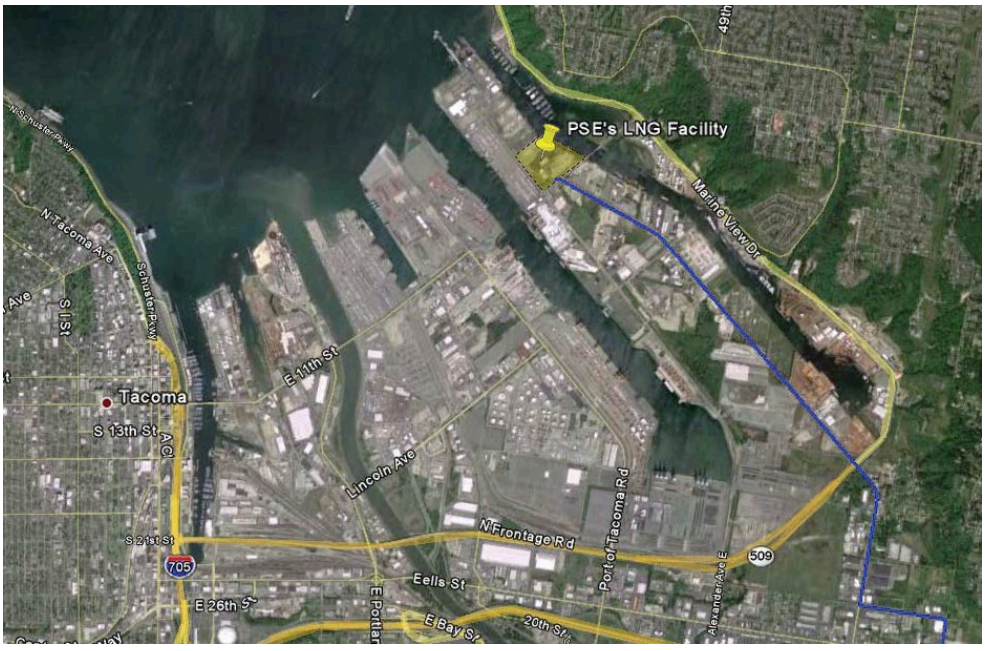
1. Siting of the Tacoma LNG Facility

Q. Where is the Tacoma LNG Facility located?

A. After exploring multiple locations, PSE selected a 33-acre parcel at the Port of Tacoma as the most suitable site for the Tacoma LNG Facility. The site is located on the Hylebos waterway, on the corner of East 11th Street and East Alexander Avenue. The site was connected to PSE's North Tacoma high pressure system with approximately four miles of new 16-inch pipe, to allow the Tacoma LNG Facility to inject gas directly into PSE's distribution system. Please see the Prefiled Direct Testimony of Roque Bamba, Exh. RBB-1T, for a discussion of the approximately four miles of new 16-inch pipe.

Please see Figure 1, below, for the location of the Tacoma LNG Facility.

Figure 1: Tacoma LNG Facility Location
(new high-pressure pipeline shown in blue)



Q. Why does the Tacoma LNG Facility require a 33-acre parcel?

A. The size of the parcel necessary for the Tacoma LNG Facility is, in part, dictated by regulations. All LNG plants are subject to the U. S. Code of Federal Regulations (CFR) Title 49, Part 193, *Liquefied Natural Gas Facilities: Federal Safety Standards*. These regulations are administered and enforced by the U.S. Department of Transportation through the Pipeline and Hazardous Materials Administration ("PHMSA") and/or by delegation of regulatory authority to state agencies that have investigative authority concerning PHMSA regulations. In Washington, PHMSA has delegated its investigative authority under 49 CFR Part 193 to the Washington Utilities and Transportation Commission Office of Pipeline Safety.

The regulations detailed in 49 CFR Part 193 use national engineering standards and fire codes to guide the siting restrictions for LNG facilities. The regulations in 49 CFR Part 193 (augmented by National Fire Protection Association ("NFPA") Standard 59A) define two exclusion zones related to an LNG facility, a thermal radiation exclusion zone and a vapor dispersion exclusion zone. A thermal radiation exclusion zone is defined by the resulting heat from a fire from the largest containment of LNG onsite, which at the Tacoma LNG Facility is the full containment tank. Therefore, the Tacoma LNG Facility thermal radiation zone is based on the tank size and defined by the surface area and height of its roof. A vapor dispersion exclusion zone is defined by the results of a computer model that simulates a release of LNG or refrigerant from plant piping and its size is

determined largely by the maximum flow rate and pressure of any pipe in the plant.

The exclusion zones associated with the Tacoma LNG Facility were driven by the need for a tank that is large enough to support PSE's peak shaving needs and the storage required by PSE's customers (approximately eight million gallons), and plant piping and liquefaction equipment. PSE projected that the minimum site acreage to accommodate these exclusion zones is 30 acres, even though the actual footprint of the Tacoma LNG Facility equipment is substantially smaller.

Q. Why did PSE select the Port of Tacoma as the site for the Tacoma LNG Facility?

A. PSE selected the Port of Tacoma as the site for the Tacoma LNG Facility for several reasons. First, the site at the Port of Tacoma is one of a few parcels in areas zoned for industrial use that is both large enough to satisfy the regulations at 49 CFR Part 193 and capable of supporting PSE's resource needs.

Second, PSE selected the Port of Tacoma because it is ideally situated for serving TOTE's marine fueling needs and capturing the value of shared-use to meet PSE's peaking needs and TOTE's fueling needs. The Tacoma LNG Facility site is located across Alexander Avenue from the TOTE terminal and allows PSE to meet TOTE's needs directly and at an inherent cost advantage over a network of LNG barges and bunker stations. The Tacoma LNG Facility will also be able to serve other marine customers from this location.

Third, the Port of Tacoma is at a location on the PSE gas distribution system that is large enough to absorb the vaporized supply and free up gas already on the pipeline to go elsewhere. This will facilitate use of the Tacoma LNG Facility to meet PSE's peaking needs. Last, the Port of Tacoma is also centrally located to serve regional trucking demand concentrated in the Tacoma, Federal Way and Kent areas.

2. Lease with the Port of Tacoma for the Tacoma LNG Facility

Q. Please describe PSE's lease with the Port of Tacoma for the Tacoma LNG Facility.

A. PSE has negotiated lease terms with the Port of Tacoma for the selected site. PSE is leasing approximately 30.15 acres of uplands and approximately three acres of submerged lands, together with all improvements located thereon, for the purpose of LNG production, storage, and distribution.

The lease has an effective operating term of 25 years from the date of first commercial operations. The lease also provides for a two-year due diligence and permitting phase, and a three-year construction phase. With timely notice, the lease provides for a 25-year renewal, provided at least 45% of the capacity involves marine uses (either fueling or transported by marine vessel); otherwise, the renewal is at the Port of Tacoma's discretion. A copy of the lease between the Port of Tacoma and PSE is included as the Third Exhibit to my Prefiled Direct testimony, Exh. RJR-4.

3. Infrastructure Associated with the Tacoma LNG Facility

Q. Please describe the infrastructure associated with the Tacoma LNG Facility.

A. The infrastructure associated with the Tacoma LNG Facility includes the equipment and foundations located at the Port of Tacoma, and at a high level, includes the following components:

- site improvement and foundations;
- buildings and structures;
- receiving equipment;
- pretreatment system;
- liquefaction train and compressors;
- LNG tank;
- vaporization train;
- truck loading system;
- underground pipeline to TOTE's vessels;
- marine fueling, or bunkering system;
- in-water works;
- balance-of-plant equipment; and
- electric substation.

Q. Please describe the necessary site improvement and foundations associated with the Tacoma LNG Facility.

A. The Tacoma LNG Facility required significant soil improvement work to meet federal seismic guidelines for an LNG plant. Soil improvement techniques are

injected grout piles, which will mitigate settling and liquefaction risks associated with a large seismic event. In addition, the storage tank was built upon a foundation with seismic isolators.

Q. Please describe the necessary buildings and structures associated with the Tacoma LNG Facility.

A. The Tacoma LNG Facility repurposed an existing building to house the control room, office space, maintenance area, and weather-sensitive equipment. Other structures include a compressor building, power distribution center building, and an existing warehouse.

Q. Please describe the necessary receiving equipment associated with the Tacoma LNG Facility.

A. Receiving equipment includes inlet gas compression, particulate filtration, and metering.

Q. Please describe the necessary pretreatment system associated with the Tacoma LNG Facility.

A. The pretreatment system removes carbon dioxide and any entrained water in the gas stream that has not been previously removed. The gas that is sent to the liquefaction train is primarily methane, ethane, and propane with a small amount of nitrogen and other hydrocarbons.

Q. Please describe the necessary liquefaction train and compressors associated with the Tacoma LNG Facility.

A. The pretreated gas is cooled to –260 degrees Fahrenheit, using a heat exchanger to transfer heat from the gas to a refrigerant loop. The refrigerant loop is made up of other hydrocarbons and requires a large compressor, which consumes the majority of the electric load at the Tacoma LNG Facility (approximately 14 MW). The system used at the Tacoma LNG Facility is a single mixed-refrigerant system.

Q. Please describe the necessary LNG tank associated with the Tacoma LNG Facility.

A. LNG will be stored on-site in a full-containment, field-erected tank, which consists of an inner nickel-steel tank and an outer concrete tank that share a common roof. In the event of a failure of the inner tank, the LNG will be contained in the outer tank. LNG is removed from the tank via submersed pumps that pump LNG out through the roof. There are no wall penetrations in either tank. The tank is designed to withstand a 2,500-year earthquake, which greatly exceeds the earthquake design used for roads, bridges, and most other commercial structures. LNG in full-containment tanks is stored at slightly above atmospheric pressure. The fact that the tanks are not kept under pressure is a key safety feature of LNG plants.

Q. Please describe the necessary vaporization train associated with the Tacoma LNG Facility.

A. The vaporization train includes the facilities that PSE will use on peak days to convert LNG in the storage tank to a gas vapor and inject it into the distribution system to serve PSE's retail gas customers.

Q. Please describe the necessary truck loading system associated with the Tacoma LNG Facility.

A. The Tacoma LNG Facility has two truck loading racks capable of filling tanker trucks simultaneously. Tanker trucks will be used to support the operation of PSE's gas system by moving LNG to PSE's satellite LNG facility in Gig Harbor, Washington, or by use of mobile LNG vaporization and injection units. Tanker trucks may also supply LNG to non-regulated LNG fuel customers like large interstate trucking fleets or small volume marine users like coastal tug or barge operators.

Q. Please describe the necessary underground pipeline to TOTE's vessel.

A. The Tacoma LNG Facility includes a cryogenic pipeline that connects the onsite storage tank to a fueling station located at TOTE's berthing location. This line is installed in a dedicated underground tunnel, and crosses beneath a public road, a rail line, and TOTE's property.

Q. Please describe the necessary marine fueling system associated with the Tacoma LNG Facility.

A. The marine fueling system is located near the stern end of TOTE's berthing location. The system includes a loading arm for fueling TOTE's vessels, and associated equipment necessary for safety and security of the fueling operation.

Q. Please describe the necessary in-water work associated with the Tacoma LNG Facility.

A. In order to support TOTE's bunkering operations, PSE constructed a small platform near the stern end of TOTE's berthing location. The platform supports parts of the marine fueling system and is large enough to meet federal standards for personnel operations and emergency access.

Q. Please describe the necessary balance-of-plant equipment associated with the Tacoma LNG Facility.

A. The balance-of-plant equipment includes an onsite backup generator for essential loads, a gas flare, instrument air system, water treatment unit, power distribution systems, safety and security equipment, and an integrated plant control system.

Q. Please describe the necessary electric substation associated with the Tacoma LNG Facility.

A. Tacoma Power constructed an electric substation at the Tacoma LNG Facility that connects to its 115 kV transmission system. PSE owns the substation. PSE is procuring electricity for the Tacoma LNG Facility at Mid-C based market prices and wheeling the electricity through Tacoma Power's 115 kV transmission system. The main energy consumer at the Tacoma LNG Facility is the liquefaction compressor, which draws approximately 14 MWs of electricity.

Q. Please describe the natural gas infrastructure needed to support the Tacoma LNG Facility.

A. PSE will use Northwest Pipeline's interstate system to deliver natural gas to PSE's distribution system, which will in turn deliver the gas to the Tacoma LNG Facility. The PSE distribution system will also deliver revaporized gas from the Tacoma LNG Facility to PSE gas customers.

Improvements to PSE's distribution system were required to support the delivery of natural gas both to and from the Tacoma LNG Facility, including a pressure increase on an existing section of pipe, constructing a new limit station, modifying an existing gate station, and adding approximately five miles of new higher-pressure pipe. The increase in operating pressure on the existing pipeline (from 250 pounds per square inch gage (psig) to 500 psig) was a planned system upgrade to be implemented in 2017. The upgrade process began in 2014 with a

Pressure Authorization Request to the Commission. See Bamba, Exh. RBB-1T, for a discussion of the natural gas distribution upgrades associated with the Tacoma LNG Project.

4. Security and Safety

Q. What type of security is required for the Tacoma LNG Facility?

A. Security at an LNG facility is similar to that of any other industrial facility. Federal regulations prescribe requirements for access control, physical security (fences, etc.), communications, monitoring, and lighting. The regulations also require that all security systems have backup power sources in the event of a power outage.

The Tacoma LNG Facility has an access control card reader system similar to that used at other PSE facilities, as well as closed circuit television monitoring and other intrusion detection devices.

Q. Describe the safety properties of LNG and the Tacoma LNG Facility.

A. As previously discussed, LNG itself is not flammable. As LNG boils off at ambient temperatures, however, it releases methane vapor, which is flammable when mixed with air at the proper concentration (5 to 15 percent methane to air). The same safety precautions that surround the use of natural gas in homes and businesses apply to working with LNG. In addition, due to LNG's cold temperature, steps are taken to prevent contact with skin or other materials that can be harmed by extreme low temperatures.

Q. What are the safety regulations that govern the design, construction, and operation of an LNG plant?

A. Although there are myriad federal, state, and local codes and standards that govern the design, construction, and operation of an LNG plant, the overarching regulation is the U. S. Code of Federal Regulations (CFR) Title 49, Part 193, *Liquefied Natural Gas Facilities: Federal Safety Standards*, issued by the U.S. Department of Transportation. These regulations at Title 49 Part 193 provide requirements for siting requirements; the design, construction, operation, and maintenance of LNG facilities; personnel qualifications and training; and fire protection and safety, including seismic design, fire protection, spill containment, and emergency procedures.

In addition, the National Fire Protection Association ("NFPA") has issued NFPA 59A, "Standard for the Production, Storage, and Handling of Liquefied Natural Gas." NFPA 59A covers general LNG facility considerations, process systems, stationary LNG storage containers, vaporization facilities, piping systems and components, instrumentation and electrical services, transfers of natural gas and refrigerants, fire protection, safety, and security. This standard includes requirements for LNG facilities to withstand substantial earthquakes. The NFPA standard for level of design means that the LNG facilities are strongly fortified for other events such as wind, flood, earthquakes, and blasts.

Because the Tacoma LNG Facility is located on a navigable waterway, several U.S. Coast Guard regulations apply, including the U.S. Code of Federal Regulations (CFR) Title 33, Part 127, *Waterfront Facilities Handling Liquefied Natural Gas and Liquefied Hazardous Gas*; 33 CFR Part 101, *Maritime Security: General*; and 33 CFR Part 105, *Maritime Security: Facilities*. Additionally, because the facility building permits are under the jurisdiction of the City of Tacoma, the Tacoma LNG Facility was designed to meet the International Building Code.

Representatives from the WUTC Pipeline Safety Office, U.S. Coast Guard, and City of Tacoma were collaboratively involved during the development, design, and construction of the Tacoma LNG Facility.

Q. What are the physical safety features of the Tacoma LNG Facility?

A. The plant was designed and built in accordance with regulations that set forth strict design standards and multiple levels of redundancy and hazard detection to prevent accidents or the release of LNG or natural gas vapors. Multiple sensors located throughout the plant were designed to rapidly detect a spill, with rapid automatic shutdown and isolation. These sensors include methane detectors, smoke detectors, flame sensors, and cryogenic temperature sensors. In addition, the plant has an Emergency Shut Down system that automatically shuts the plant down and places it in a safe mode (stopping pumps, closing valves, etc.) whenever a non-normal condition is sensed. There are also Emergency Shut

Down buttons placed throughout the plant that allow personnel to manually trigger a shutdown in the event of an emergency.

5. Tacoma LNG Facility as a Peak Day Resource

Q. What is the capacity of the Tacoma LNG Facility as it relates to the Peak Day Resource?

A. The Tacoma LNG Facility is capable of liquefying 250,000 gallons of LNG per day and storing approximately 8 million gallons of LNG on site. Approximately one-tenth of the liquefaction capacity and 79% of the storage tank is dedicated to the Peak Day Resource. The Tacoma LNG Facility is capable of injecting 66,000 Dth/day of vaporized gas and diverting up to 19,000 Dth/day of gas into PSE's distribution system to provide 85,000 Dth/day of peak-day supply to the PSE gas system -- enough natural gas to serve approximately 85,000 homes. The Tacoma LNG Facility will also dispense LNG to PSE's Gig Harbor LNG facility for peak day use via the tanker truck loading system.

Q. Did PSE consider the costs of the Tacoma LNG Project to PSE gas customers?

A. Yes. One of the key considerations for the Tacoma LNG Project was the concept of dual-use or shared-use. The economy of scope and economy of scale together made the Tacoma LNG Project one that could serve as both a peaking resource and a provider of transportation fuel, each at a lower cost than would otherwise be possible if they were developed and constructed separately. PSE considered the

costs of the peak resource portion of the Tacoma LNG Project to PSE gas customers by examining the expected revenue requirement of the share of the Tacoma LNG Facility and the supporting upgrades to PSE's natural gas distribution system along with the revenue contribution from transportation of gas across the PSE gas system to support non-regulated LNG sales.

This ongoing analysis was presented in multiple reports to the PSE Board of Directors, including in July of 2014,[11] and later updated in subsequent reports to the PSE Board of Directors in September of 2015[12] and August of 2016,[13] just prior to the September 22, 2016, decision by the PSE Board of Directors to go forward with construction of the Tacoma LNG Project. PSE again updated its analysis and presented a report to the PSE Board of Directors as part of a prudence re-examination conducted in February of 2018 during an unexpected permitting delay in the construction phase of the project.[14]

Q. In the additional cost analysis performed between 2014 and 2016, what was the assumed total peak-day capacity of the Tacoma LNG Facility by winter 2021 to 2022?

A. The assumed total peak-day capacity of the Tacoma LNG Facility remained at 85,000 Dth/day, including 66,000 Dth/day of gas injection from the Tacoma LNG

[11] *See* Fourth Exhibit to the Prefiled Direct Testimony of Ronald J. Roberts, Exh. RJR-5C (Confidential) at 185-822.
[12] *See* Exh. RJR-5C at 931-1281.
[13] *See* Exh. RJR-5C at 1387-1693.
[14] *See* Exh. RJR-5C at 1767-1796.

Facility, and up to 19,000 Dth/day of diverted gas that can be delivered to any PSE gate station on the NWP system.

Q. Please describe the injection capacity of the Tacoma LNG Facility.

A. The Tacoma LNG Facility is equipped with a vaporizer capable of gasifying and injecting natural gas into PSE's natural gas distribution system at a rate of 66,000 Dth/day. Natural gas will be injected directly into PSE's high pressure gas system at the Tacoma LNG Facility. To supply the vaporized gas, PSE has reserved a significant portion of the onsite storage tank capacity which will allow the Tacoma LNG Facility to supply 66,000 Dth/day for more than six days.

Q. How does PSE project that it will manage the Tacoma LNG Facility to optimize its peak resource capacity?

A. The tank will be filled over a 270-day period using PSE's reserved liquefaction capacity. During the winter months, PSE can sell its liquefaction capacity on a short-term basis for the benefit of its regulated core gas utility customers.

In the event that this resource is not fully called upon over the course of a given winter season, PSE can sell unutilized liquefaction capacity under short-term contracts over the non-winter period (up to 270 days) to the economic benefit of PSE's regulated core gas utility customers. The value associated with selling such underutilized LNG capacity is not considered in PSE's analyses. *See* Exh. RJR-5C at 1673.

6. Other additional advantages of on-system LNG storage

Q. Are there any other advantages of having on-system LNG storage?

A. Yes. The primary advantage of on-system LNG storage is that it provides physical natural gas. In contrast, pipeline capacity only provides the physical capacity to deliver sufficient quantities of natural gas to PSE's system. It does not include the actual natural gas supply, which would have to be purchased independently. Depending on perceived market constraints, the natural gas supply purchase might be arranged in advance through the purchase of a winter, peak-day call option, or on the spot market, if available, at the then-current premium price, when the supply is needed. PSE, however, does not generally rely on spot market availability for firm natural gas supply requirements.

Other advantages of having the on-system LNG storage provided by the Tacoma LNG Facility is that it reduces PSE's reliance on Northwest Pipeline, and it would provide natural gas supply during times of regional supply disruption. Further, an on-system LNG storage facility increases the underlying capacity of the adjoining distribution system for peak-day service. Finally, the on-system LNG storage offered by the Tacoma LNG Facility will provide infrastructure to serve developing natural gas transportation fuel markets. *See* Exh. RJR-5C at 72, 76, 90, 176, 211, 298, 614, 1418.

7. Permitting and Environmental Matters

Q. How did PSE approach the permitting process for the Tacoma LNG Project?

A. PSE worked with over a dozen federal, regional, and state agencies and local jurisdictions on the environmental review and permitting of the Tacoma LNG Project. These agencies and jurisdictions included: the Seattle District, U.S. Army Corps of Engineers; U.S. Coast Guard; the Washington Department of Ecology; the Washington Department of Fish and Wildlife; Washington Department of Transportation; Washington Department of Archaeology and Historic Preservation; the City of Tacoma; Pierce County; the City of Fife; the Port of Tacoma; and the Puget Sound Clean Air Agency. These environmental processes afforded the public multiple opportunities to provide input and allowed for the needs and preferences of stakeholders to be considered in the design and construction of the Tacoma LNG Project.

Q. What permits did PSE need to develop and construct the Tacoma LNG project?

A. The permits, approvals, consultations, authorizations, and reviews issued or required by the agencies and jurisdictions identified above number more than thirty-five. In addition, PSE obtained over fifty building and site development permits from the City of Tacoma and Tacoma Public Utilities. None of these building or site development permits were appealed and all of them have been

closed out. Please see the Fifth Exhibit to my Prefiled Direct Testimony, Exh. RJR-6, for a complete list of the project permits PSE received.

Q. Please describe the environmental review of the Tacoma LNG Project that was performed by the City of Tacoma and the Puget Sound Clean Air Agency.

A. The City of Tacoma prepared an Environmental Impact Statement ("EIS") pursuant to the Washington State Environmental Policy Act ("SEPA"). The EIS prepared by the City of Tacoma also included a third-party review of the engineering of the Tacoma LNG Facility. The City of Tacoma issued the final EIS on November 9, 2015. In 2018, in support of the Notice of Construction, the Puget Sound Clean Air Agency made the unprecedented determination to prepare a Supplemental Environmental Impact Statement ("SEIS") which included a Life Cycle Analysis of project-related greenhouse gas ("GHG") emissions.

Q. Were any of the permits appealed?

A. Yes. The following permits were appealed after issuance:

(i) the 2015 City of Tacoma demolition and clear and grade permits;

(ii) the 2015 Tacoma Shoreline Substantial Development Permit;

(iii) the 2016 WDOE Coastal Zone Consistency Determination;

(iv) the 2016 WDOE 401 Water Quality Certification; and

(v) the 2019 Puget Sound Clean Air Agency Notice of Construction Permit.

The City of Tacoma issued the first demolition and clear and grade permits in November of 2015. The Puyallup Tribe appealed those permits in December of 2015 under the Washington Land Use Petition Act and also challenged the adequacy of the City of Tacoma's EIS. This consolidated appeal was filed in Pierce County Superior Court. The Puyallup Tribe moved to dismiss this appeal in January of 2016, and an order granting dismissal was filed in 2016.

The City of Tacoma issued the Shoreline Substantial Development Permit in December of 2015. The Puyallup Tribe appealed the permit to the Shoreline Hearings Board in January of 2016. Following motions for summary judgment, the remaining issues were heard in a five-day live adjudication in May 2016, and the Shoreline Hearings Board affirmed the permit in July 2016. The Puyallup Tribe then appealed the permit to Thurston County Superior Court. PSE filed for and obtained direct review by the Washington Court of Appeals. The Court of Appeals upheld the City's shoreline permit following briefing and oral argument in 2017.

The Washington Department of Ecology issued the 401 Water Quality Certification and the Coastal Zone Consistency Determination in September 2016. The Puyallup Tribe appealed both permits to the Pollution Controls Hearings Board. Following motions for summary judgment the Pollution Controls Hearings Board dismissed the appeals in February 2018. The Puyallup Tribe then appealed

the permits to the Pierce County Superior Court which affirmed the permits in 2018 following motions and oral argument.

The Puget Sound Clean Air Agency published a Supplemental EIS (SEIS) in March of 2019 and issued a Notice of Construction permit in December of 2019. The Puyallup Tribe appealed the permit and the adequacy of the SEIS in December of 2019. A group including A Cleaner Tacoma, Sierra Club, Washington Physicians for Social Responsibility, Stand.Earth, and Washington Environmental Council (ACT) also appealed the Notice of Construction and the adequacy of the SEIS in December of 2019. Both appeals were filed with the Pollution Controls Hearings Board and the two appeals were consolidated in 2020. In January 2020, each appellant filed a motion for stay which PSE successfully defended against.

The Puyallup Tribe and ACT appealed the Pollution Controls Hearings Board denial of the stay to Thurston County Superior Court, where the denial of stay was upheld in 2020. The Puyallup Tribe and ACT appealed to the Court of Appeals in 2020. Following the Puyallup Tribe and ACT's unsuccessful petition to the Washington Supreme Court to accept direct review in 2021, all parties briefed the matter and in September of 2021, the Puyallup Tribe and ACT voluntarily withdrew their appeals of the denial of the stay of the permit.

Following multiple rounds of competing motions for summary judgment, over twenty issues were tried before the Pollution Controls Hearings Board over a ten-

day adjudicative hearing in April of 2021. Post-hearing briefing followed the hearing, and ACT submitted additional legal authority to the Pollution Controls Hearings Board for its consideration. On November 19, 2021, the Pollution Controls Hearings Board issued a 180-page decision that upheld the Notice of Construction and adequacy of the environmental review contained in the SEIS and denied each assignment of error made by the Puyallup Tribe and ACT. In December 2021, the Puyallup Tribe and ACT filed appeals of that decision by the Pollution Controls Hearings Board.

8. Community Outreach

Q. What outreach was performed for the Tacoma LNG Project?

A. PSE used multiple communication and outreach strategies to provide information to its customers about the Tacoma LNG Project. Early in the project, PSE conducted focus groups and telephone polls to gauge the public's understanding of LNG and gather information about any concerns. Based on this input an education and outreach strategy was developed to provide information and an opportunity for input to all stakeholders.

PSE's communication and outreach has included briefings with elected officials at the federal, state, county, city, and Port of Tacoma levels. In addition, PSE has briefed neighborhood councils, local community and business groups, and Port of Tacoma tenants; provided comment at City Council meetings; and provided tours of the Tacoma LNG Project site. In addition to presentations, PSE has provided

the same informational content about LNG through a website (with a dedicated email for project questions or comments), fact sheets, newsletter, social media, and digital and TV ads.

PSE participated in more than 10 public meetings and hearings from 2014 to the present and held telephone town halls and an open house in 2016. There have also been two processes pursuant to the State Environmental Policy Act - the City of Tacoma's EIS process and the Puget Sound Clean Air Agency's Supplemental EIS process – that offered the public an opportunity to review in-depth environmental reviews by independent experts and provide comment.

PSE undertook significant efforts to engage with the Puyallup Tribe in 2014 and 2015 regarding the Tacoma LNG Project, many of which were rebuffed. On September 8, 2014, and again on September 18, 2014, PSE hand-delivered letters to the Puyallup Tribe and its Chair, at the Puyallup Tribe's administrative headquarters to introduce the Tacoma LNG Project and ask for an opportunity to meet with the Tribe and its leadership to discuss the Tacoma LNG Project and answer questions. On September 11, 2014, the permitting manager for the Tacoma LNG Project telephoned the Puyallup Tribe Chair, at the Puyallup Tribe administrative headquarters; upon learning that the Tribe Chair was unavailable, the PSE permitting manager requested a return call so that he could schedule a

meeting with the Puyallup Tribe and its leadership.[15] On September 19, 2014, PSE's permitting manager for the Tacoma LNG Project personally hand-delivered a copy of the September 18, 2014, letter to the Puyallup Tribe to the attention of its Chair, at the Puyallup Tribe's administrative headquarters. No responses to the letters or the phone call were received from the Puyallup Tribe or its Chair.

In late September of 2014, PSE in-house legal counsel electronically contacted the Puyallup Tribe's environmental legal counsel to advise her of the City of Tacoma's SEPA review of the Tacoma LNG Facility. The Puyallup Tribe's environmental legal counsel responded via electronic mail that she was aware of the Tacoma LNG Project and that the Puyallup Tribe was examining the SEPA process.

Following the close of comments on the DEIS, PSE technical staff met with Puyallup Tribe legal and technical staff; and PSE leadership and Puyallup Tribe leadership met at a meeting sponsored by the City of Tacoma to discuss the Tacoma LNG Project. In addition, during the Shoreline Hearings Board proceedings described above, PSE technical, permitting, and legal staff met with Puyallup Tribe environmental, technical, and legal staff to discuss the aspects of the Tacoma LNG Project that were to be sited and developed on the Hylebos Waterway.

[15] The PSE permitting manager explained the purpose of the meeting was to discuss the Tacoma LNG Project, any Puyallup Tribe concerns, and to invite the Puyallup Tribe's participation in the upcoming expanded scoping for the EIS.

C. Development, Construction, and Operation of the Tacoma LNG Project

Q. Has PSE prepared an exhibit that provides a timeline and narrative of the process by which PSE developed the Tacoma LNG Project.

A. Yes. Please see Exh. RJR-3 for a detailed narrative timeline of the process by which PSE developed and constructed the Tacoma LNG Project.

Q. How will PSE manage and operate the Tacoma LNG Facility?

A. PSE determined that the most efficient operating strategy would be to outsource operation of the plant to a third party. PSE conducted a competitive request for proposal process in 2019 and selected NAES Corporation ("NAES"), of Issaquah, Washington as the operations contractor. PSE has a nearly ten-year history with NAES operating PSE's Ferndale Generating Facility. NAES currently operates over 100 facilities throughout the United States, Canada, and other countries. With this breadth of facility experience and a solid reputation, NAES is able to leverage its size and structure to recruit talent in the power and process industries as well as obtain competitive subcontractor and supplier pricing.

PSE and NAES executed an Operations & Maintenance Services agreement ("NAES O&M Agreement") on January 27, 2020. A copy of the NAES O&M Agreement is included as the Sixth Exhibit to my Prefiled Direct Testimony, Exh. RJR-7C. The NAES O&M Agreement has a five-year term that begins with successful commissioning of the facility and transition to commercial operations. The NAES O&M Agreement utilizes a cost-plus model with metric-based

performance bonuses that was partly modeled off the existing PSE/NAES agreement for operating the Ferndale Generation Facility. Under the NAES O&M Agreement, NAES direct hires the facility operating staff.

PSE assigned an Asset Manager to actively administer the contract, including budget, safety, and environmental review. The Asset Manager will meet during the third quarter of each year with NAES facility management to formulate the next-year's annual budget using predicted LNG production requirements and run profiles as well as historical maintenance cost data. PSE's Asset Manager will meet monthly with NAES to review operating costs and variances.

The NAES O&M Agreement includes a cost-plus mechanism that incorporates an annual "Operations Fee" as well as an annual "Incentive Payment" that is based on meeting five performance factors. These performance factors include: (1) a Safety Factor linked to leading and trailing indicators; (2) an Environmental Factor linked to leading and trailing indicators; (3) a Vaporization factor tied to vaporization events; (4) a Truck Loading factor linked to LNG truck loading commitments; and (5) a Bunkering factor linked to maritime bunkering orders. Should performance on these factors not achieve PSE's goals, the Incentive Payment will be reduced and in extreme cases NAES is required to pay liquidated damages to PSE.

D. Costs Associated with Regulated Portion of the Tacoma LNG Facility

1. Ownership Structure of the Tacoma LNG Facility

Q. Please describe the ownership structure of the Tacoma LNG Facility.

A. The Tacoma LNG Facility is jointly owned by PSE and Puget LNG as tenants in common. Consistent with the cost allocation methodology approved by the Commission in Docket UG-151663,[16] capacity and associated costs will be allocated on a pro-rated basis to regulated and non-regulated services. PSE will own the project capacity used to serve the peak day needs of its core gas customers as part of its regulated operations and is seeking a prudence determination in this proceeding so it can include the related costs in its gas rate base.

Puget LNG will own the project capacity used for marine fuel sales pursuant to its Fuel Supply Agreement with TOTE and any other non-regulated transportation fuel sales. As determined in Docket UG-151663, all costs and revenues associated with non-regulated fuel sales are outside the purview of Commission oversight of PSE's regulated business. Therefore, PSE's regulated customers will not be responsible for the costs nor will they benefit from the revenues associated with non-regulated sales.

[16] *See* Docket UG-151663 Settlement Agreement dated September 30, 2016 and UG-151663, Final Order 10 Approving and Adopting Settlement Stipulation; Reopening Record and Amending Order 08 in Docket U-072375, dated Nov. 1, 2016 ("Order 10").

Q. Did the Commission approve a methodology for allocating costs between the regulated and non-regulated portions of the Tacoma LNG Facility in Docket UG-151663?

A. Yes. The settlement approved by the Commission in Order 10 established the cost allocation methodology, which defines the percentage of capital and operating and maintenance ("O&M") costs for the Tacoma LNG Facility to be applied to the regulated (PSE) and non-regulated (Puget LNG) businesses.

2. Tacoma LNG Facility Capital Costs

Q. What is the total capital cost of the Tacoma LNG Facility allocable to PSE?

A. As of December 31, 2021, the total capital cost of the Tacoma LNG Facility allocable to PSE is $239,413,151. See, Table 1, Allocation of Capital Costs for the Tacoma LNG Facility, below.

Q. How does the capital cost allocable to PSE compare to the estimated cost at the time the decision was made to go forward with the Tacoma LNG Project?

A. The PSE Board of Directors approved execution of the EPC contract and construction of the Tacoma LNG Facility on September 22, 2016. At that time, the estimated capital cost for the Tacoma LNG Project was $422 million; of this amount, $182 million were allocable to PSE.[17] As shown below in Table 1, Allocation of Capital Costs for the Tacoma LNG Facility, the total capital cost for

[17] *See* Exh. RJR-3 at 54; *see also* Exh. RJR-5C at 1703.

the Tacoma LNG Project is $478 million and $239 million of the total capital costs are allocable to PSE.

Q. Please explain the reasons for increases in the capital costs of the Tacoma LNG Project from the initial cost estimates.

A. The capital costs of the Tacoma LNG Project increased from the initial cost estimates for a number of reasons. On November 2, 2017, the estimated capital costs had increased by $29.6 million ($11 million to PSE) due to changes in pipeline gas quality,[18] delays due to air permit, flare and vaporizer changes, the LNG cryogenic pipeline, legal costs due to appeals by the Puyallup Tribe, development phase overruns, and project management.[19] In addition, as I described above the Puget Sound Clean Air Agency made the unprecedented decision to require a Supplemental Environmental Impact Statement that included a Life Cycle Analysis of project-related GHG emissions. The adjudication of the Puget Sound Clean Air Agency's Notice of Construction and adequacy of the SEIS at the Pollution Controls Hearings Board included more than one dozen prehearing/discovery motions and more than fifteen motions *in limine*. Depositions were taken of the more than twenty witnesses and certain key experts required multiple depositions. The Environmental Protection Division of the Office of the Washington Attorney General also filed for amicus status supportive of the Puyallup Tribe and ACT and participated in responding to one of PSE's

[18] *See* Exh. RJR-3 at 56; *see also* Exh. RJR-5C at 1733 for a discussion of the gas quality changes.
[19] *See*, Exh. RJR-3 at 56; *see also* RJR-5C at 1748, 1754.

summary judgment motions. These details are included to provide illustrative examples of litigation expenses PSE incurred to defend just one permit. As described above, a number of permits were appealed through appellate levels.

In addition to the increased costs due to litigation expenses, during the period that the permits were subject to appeal, PSE was unable to move forward with certain of its construction efforts. At that time, PSE's construction contractor, Chicago Bridge & Iron, had mobilized its employees to the Tacoma LNG Project site and the two companies worked together to reach resolution of the likely cost impacts of delay created by the Puget Sound Clean Air Agency process. PSE and Chicago Bridge & Iron agreed upon pricing and terms and conditions for a change order necessitated by the delay under which PSE agreed to pay a firm price of $10,837,951 to Chicago Bridge & Iron, with allowances to PSE of approximately $2.1 million. At the time, PSE projected that the delay associated with the Puget Sound Clean Air Agency would increase the budget for the Tacoma LNG Project by $56 million. These increased costs are explained in more detail in Exh. RJR-3 at 67-68.[20] The Chicago Bridge & Iron contract and relevant attachments thereto are provided in the Seventh Exhibit to my Prefiled Direct Testimony, Exh. RJR-8C.

[20] *See also* Exh. RJR-5C at 1813, 1816-18.

Q. Please describe the methodology used to allocate plant capital costs between the regulated owner (PSE) and the non-regulated owner (Puget LNG) of the plant

A. The Tacoma LNG Facility provides five distinct plant services to its owners: liquefaction, storage, bunkering, truck loading, and vaporization. Plant capital costs were allocated, on a prorated basis, consistent with the expected utilization of plant services by PSE, the regulated owner, and Puget LNG, the non-regulated owner, all in accordance with the allocation methodology approved by the Commission in Order 10.

Q. How were capital costs associated with each of the five distinct plant services allocated to PSE and Puget LNG?

A. Capital costs associated with liquefaction services were allocated based on the amount of LNG, measured in LNG gallons per day, to be produced for each owner of the Tacoma LNG Facility; ten percent to PSE and ninety percent to Puget LNG.

Capital costs associated with storage services were allocated based on the volume of LNG, measured in LNG gallons, to be stored in the LNG tank for each owner of the Tacoma LNG Facility; seventy-nine percent to PSE and twenty-one percent to Puget LNG.

One hundred percent of the capital costs related to bunkering costs were allocated to Puget LNG. Capital costs associated with truck loading services were allocated to the owners based on each owner's expected use of the truck loading facilities; five percent to PSE, and ninety-five percent to Puget LNG.

Capital costs associated with vaporization service were allocated one hundred percent to PSE because vaporization service is solely attributable to the regulated use of LNG for gas peak shaving needs.

Q. Are all Tacoma LNG Facility capital costs directly associated with the plant services described above?

A. No. Where possible, capital costs were allocated directly to the plant services for which they were incurred. When capital costs incurred were not directly attributable to a specific plant service, they were placed in the common cost category. Common costs include, but are not limited to, costs associated with general engineering, general permitting, general development, demolition and site prep, common utilities, project management, and insurance.

Q. How were common capital costs allocated to PSE and Puget LNG?

A. The initial common cost allocations were based on the estimated weighted average total cost to each owner of the Tacoma LNG Facility, and were originally calculated as forty-three percent allocated to PSE and fifty-seven percent allocated to Puget LNG. In accordance with Order 10, PSE was required to

determine the actual allocation percentages based on the actual costs incurred.[21] Table 1, Allocation of Capital Costs for the Tacoma LNG Facility, shows that the initial allocation percentages did not change based on actual capital costs as of December 31, 2021.

Table 1: Allocation of Capital Costs ($1,000s) for the Tacoma LNG Facility

Facility Services	Capital Allocated to Each Source	Regulated PSE	Non-Regulated Puget LNG
Liquefaction	$ 98,510	10%	90%
Storage	$ 105,052	79%	21%
Bunkering	$ 31,399	0%	100%
Truck Loading	$ 6,251	5%	95%
Vaporization	$ 17,501	100%	0%
Total Before Common	$ 258,714	$ 110,656	$ 148,058
Common Allocation Factor		43%	57%
Common Items	$180,341	$ 77,325	$103,015
Gross Allocated Capital	$439,055	$187,981	$251,074
Capital Allocation Ratio		43%	57%
Manufacturers Tax Exemption	$ (27,531)	Not-Eligible	$ (27,531)
AFUDC/IDC	$ 66,735	$ 51,432	$ 15,303
Total Plant Closings	$478,258	$ 239,413	$238,845

[21] See, Order 10 at p. 26, ¶ 61.

3. Tacoma LNG Facility Operations and Maintenance (O&M) Costs

Q. How will operating expenses be allocated to PSE and Puget LNG?

A. Operating expenses, which include all fixed and variable costs of operating the Tacoma LNG Facility, will be allocated to PSE and Puget LNG consistent with the allocation methodology and assumptions established in Order 10.

To the extent possible, operating costs will be directly assigned to a specific plant service. When it is not possible to directly assign an operating cost to a particular plant service, the cost will be allocated to one or more plant services based on the drivers of the cost. For example, plant electricity consumption is almost entirely driven by the cost to run compressors needed to liquefy gas. Therefore, variable electric expenses incurred over a particular time period will be allocated based on the LNG volumes liquefied in that same period. Costs that cannot be directly allocated to PSE and Puget LNG based on their utilization of specific plant services will be allocated based on the cost allocation allocators in Table 2 below.

Table 2: Cost Allocators for Operating Expenses

Common Cost Allocator	The common cost allocator is expressed as a percentage of the total weighted average capital cost attributable to each owner of the Tacoma LNG Facility (43% PSE, 57% Puget LNG).
Annual Capacity Allocator	The annual capacity allocator is based on forecasted LNG capacity for a given year and will be used to allocate fixed electric costs.
LNG Volume Allocator	The LNG volume allocator is based on actual LNG volumes liquefied and will be used to allocate variable electric costs and plant consumables.
Wharfage Allocator	The wharfage allocator is used to allocate Port of Tacoma volumetric charges. The Port of Tacoma volume charges only apply to LNG moved through the truck loading racks and bunkering system and will not apply to volumes liquefied for peak shaving.

Q. Please describe the fixed operating expenses to be allocated.

A. PSE has grouped the fixed operating expenses associated with the Tacoma LNG Facility into seven categories: maintenance, facility staff, incremental insurance, allocated corporate overhead, lease, bunkering station, and fixed electricity costs. PSE will recover fixed operating expenses allocated to the peaking portion of the Tacoma LNG Facility through regulated rates. Puget LNG will separately account for fixed costs allocated to Puget LNG on its own books. Table 3, below, describes the seven categories of fixed operating expenses and the means of allocating each category.

Table 3: Tacoma LNG Fixed Operating Expenses

Maintenance	This category encompasses all maintenance costs other than consumables and labor and includes replacement parts and maintenance services performed by outside service providers. Maintenance attributable to equipment used for a particular service will be allocated based on the use of that service, e.g., the costs associated with maintenance on the storage tank will be allocated in accordance with the allocation factor for storage services. General maintenance not directly attributable to a service, such as the cost of security or grounds maintenance, will be based on the common cost allocator.
Facility Staff	This category includes the salaries and overhead for Tacoma LNG Facility staff, which are expected to be provided by the plant operator. Like maintenance expense, to the extent possible, staff hours will be allocated based on the work of Tacoma LNG Facility staff. For staff time that cannot be directly assigned, the expense will be allocated on the common cost allocator.
Incremental Insurance	Incremental insurance premiums will be allocated based on the common cost allocator.
Allocated Corporate Overhead	All general costs are allocated, on a formulaic basis determined by WUTC mandated ratemaking rules, a certain amount of overhead to recover corporate administrative and general expenses. The administrative fee will largely be charged based on the share of the Tacoma LNG Facility's total O&M expenses for the previous contract year, but a portion will be charged based on gross plant balances at the beginning of the contract year. The administrative fee will be set at the start of each contract year. The non-regulated portion of the Tacoma LNG Facility will also be responsible for a portion of corporate overheads, however the allocation will

	be different. PSE labor allocated to non-regulated LNG fuel sales will be assessed an overhead rate that covers corporate expenses. In addition, the ownership of the non-regulated portion of the Tacoma LNG Facility by Puget LNG will attract working capital away from the regulated part of the business. The lost regulated revenues associated with the return on that working capital are categorized as part of corporate overhead for Puget LNG's fuel sales.
Lease	The Tacoma LNG Facility is located on land pursuant to a long-term lease with the Port of Tacoma. PSE and Puget LNG will each pay their allocable share of the lease payments, which are subject to an annual increase equal to the previous year's average CPI-U.[22] The cost of the lease will be allocated using the common cost allocator.
Bunkering Station	Costs specifically attributed to operating the bunkering facilities include the costs of an exclusive easement for the real estate rights. These costs will be fully allocated to Puget LNG.
Fixed Electric	Fixed electric charges include fixed payments to Tacoma Power. Fixed electric costs will be allocated based upon the annual capacity allocator.

Q. Please describe the variable operating expenses to be allocated.

A. Table 4, below, summarizes the categories of variable operating expenses associated with the Tacoma LNG Facility. Variable operating expenses will be allocated based on actual gallons liquefied.

Table 4: Tacoma LNG Variable Operating Expenses

Plant Consumables	Consumables include the nitrogen and other compounds used to treat and cool the natural gas. Consumable costs will be allocated each month based on actual liquefaction volumes for that month.
Port of Tacoma Volume Charge ("Wharfage")	The Port of Tacoma charges a fee for any commodity that is sold in the Port. This fee will be assessed at $0.085/volumetric barrel (approximately $0.1573/BOE). This rate is subject to an annual increase by CPI-U. The Port of Tacoma is reserving the right to develop a Port Tariff for LNG that may be substituted in lieu of this charge. This cost will be assigned to Puget LNG.
Variable Electric Costs	Electricity is the largest operating cost of the Tacoma LNG Facility. Electricity will be provided and wheeled by Tacoma Power based on its Schedule CP Contract Industrial Service rate schedule plus 15 percent for the first 10-years, then according to the industrial rate schedule without an adjuster thereafter. Variable Electric Costs will be allocated based on actual liquefaction volumes for that month.

[22] Consumer price index for all urban customers ("CPI-U").

Q. Please describe the allocation of O&M expenses for the Tacoma LNG Facility.

A. Based on the allocations described above, Table 5 Allocation of O&M Expenses for the Tacoma LNG Facility, shows the allocation of Tacoma LNG Facility fixed and variable O&M expenses to specific allocators in the allocation methodology column.

Table 5: Allocation of O&M Expenses for the Tacoma LNG Facility

Fixed Expenses	Allocation Methodology	Regulated PSE	Non- Regulated Puget LNG
Maintenance	Direct Assigned (or Common Cost Allocator)	TBD	TBD
Facility Staff	Direct Assigned (or Common Cost Allocator)	43%	57%
Incremental Insurance	Common Cost Allocator	43%	57%
Allocated Corporate Overhead	100% to Puget LNG	N/A	100%
Lease	Common Cost Allocator	43%	57%
Bunkering Station	Bunkering Allocator	0%	100%
Fixed Electric	Annual Capacity Allocator	10%	90%
Variable Expenses			
Plant Consumables	LNG Volume Allocator	TBD	TBD
Port Volumetric Charge	Wharfage Allocator	0%	100%
Variable Electric	LNG Volume Allocator	TBD	TBD

Q. Please describe how the incremental costs for core gas customers will be calculated.

A. The incremental gross costs of the Tacoma LNG Project for core gas customers consist of: (i) Tacoma LNG Facility costs (return on and of the asset); (ii) fixed and variable operation and maintenance costs (O&M) related to the Tacoma LNG Facility; and (iii) the cost of gas distribution system upgrades that were required specifically to utilize the LNG facility (those considered to be incremental to the facility that were not otherwise required and included in PSE's long-range plan since 2013).

The actual net costs to PSE's core gas customers include the total gross costs identified above less any incremental facility revenues transferred from non-regulated operations to regulated operations. Incremental facility revenues generated by the Tacoma LNG Facility that will be transferred to the core gas book consist of non-regulated LNG customers' share of PSE core gas customer administrative and general expenses, as well as the service revenues expected from these non-regulated customers to access PSE's gas distribution system under Schedule 87T.

The cost of the peaking resource to PSE's regulated core gas utility customers will be offset by revenue contributed by unregulated transportation fuel gas customers consistent with the cost allocation methodology approved by the Commission in Order 10.

E. PSE's Decision to Develop and Construct the Tacoma LNG Facility was Prudent

1. Need for Resource and Benefits

Q. Has PSE established a need for new peak-day resources to serve its retail natural gas customers?

A. Yes. As described in detail in Exh. RJR-3, PSE first identified a potential need for an LNG storage facility to meet demand in its 2009 Integrated Resource Plan (the "2009 IRP"). The 2009 IRP state that PSE's gas sales portfolio had sufficient resources through the winter of 2014-2015 but would need additional gas supply resources thereafter.[23] PSE next identified a need for an LNG liquefaction and storage facility to meet demand in its 2011 Integrated Resource Plan (the "2011 IRP"). The 2011 IRP determined that PSE's gas load and resources were in balance until about 2017 and identified a lowest reasonable cost plan for meeting natural gas demand in 2017 and beyond through combined use of (i) demand-side resources, (ii) increasing reliance on natural gas from Northern British Columbia, and (iii) a regional LNG storage facility.[24] PSE first presented a business case for an LNG storage facility to the PSE Board of Directors at a meeting held on May 9, 2012. At the May 9, 2012 meeting, the PSE Board of Directors authorized PSE to continue investigating the potential for ownership of an LNG liquefaction and storage facility. See Exh. RJR-3 at 4-7.

[23] *See* Exh. RJR-3 at 3, *see also* 2009 IRP at 6-29.
[24] *See* Exh. RJR-3 at 3, *see also* 2011 IRP at 1-13.

As further described in Exh. RJR-3, PSE's continued need for new peak-day resources to serve its retail natural gas customers was set forth in the 2013 Integrated Resource Plan (the "2013 IRP"). The 2013 IRP considered expected customer loads into the future. The 2013 IRP demonstrated a need for peaking resources beginning in 2016-17, and projected PSE's deficit to grow to approximately 117,800 decatherms ("Dth") per day by 2022-23, and 236,000 Dth per day by 2026-27. PSE continued to re-evaluate its need for the Tacoma LNG Facility during both the development phase and the construction phase of the Tacoma LNG Project.

Table 6 shows decisions made by the PSE Board of Directors through the development and construction phases of the Tacoma LNG Project and the forecasted need at the time those decisions were made.

Table 6: Major Actions of the PSE Board of Directors

Date	PSE Board of Directors Action	Immediate Forecasted Need [25]	Forecasted Need at Year 20
January 23, 2013	Approve continuing pursuit of LNG strategy *See* Exh. RJR-5C at 68-69	13.65 MDth/day 2019-2020	274.61 MDth/day 2032-33
November 8, 2013	Authorize continued execution of LNG business strategy *See* Exh. RJR-5C at 157-163	19.24 MDth/day 2017-2018	425.35 MDth/day 2033-34
January 22, 2014	Authorize continued execution of LNG business strategy *See* Exh. RJR-5C at 167, 180	8.82 MDth/day 2015-2016	389.94 MDth/day 2034-35

[25] 1 MDth is equal to 1000 Dth.

July 30, 2014	Authorize execution of lease with Port of Tacoma[26] *See* Exh. RJR-5C at 592-93, 616	8.82 MDth/day 2015-2016	389.94 MDth/day 2034-35
April 28, 2015	Authorize proceeding with hybrid model (PSE to own assets to meet peak load; unregulated subsidiary of Puget Energy to own remaining assets and make unregulated transportation fuel sales) *See* Exh. RJR-5C at 866, 871	2.4 MDth/day 2016-2017	304.42 MDth/day 2016-2017
August 6, 2015	Authorize selection of Chicago Bridge & Iron as engineering, procurement, and construction contractor *See* Exh. RJR-5C at 881-82, 901-02, 909	2.4 Mdth/day 2016-17	304.42 Mdth/day 2035-36
February 26, 2016	Authorize continued pursuit of all transportation fuel sales as unregulated and defend permits *See* Exh. RJR-5C at 1323, 1327, 1339	2.4 MDth/day 2016-2017	304.42 Mdth/day 2035-36
August 4, 2016	Affirmed strategy for development and construction of Tacoma LNG Project *See* Exh. RJR-5C at 1388-89, 1394	7.95 MDth/day 2016-2017	269.50 Mdth/day 2037-38
September 22, 2016	Approve execution of ECP contract contingent on receipt of Corps of Engineers permits and WUTC approval of regulatory settlement[27] *See* Exh. RJR-5C at 1707, 1713-14	7.95 MDth/day	269.50 Mdth/day 2037-38
November 2, 2017	Authorize budget increase to $451 million *See* Exh. RJR-5C at 1746-48	27.22 MDth/day 2017-2018	237.31 Mdth/day 2038-39
March 1, 2018	Approve pursuit of modified construction plan and continue construction of	27.22 Mdth/day 2017-2018	237.31 Mdth/day 2038-39

[26] Also authorized execution of LNG Fuel Supply Agreement and Interim LNG Fuel Supply Agreement with TOTE; both agreements later assigned to Puget LNG and not at issue in this proceeding.

[27] Regulatory settlement approved in Order 10 and included limited exemptions from certain merger commitments and allocation of capital costs between regulated and non-regulated activities.

	parts of Tacoma LNG Project unaffected by Puget Sound Clean Air Agency air permit delay *See* Exh. RJR-5C at 1774, 1782		
June 21, 2018	Authorize budget increase to include estimated increased costs of $56 million due to the Puget Sound Clean Air Agency air permit delay *See* Exh. RJR-5C at 1816-1817	27.22 Mdth/day 2017-2018	237.31 Mdth/day 2038-39

As shown in Table 6, on August 4, 2016, the PSE Board of Directors affirmed a strategy for development and construction of the Tacoma LNG Project, and on September 16, 2016, the PSE Board of Directors approved execution of the engineering, procurement, and construction ("ECP") contract contingent on receipt of Corps of Engineers permits and WUTC approval of the regulatory settlement ultimately approved and adopted in Order 10. At the time both of these decisions were made by the PSE Board of Directors, PSE had a forecasted need of 7.95 MDth/day in 2016-2017 and 269.5 MDth/day in 2037-38.[28] And, on March 1, 2018, the PSE Board of Directors affirmed its commitment to completing the Tacoma LNG Facility by approving the modified construction plan to address construction delays created by the delay in issuance of the air permit by the Puget Sound Clean Air Agency, and on June 21, 2018, the PSE Board of Directors approved an additional budget increase due to that delay. At the time these decisions were made, PSE had a forecasted need of 27.22 Mdth/day in 2017-2018 and 237.31 Mdth/day in 2038-39.[29]

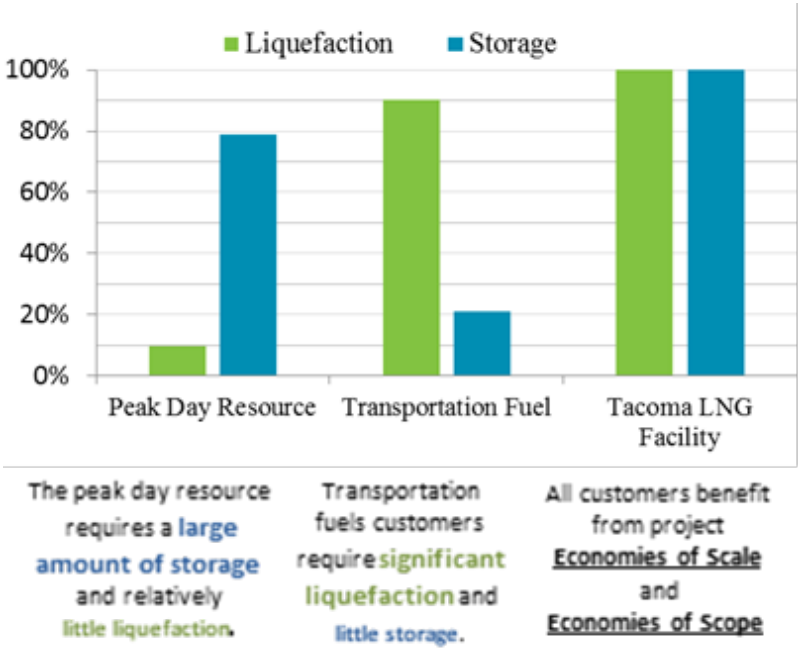
[28] This is equal to 7,950 Dth/day in 2016-17 and 269,500 Dth/day in 2037-38.
[29] This is equal to 27,220 Dth/day in 2017-18 and 237,310 Dth/day in 2038-39.

Q. Are there additional benefits to developing and constructing the Tacoma LNG Facility for PSE's gas utility customers?

A. Yes. As I described earlier in my testimony, although the primary purpose of the Tacoma LNG Facility is to provide peak-day supply for PSE's retail natural gas customers, the project is a dual-use facility that provides enhanced benefits by serving additional fuel markets. LNG facilities are capital intensive and, therefore, costs for all customers are reduced when the facilities' cost can be distributed across a larger customer base. As shown in Figure 2 below, the peak-shaving component of the Tacoma LNG Facility used by PSE requires significant storage and relatively small liquefaction capacity. Conversely, the marine, heavy-duty trucking and other fuel markets served by Puget LNG require significant, steady liquefaction and minimal storage.[30]

[30] In 2010, the International Maritime Organization, a United Nations organization, approved the North American Emissions Control Area, establishing more stringent emissions standards within 200 nautical miles of the U.S. and Canadian coast. The Environmental Protection Agency is responsible for administering vessels operating in the North American Emissions Control Area. Ships operating within the North American Emissions Control Area were required to reduce the sulfur content of their fuel to one percent (1%) in August 2012 and must further reduce it to one-tenth of one percent (0.1%) by 2015. Vessel operators can meet the new standard by switching to lower sulfur diesel fuels, installing scrubbers, or transitioning to a cleaner fuel, such as LNG. Many operators, including TOTE, are finding that LNG is the preferred alternative.

Figure 2: Illustrative Usage of Elements of the Tacoma LNG Facility Between Peak Day Resource and Transportation Fuel Sales



By combining these complementary load profiles, PSE will optimize the Tacoma LNG Facility and minimize peaking-resource costs for PSE's retail natural gas customers.

See Section III.D of this testimony for a discussion of the costs associated with the regulated portion of the facility, and the allocation of costs between the regulated and non-regulated portions of the Tacoma LNG Facility established in Docket UG-151663.

Q. Are there environmental benefits associated with the Tacoma LNG Facility?

A. Yes. Another benefit of using the Tacoma LNG Facility to serve the secondary purpose of helping to meet the needs of non-regulated gas retail customers is that

LNG as a fuel source offers significant environmental benefits when compared to diesel or marine fuel oil. Emissions from natural gas do not contain particulates or SO_X. LNG has been embraced by the American Lung Association as a Clean Fuel in its "Clean Air Choice" program. In addition, using LNG in long-haul trucking operations can result in a 25 percent reduction of CO_2 emissions.

2. Comparison of Alternatives

Q. Did PSE's evaluation of the Tacoma LNG Facility include a comparison of other resource alternatives?

A. Yes. PSE performed an analysis of resource alternatives as part of its 2013 IRP gas portfolio analysis. The 2013 IRP projected that PSE acquire a combination of the following resources to meet a growing gas peak-day resource need:

- demand-side resources (up to 37,000 Dth per day);
- LNG peaking project (50,000 Dth per day);
- upgrading the SWARR propane-air facility (30,000 Dth per day);
- additional Mist storage with additional pipeline capacity (50,000 Dth per day); and
- additional pipeline capacity via expansions of Northwest Pipeline/Westcoast (up to 150 Dth per day) and Northwest Pipeline/KORP (78 Dth per day).[31]

PSE subsequently updated its analysis of resource alternatives using the integrated resource planning models and performed a discounted cash flow analysis of the

[31] *See* 2013 IRP, Chapter 1, pages 1-14 through 1-16 for a more detailed discussion of the resource plan and the timing of resource additions.

Tacoma LNG Project all of which were reported to the PSE Board of Directors in July 2014. The results of these analyses were consistent with the results of the 2013 IRP and further supported development of the Tacoma LNG Project.

Q. Did PSE continue to compare the Tacoma LNG Facility to other resource alternatives during the development of the project?

A. Yes. PSE updated its analysis of resource alternatives and its cost analysis of the Tacoma LNG Facility during the development process, in its 2015 IRP.[32] PSE management presented resource alternatives and cost analysis in reports to the PSE Board of Directors in September 2015 and August 2016, as well as in the report to the PSE Board of Directors on September 22, 2016, when it approved construction of the Tacoma LNG Facility. Prior to the September 22, 2016 PSE Board of Directors meeting, PSE completed five annual natural gas peak-day resource need forecasts, all of which demonstrated a need for new gas resources, such as the Tacoma LNG Project, to meet peak-day gas demand. A summary of these need forecasts is provided in the Eighth Exhibit to my Prefiled Direct Testimony, Exh. RJR-9.

In addition, PSE performed a re-evaluation of alternatives, costs, and risks in February 2018 during an unexpected permitting delay in the construction phase of the project which showed that the Tacoma LNG Project remained a prudent

[32] *See* 2015 IRP, Chapter 7, pages 7-19 through 7-30 for a description of the natural gas supply-side and demand-side resource alternatives examined in the 2015 IRP.

choice for meeting PSE's peak-day gas resource need at the lowest reasonable cost. The results of this re-evaluation were presented to the PSE Board of Directors on March 1, 2018. See Exh. RJR-3 at 59-66 for a detailed description of this re-evaluation. Each of the IRP updates and the 2018 re-evaluation reaffirmed the Tacoma LNG Project as a least-cost resource option to help meet customer demand.

3. Involvement of PSE Management and the PSE Board of Directors

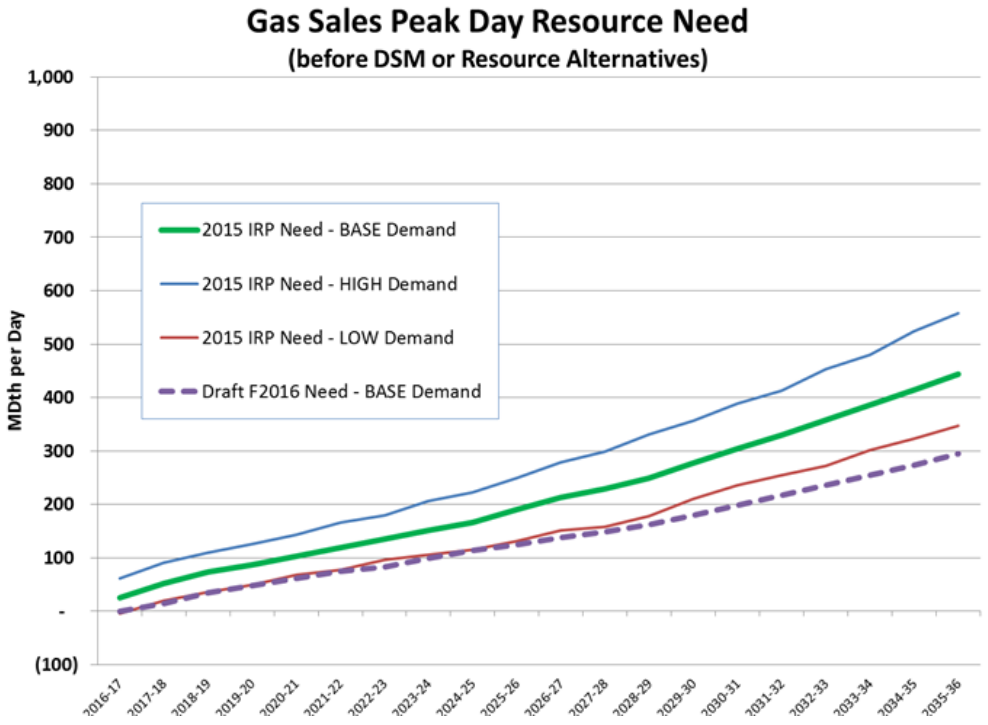
Q. Did PSE keep contemporaneous documentation of its evaluation process, and keep its management and board of directors informed throughout the evaluation, development and construction of the Tacoma LNG Facility?

A. Yes. PSE delivered dozens of presentations and reports to its Energy Management Committee and the PSE Board of Directors during the evaluation, development, and construction phases of the Tacoma LNG Facility. Updates offered an ongoing assessment of project benefits, risks, costs and schedule, and sought multiple approvals at key points along the way. Please see Exh. RJR-3 for the timing and specifics of relevant presentations to the PSE Board of Directors, and Table 6, Major Actions of PSE Board of Directors, above, regarding approvals and authorizations by the PSE Board of Directors.

Q. Please describe the presentation that was made to the PSE Board of Directors just prior to seeking and receiving approval to construct the Tacoma LNG Project.

A. Just prior to seeking approval to construct the Tacoma LNG Facility in September 2016, members of PSE management presented to the PSE Board of Directors a natural gas peak-day resource need update at a meeting on August 4, 2016. The updated forecast of peak gas sales demand was based on PSE's F2016 load forecast. Figure 3 presents a comparison of the F2016 gas sales load forecast peak resource need to the high, low and base demand scenarios of the 2015 IRP. There were no changes in the resources available to meet peak demand between the 2015 IRP and the 2016 update, therefore, the differences in the peak resource need reflect only the change in the load forecast.

Figure 3: Updated Gas Peak Need From August 2016 Report to the Board of Directors



The F2016 load forecast encompasses two years of change from the F2014 load forecast, which was used in the 2015 IRP. The 2016 load forecast closely follows the low demand scenario from the 2015 IRP until the winter of 2029, at which point the F2016 load forecast remains below the low demand scenario. The lower F2016 load forecast reflects lower weather adjusted actual use per customer, lower customer additions due to lower projections of population growth in the region and a faster future growth rate in gas retail sales.

Q. When did the PSE Board of Directors make the decision to move forward with construction of the Tacoma LNG Facility?

A. The decision to move forward with construction of the Tacoma LNG Facility was made at a PSE Board of Directors meeting on September 22, 2016, when the PSE Board of Directors approved execution of the EPC contract with Chicago Bridge & Iron, contingent on receipt of the Corps of Engineers permits and WUTC approval of the regulated settlement proposed in Docket UG-151663. See Exh. RJR-3 at 45 to 52 for a detailed discussion of the presentations that were made to the PSE Board of Directors on August 4, 2016 and September 22, 2016 to support its decision to approve execution of the EPC contract and move forward with the Tacoma LNG Facility.

Q. Did PSE update its gas resource need analysis during construction of the Tacoma LNG Facility?

A. Yes. PSE updated its natural gas resource need analysis in each of the 2017 IRP, the 2019 IRP Progress Report, and the 2021 IRP. PSE also updated the load forecasts in each of the F2017, F2018, and F2019 forecasts. Each of these updated forecasts continued to demonstrate an immediate need for new gas resources, such as the Tacoma LNG Facility, to meet peak-day demand.[33] Additionally, the February 2018 re-evaluation of the Tacoma LNG Project conducted by PSE for

[33] The need for new gas resources in each of those years was: F2017, 27.22 Mdth/day in 2017-2018; F2018, 39.98 MDth/day in 2018-2019; F2019, 2.35 MDth/day in 2019-2020; *see* Exh. RJR-9.

the PSE Board of Directors continued to show an immediate need and that the Tacoma LNG Project was the least cost alternative. At the time the 2018 re-evaluation was performed, the "sunk capital costs" of the Tacoma LNG Project were equal to $212 million (PSE portion $95.4 million) and the "termination costs" were estimated to be $61 million. Of the $273 million total sunk capital costs and estimated termination, the PSE portion was $123 million. See Exh. RJR-3 at 59-66 for a detailed discussion of this re-evaluation.

4. The Tacoma LNG Facility is Used and Useful

Q. When does PSE expect to bring the Tacoma LNG Facility into service?

A. Construction of the Tacoma LNG Project is complete and natural gas is being delivered to the plant for liquefaction. Natural gas deliveries were suspended in late December 2021 due to predictions of sustained cold weather in the Puget Sound region. PSE expects commissioning of the liquefaction equipment and the vaporization equipment will be complete by the end of January 2022.

Q. Please summarize PSE's request with respect to the Tacoma LNG Project.

A. The Commission should find that the Company's decision to develop and construct the Tacoma LNG Project for use as a natural gas peaking resource was prudent. PSE established it had a gas resource need and that the Tacoma LNG Project was a cost-effective means of meeting that need. PSE continued evaluating its gas resource needs and confirming that the Tacoma LNG Project was a cost-effective resource throughout the development and construction

process; and PSE kept its Board of Directors informed and sought approvals throughout the development and construction phases of the Tacoma LNG Project. The construction of the plant was carried out in a prudent manner. PSE therefore seeks a determination of prudence and cost recovery for the regulated portion of the costs of the Tacoma LNG Project.

IV. PSE'S INVOLVEMENT IN THE COLSTRIP GENERATING FACILITY

A. Background

Q. Please describe the Colstrip generating facility.

A. Colstrip Steam Electric Station ("Colstrip") is a four-unit, coal fired electric generation facility located in Colstrip, Montana. The facility is currently capable of producing 1,480 megawatts of electricity. Units 1 and 2 were retired in January of 2020. Units 3 and 4 are each rated at 740 MW, and they are operated by Talen Montana ("Talen MT").

Q. What is PSE's ownership interest in Colstrip?

A. PSE owns 50 percent of retired Units 1 and 2 and 25 percent of Units 3 and 4. The remaining 75 percent ownership of Units 3 and 4 is divided among five other entities, as shown in Table 7, below.

Table 7: Ownership of Colstrip Units 3 and 4

	Colstrip Unit 3	Colstrip Unit 4
Avista Corporation	15%	15%
Northwestern Energy		30%
PacifiCorp	10%	10%

Puget Sound Energy	25%	25%
Portland General Electric Company	20%	20%
Talen Montana	30%	

Q. What are PSE's ongoing and contractual obligations related to its ownership in the Colstrip facility?

A. Several contracts pertaining specifically to Units 1 and 2 expired with the closure of those units, including the Construction and Ownership Agreement, which described the ownership interests and cost allocations among owners, and the Operations and Maintenance Agreement. These agreements are provided as Exh. RJR-10 and RJR-11, respectively. Other contracts that originate from the early history of the facility remain in effect today. These include a Common Facilities Agreement ("CFA"), which described the ownership interests and details the allocation of shared item costs to each owner. In addition, the Ownership and Operations Agreement dated May 6, 1981 ("O&O Agreement") continues to govern the operation of Units 3 and 4. Please see Exh. RJR-12, for a copy of the CFA and its subsequent amendment, and Exh. RJR-13 for a copy of the O&O Agreement.

PSE is obligated under the O&O Agreement to fund costs to operate and maintain Units 3 and 4 as long as the company holds an ownership share in Colstrip. PSE continues to evaluate opportunities to exit its ownership and involvement in Colstrip in order to comply with CETA and state policy objectives. Until an appropriate opportunity materializes, the Company remains focused on closely

monitoring and limiting the costs of its remaining interest in the facility while honoring the terms of its contractual obligations. As a result, proposed capital costs for 2022 and beyond are described in the sections that follow. PSE will continue to rigorously evaluate these capital requests within the scope of all safety, regulatory and reliability parameters.

Q. How much annual electric generation does Colstrip provide to PSE?

A. Colstrip provided 16 percent of total PSE load from 2018 to 2020. Table 8 below contains the generation, in megawatt hours, PSE received from the Colstrip Units from 2018-2020 prior to the closure of Units 1 and 2. Variations in the annual production are due to a number of factors, including facility issues such as planned and unplanned maintenance events, and transmission issues. Variability is also the result of PSE's daily request for electricity, which is influenced by load serving need, availability of other resources, and market pricing.

Table 8: Energy (MW) from Colstrip PSE received (2018-2020)

	2018	2019	2020
Units 1&2 (MWh)	1,767,119	1,734,247	8,009
Units 3&4 (MWh)	2,417,831	2,613,392	2,094,329

PSE has requested the Company's maximum share from Unit 3 and 4 approximately 75 percent of the time over these three years.

Q. How does PSE procure fuel for Colstrip Units 3 and 4?

A. Colstrip Units 3 and 4 were designed and built as mine-mouth coal plants to burn the coal available from the Rosebud mine, currently owned by Westmoreland

(formerly Western Energy Company). The Rosebud mine is located adjacent to the plant, and Rosebud coal has been the exclusive fuel source for Units 3 and 4 since the units began generating in the mid-1980s.

All the owners of Colstrip Units 3 and 4 except Talen MT executed a new Coal Supply Agreement with a term from January 1, 2020, through December 31, 2025, which corresponds to when the CETA statute prohibits the use of coal-fueled generation resources to serve the electricity needs of Washington customers. The Coal Supply Agreement is a fixed-price contract, with a quarterly price adjustment based on federal indices. Coal transportation costs are included as part of the Coal Supply Agreement. Each buyer must purchase a minimum volume of coal, and the per-ton price is reduced if a buyer purchases its minimum volume requirement or more. If a buyer fails to purchase its minimum volume requirement, then the buyer has an option (i) to pay a penalty based on its purchase shortfall, or (ii) purchase the make-up volume in the first six months of the following year. The Coal Supply Agreement is provided as Exh. RJR-14C.

Q. Does Colstrip's location in Montana create any unique challenges for PSE?

A. Yes, it does. Colstrip is located in Montana, rather than Washington State where all of PSE customers are located. As a result, PSE must navigate between conflicting state laws and public policy objectives.

In 2019 Washington State passed CETA, which is among the most ambitious clean energy standards in the United States. Prior to CETA's passage, PSE had

been working to meet Energy Independence Act requirements of 15 percent renewable electricity by 2020. CETA, however, substantially increased that standard, requiring a carbon neutral electricity supply by 2030.

Importantly as it relates to Colstrip, to meet Washington's CETA mandates PSE must remove all coal-fired power from customer electric rates by the end of 2025. The closure of Colstrip Units 1 and 2 was the first step in achieving that requirement. That will leave Colstrip Units 3 and 4 as the only PSE-owned coal-fired generation resource in PSE's portfolio.

The public policy interests in the State of Montana approach the life of the Colstrip facility from a different perspective. Colstrip provides approximately 240-250 direct jobs to the residents of the State and another 380 jobs at the Westmoreland Rosebud Mine, which supplies the coal fuel to Colstrip. The mine and plant each pay significant revenue in the form of state and local taxes, including the wholesale energy transaction tax and the coal severance tax. Given the economic impact of the Colstrip facility, policy leaders in Montana would like Colstrip to operate for many years.

Q. Do Montana State laws introduce additional complications?

A. Yes. The State of Montana recently passed legislation that complicates the closure or exit of an owner from Colstrip Units 3 and 4. Senate Bills 265 and 266, which were signed into law in 2021, are intended to prolong the life of Colstrip.

Q. Please describe Montana Senate Bill 265.

A. Montana Senate Bill 265 forces all contract disputes to be resolved in Montana, which conflicts with a stipulation in the O&O Agreement that identifies Spokane, Washington as the location for arbitration of disputes. In addition, the legislation changes the arbitrator selection conditions. Text of the enrolled legislation can be found at https://leg.mt.gov/bills/2021/billhtml/SB0265.

Q. Please describe Montana Senate Bill 266.

A. Montana Senate Bill 266 expands the definition of "unfair and deceptive practices" to include failure of an owner to fund Colstrip operating costs, and/or certain actions to permanently close the facility. In addition, the law gives the Montana Attorney General authority to issue fines of $100,000 per day to each Colstrip owner who does not comply. Text of the enrolled legislation can be found at https://leg.mt.gov/bills/2021/billhtml/SB0266.

B. Ownership and Operations Agreement, Efforts to Close Units 3 and 4

Q. Please explain the Unit 3 and 4 Ownership and Operations ("O&O") provisions related to closure of those Colstrip units.

A. The Unit 3 and 4 O&O Agreement lacks clear provisions related to the retirement or closure of Units 3 and 4. Some Colstrip co-owners interpret the O&O Agreement to require a unanimous vote of all owners to close Unit 3 and 4, citing language stating that "[e]ach Project User's schedule of generation shall not be

less at any time than such Project User's Project Share of the minimum operating capability of the Project unless all Project Users agree on a shutdown of the Project…" However, PSE does not believe that unanimous agreement to close Units 3 and 4 will be achievable in the foreseeable future.

Q. What has PSE done to try and clarify the question of closure provisions for Colstrip Units 3 and 4?

A. As previously mentioned, the Coal Supply Agreement expires on December 31, 2025, which corresponds to when the CETA statute prohibits the use of coal-fueled generation resources to serve the electricity needs of Washington customers. Therefore, PSE sees the end of 2025 as a deadline for the closure of Colstrip Units 3 and 4. Also, while PSE was preparing this general rate case filing, the Colstrip co-owners began the process to arbitrate the question of whether retirement of Units 3 and 4 requires a simple majority of owners or an unanimity. PSE, in conjunction with Portland General Electric, Avista, and PacifiCorp, hold the position that closure can be determined by a simple majority. Northwestern Energy and Talen MT hold the position that unanimity is required for closure. The arbitration process began in the spring of 2021 and continues today. The process is moving very slowly, and the co-owners have not yet agreed on an arbitrator or location for arbitration. Although the O&O Agreement explicitly states that arbitration shall take place with one arbitrator in Spokane, Washington, Montana Senate Bill 265, which I described above, was enacted specifically to supersede the arbitration provision of the O&O Agreement.

Q. Has PSE undertaken steps to divest of its ownership in the Colstrip facility altogether?

A. PSE continually evaluates its ownership interest in the Colstrip facility. A number of times over the past two decades PSE has pursued opportunities to reduce or shed its interest in the Colstrip facility. These efforts were based on customer requests, anticipated or approved laws and regulations, and analyses of the economic impact those laws and regulations may have on Colstrip costs.

In the 2016 Washington legislative session PSE sought legislative approval to purchase more interest in Colstrip Units 1 and 2, which would have allowed PSE to control the closure date of those Units and leverage its ownership position to discuss a glide path toward retirement of the units. The legislature did not pass the legislation necessary for PSE to implement its proposed path.

PSE had the opportunity to retire Colstrip Units 1 and 2 in 2019 when its co-owner Talen MT requested that PSE agree to a closure of the Units by the end of that year. PSE assessed the opportunity to reduce GHG emissions, its ability to provide replacement power at a reasonable rate, and its retiring fuel contracts, and PSE ultimately agreed to retire the Units.

Then in 2020 PSE sought to further reduce its interest in Colstrip by selling PSE's ownership share in Unit 4 to Northwestern Energy. PSE filed an application with the Commission seeking approval of the sale. Ultimately the proceeding did not appear to provide enough support for approval of the proposed sale. Additionally,

the proceeding would not have concluded in time to meet the stipulations of the proposed sale contract with Northwestern Energy. Therefore, PSE withdrew its application for approval of the sale of Unit 4.

C. Capital and O&M Budget Process and Approval

1. Budget Process

Q. Please explain the Colstrip Units 3 and 4 budgeting process pursuant to the O&O Agreement.

A. The Colstrip budget process is described primarily in Section 10 and Section 17 of the O&O Agreement (Exh. RJR-13). The budget process takes place over several months. In the spring of each year, Talen MT requests a non-binding estimate of generation each Colstrip Owner expects to request the following year. From that data the plant staff creates an annual budget, considering known factors such as planned maintenance outages and the average forced outage factor of the units. By September 1 the Colstrip operator provides the owners with a draft budget package for the following year. The package includes the Operations and Maintenance budget, the Capital Budget, and the Common Facilities budget. Per the O&O Agreement, the owners are to approve that budget or an amended budget by November 1.

Votes representing 55 percent of the station's ownership are required to approve an operating budget. If a budget is not approved and the owners cannot agree on

an amended budget, the matter goes to arbitration per Section 18 of the O&O Agreement.[34]

Q. What are the consequences if PSE does not approve a proposed budget?

A. PSE can request adjustments, but ultimately PSE must decide to approve a budget by balancing the need to safely and reliably serve its customers while providing power in a financially responsible manner. PSE owns 25 percent of Units 3 and 4; therefore, PSE alone cannot deny budget approval. *See* Section 17 (f)(ii) of the O&O Agreement.

2. 2022 Colstrip Budgets

Q. Please discuss the preparation of the 2022 Colstrip Units 3 and 4 budgets.

A. Preparation of the 2022 Colstrip facility budget began very early in 2021. PSE and the other pacific northwest owners coordinated communications with Talen MT, which operates Colstrip, to advocate for more information from Talen MT concerning facility expenditures and to press for budget reductions. The pacific northwest owners have made several requests of Talen MT for a list of budget items that could potentially be reduced or eliminated along with the operational, safety, and regulatory risks that apply to those items. That request has not been fulfilled to PSE's satisfaction.

[34] Budgets for the years 2019, 2020, and 2021 were not approved by the November 1 deadline but were approved at a later date without arbitration.

In June 2021, Northwestern Energy sent a letter to PSE and the other pacific northwest owners opposing reductions in the Colstrip Unit 3 and 4 budgets. Please see Exh. RJR-15, for a copy of the letter.

PSE and the other PNW owners requested Talen MT provide a series of workshops to present further information and detail on proposed expenditures so the owners could make an informed decision on the 2022 Colstrip Units 3 and 4 budget package. Please see Exh. RJR-16, for a copy of the correspondence related to the request for workshops. Talen MT agreed to the budget workshop concept and began scheduling times for meetings.

Per the O&O Agreement, Talen MT provided PSE with a draft budget for 2022 on September 1, 2021. The workshops presenting information to the Owners continued through October 20, 2021, with continued discussion on PSE's part to have Talen MT review its process and workflow to reduce spending. At the October 20, 2021 meeting, Talen MT presented the possibility of some reductions. On October 27, 2021, Talen MT presented an updated proposed budget for Units 3 and 4 to the Owners for consideration. In early January 2022 Talen MT called for a vote on the October budget document (Revision 1). In late January 2022 a majority of the Colstrip Unit 3 and 4 owners voted to approve the budget proposal, Revision 1. Please see Exh. RJR-17 for a copy of the Colstrip Units 3 and 4 budget Revision 1. PSE was the only Owner not voting in favor of the budget; the Company abstained from the vote because it believed there was still further discussion on potential budget reductions that needed to be concluded

prior to a vote. PSE will continue those efforts in spite of the passage of the budget.

Part of the further discussions mentioned above involved a recently completed benchmarking report of Colstrip Units 3 and 4. In 2021 the pacific northwest owners engaged the nationally known consulting firm of KPMG to conduct an operational benchmarking and assessment of Colstrip Units 3 and 4. The report is still being reviewed but appears to offer opportunities for an increase in efficiency of the operations of Colstrip Units 3 and 4.

Q. Why does PSE advocate for reducing spending at Colstrip?

A. First and foremost, PSE's objective is to provide customers with safe and reliable electricity at the most reasonable cost possible. Thus, PSE advocates strongly for efforts to achieve more cost-effective operations.

Second, PSE recognizes and supports Washington State's policies aimed at reducing the carbon emissions from electric generation. PSE intends to focus Colstrip expenditures on items necessary for safe and efficient operations until PSE can exit Colstrip appropriately.

D. Colstrip Major Maintenance Cycles

Q. Do Colstrip Units 3 and 4 have a regularly scheduled cycle for major maintenance?

A. Yes. Each unit of Colstrip undergoes a major maintenance cycle every four years. Prior to 2019 each unit underwent major maintenance every three years. However, in the 2018 budget discussion the owners requested to change the major maintenance cycle to four years to reduce long-term spending on the units by eliminating a future major maintenance cycle.

Q. What is the purpose of major maintenance events at Colstrip Units 3 and 4?

A. Major maintenance events are undertaken to perform work that takes an extended period of time, cannot be done safely when the plant is generating electricity, or may need a specialized contractor to accomplish. Examples of these work events include generator testing, water tube maintenance and repair, air preheater basket replacements, and replacement of items due to expected wear and deterioration from use. This type of work cycle is typical throughout the power generation industry.

There are three main objectives of major maintenance work: first, it is critical to maintain a safe work environment for the employees at Colstrip and any communities near the facility; second, major maintenance work is undertaken to meet and maintain regulatory requirements, and third, the work is necessary to provide the efficient generation of electricity.

E. Major Capital Projects

Q. Please explain how major capital projects are identified for Colstrip Units 3 and 4.

A. The process begins with an assessment by Talen MT, the plant operator, of the ongoing condition of equipment and processes at the plant. The staff creates a capital project plan based on existing conditions, historical knowledge of the facility, and input from outside experts such as original equipment manufacturers, equipment vendors, and engineers.

The proposed capital items are described in the budget package provided to co-owners on September 1 each year with the comprehensive budget I described above. Talen MT also provides technical information and an explanation of each item in a Capital Justification Summary. The Capital Justification Summaries present alternatives to undertaking the work, the payback period for the work, and categorization of the project. A meeting among the owners to walk through proposed capital items provides a venue for exploring options and obtaining additional information on proposed projects.

Q. Are capital expenditures part of the major maintenance work at Colstrip Units 3 and 4?

A. Yes. Capital projects are a major component of major maintenance events and often drive the critical path for major maintenance events.

1. Historic Capital Expenditures

Q. Please explain the main expenditures undertaken in the 2019 Colstrip Unit 3 and 4 capital spend.

A. Please see Table 9 below for the 2019 capital expenditures undertaken at Colstrip Units 3 and 4 that had a total cost of more than two million dollars at year end.

Table 9. 2019 Capital Expenditures

DESCRIPTION	Total Cost	PSE Share
34 Design / Build Ash Pond Closure - ARO	[redacted]	[redacted]
GWCSP 3&4 - ARO	[redacted]	[redacted]
34 Pond Chemistry Water Treatment System	[redacted]	[redacted]

Q. Please briefly describe the 34 Design /Build Ash Pond Closure ARO.

A. The scope of this project was to design Units 3 and 4 Bottom Ash Pond Closure per the Coal Combustion Residuals ("CCR") Rule (40 CFR 257). The bottom ash pond ceased receiving CCR material in 2018 and needed to be closed per the CCR Rule (40 CFR 257).

Q. Please briefly describe the Groundwater Capture Storage Pond 3&4 - ARO project.

A. The scope of this project was to construct the groundwater capture storage pond identified in the MDEQ approved Plant Site Remedy Evaluation to meet Colstrip Wastewater Administrative Order on Consent ("AOC") remediation requirements. The groundwater capture storage pond stores captured groundwater from the Plant Site area and the Units 1 and 2 SOEP/STEP area until the groundwater capture

treatment system is operational. It also serves as a collection point for captured groundwater when the treatment system is off for maintenance, meeting the requirement for ongoing remediation.

Q. Please briefly describe the 3 and 4 Pond Chemistry Water Treatment System project.

A. 2019 was the third year of the 3 and 4 Pond Chemistry Water Treatment System project, also known as the Brine Concentrator/Crystallizer project. Final payments for the equipment and construction activities occurred in 2019. This project is required to help meet the CCR Rule pond closure and lining requirements. In order to close and line 3 and 4 effluent holding pond cells as required by the CCR Rule (40 CFR Part 257), water is being removed from the cells to support those activities. The removal of this excess water has caused the pond chemistry to increase in salts, resulting in the need for a treatment system to keep the pond chemistry within operating guidelines.

Please see Exh. RJR-19C, which contains the Capital Justification Summaries (Hurdle Rate Sheets) for the above identified capital work performed in 2019. These documents contain budgetary estimates prior to projects being performed so the amounts may differ from actual spend at the end of the project.

Q. What were the main expenditures in the 2020 Colstrip capital spend?

A. Please see Table 10 below for the 2020 capital expenditures undertaken at Colstrip Units 3 and 4 that had a total cost of more than two million dollars.[35]

Table 10. 2020 Capital Expenditures

Description	Total Budget	PSE Share
IP Turbine Overhaul, Unit 4	[redacted]	[redacted]
Unit 4 Cooling Tower Replacement		
Design/Build Dry Waste Disposal Sys		
U4 Turbine/Generator Base OH		

These 2020 capital expenditure projects are described briefly below. Additional information on these projects, including the Capital Justification Summaries, can be found in Exh. RJR-2019C.

Q. Please briefly describe the Intermediate Turbine Overhaul project.

A. This work was the completion of a three-year project. The project entailed disassembling the Intermediate Pressure Turbine ("IP") and replacing the rotor, stationary blades (blade rings), and the inner cylinder. The current outer cylinder was re-used. Blades in rows 1-3 and the blade rings on both sides had moderate to severe erosion on the trailing and leading edges. The inlet flow guide was out of round due to thermal distortion and the inner cylinder bolting hardware was starting to bottom out. This was an efficiency and reliability project. Operating to failure could have caused an outage of more than 40 days with the loss of

[35] The table reflects final costs, whereas the capital justification summaries mentioned below are based on estimated projections.

generation costs as well as higher repair costs. Additionally, a failure could have led to safety issues.

Q. Please briefly describe the Cooling Tower Replacement project

A. Cooling tower fill is typically replaced every ten years per the manufacture's recommendations. At the time of this project, the Unit 4 fill had been in place more than 11 years. The fill was brittle, as expected with age, and had been subjected to additional breakage due to structural failures in the tower. The original project was scheduled to replace 90 percent of the fill and 50 percent of the piping and nozzles. However, due to budgetary considerations the project was reduced, moving approximately 50 percent of the work out to the next scheduled outage. The 50 percent of replacement in 2020 was done in conjunction with replacing structural beams in the tower so costs savings was realized by combining the two scopes of work. Failing to replace the fill could have led to additional forced outages.

Q. Please describe the Dry Waste Disposal System project.

A. The Dry Waste Disposal System work was undertaken to fulfill a settlement related to the coal ash waste system at Colstrip. The settlement requires Colstrip Units 3 and 4 to be converted to a non-liquid disposal system ("dry waste disposal") by July 1, 2022. Please see an expanded discussion on this project later in my prefiled testimony.

Q. Please briefly describe the Unit 4 Turbine/Generator base overhaul project.

A. The purpose of this project was to perform base maintenance on the turbine/generator for Unit 4. The work was consistent with recommendations from the original manufacturer. The scope included the mobilization of labor, the high velocity oil flush, bearing work as required, general open and close on the generator, throttle valve pinned seat installation, governor valve, turbine control valves, IV and reheat stop valve routine rebuilds, contractor overhead (site support staff, project management, contract engineering support, office/clerical help, etc.), scaffolding, insulation, tool use, general steam chest maintenance, NDE testing and maintenance of the bolts and studs on the valves and steam chest and other assigned duties. This base maintenance is performed as preventative maintenance to ensure proper operation and reliability of the turbine/generator.

Q. What were the main Colstrip capital expenditures in 2021?

A. Please see Table 11 below for the 2021 capital expenditures undertaken at Colstrip Units 3 and 4 with an estimated total cost of more than two million dollars.[36]

Table 11. 2021 Capital Expenditures

DESCRIPTION	Total Cost	PSE Share
U3 Boiler Burner Bucket and Aux Air Replace	[redacted]	[redacted]
Cooling Tower Fill		
Turbine/Generator Base Overhaul		
Design/Build Dry Waste Disposal System		

[36] The table reflects final costs, whereas the capital justification summaries mentioned below are based on estimated projections.

Brief descriptions of these projects appear below. Additional information, including Capital Justification Summaries can be found in Exh. RJR-20C.

Q. Please briefly describe the Unit 3 Boiler Burner Bucket and Aux Air Replacement project.

A. The burner buckets and aux air tips are critical component of the NOx control system and are essential to meeting environmental compliance. The buckets (SOFA, TOFA, Burner) warp with heat exposure over an extended time, which causes buckets to bind up in the boiler and restrict movement during unit operation. Through inspection during overhaul the buckets are found to be at the end of life in 3-4 years. The preventative maintenance process of replacing buckets is most economical with scaffold already in place for other work during major maintenance as this allows for an effective and cohesive removal of buckets, repairs to support material, testing of movement, and alignment of all emission components associated with the boiler corners at the same time. Burner buckets/aux air tips are a portion of the SmartBurn NO_X control system and need to be in good repair for combustion optimization, and particulate matter and NO_X control. Pushing replacement of these buckets to the following overhaul would risk environmental compliance for the unit.

Q. Please briefly describe the Cooling Tower Fill project.

A. The Unit 3 cooling tower fill was last replaced in 2007 making it 14 years old in 2021. That is four years past the manufacturer's recommendations of replacement every 10 years. The fill is becoming brittle due to age and has been subjected to additional breakage due to structural failures in the tower, much like the Unit 4 cooling tower. When the fill breaks the cooling tower efficiency is reduced and the pieces of broken fill attach to the screens which can cause an increase in condenser backpressure. Additionally, the fill has experienced significant fouling, increasing the weight of the fill and decreasing the efficiency. This project will replace 50 percent of the fill and 10 percent of the piping and nozzles, in conjunction with the structural maintenance during the 2021 overhaul. There is also significant damage to the cooling tower structural members and beams that will be addressed by this project. If not addressed, this could result in additional forced outages.

Q. Please briefly describe the Turbine/Generator Base Overhaul.

A. This project was a two-year project with initial commitment in 2020 to rebuild the turbine control valves removed from Unit 4. The valves were shipped offsite to be refurbished and repaired and then installed in Unit 3 in 2021. This was necessary since the control valves are crucial for turbine control and protect against over-speed events. Overspeed events can cause catastrophic failure of the turbines. This work scope was similar to work performed on Unit 4 in 2020, and it included

base maintenance performed as preventative maintenance to ensure proper operation and reliability of the turbine/generator. Not addressing this work would cause an increase in risk of catastrophic failure, thereby jeopardizing safety and reliability.

2. Planned and Proposed Capital Expenditures

Q. Please explain the main capital expenditures in the proposed 2022 budget in this rate proceeding.

A. Please see in Table 12 below the single 2022 capital expenditure expected to be undertaken at Colstrip Units 3 and 4 with an estimated total cost of more than two million dollars.

Table 12. 2022 Capital Expenditure Estimate Greater than $2,000,000

DESCRIPTION	Total Cost	PSE Share
Design/Build Dry Waste Disposal System	[redacted]	[redacted]

Please see an expanded discussion on this dry waste disposal system project later in this prefiled testimony.

Q. Please explain the main capital expenditures proposed for 2023-2025 in this rate proceeding.

A. Table 13 below lists the proposed 2023-2025 capital expenditures expected to be undertaken at Colstrip Units 3 and 4 with an estimated total cost of more than two million dollars.

Table 13: Proposed Colstrip Capital Projects (2023-2025)

2023 Capital Projects (proposed)	**Total Cost**	**PSE Share**
Final Superheat Section Replacement	[redacted]	[redacted]
Heavy Equipment Replacement		
Total:		
2024 Capital Projects (proposed)	**Total Cost**	**PSE Share**
Boiler Bucket Burner and Aux Air Replacement	[redacted]	[redacted]
Cooling Tower Fill		
De-Aerator Tank Replacement		
Auxiliary Turbine Overhaul		
Capital Project Support		
Turbine/Generator Base Overhaul		
EHP G Cell Liner		
IP Turbine Overhaul		
Condenser Tube Replacement		
Final Superheat Section Replacement		
Total:		
2025 Capital Projects (proposed)	**Total Cost**	**PSE Share**
Boiler Bucket Burner and Aux Air Replacement	[redacted]	[redacted]
Auxiliary Turbine Overhaul		
De-Aerator Tank Replacement		
F Cell Liner - long term Evap Pond		
Construct Liner System EHP C Cell		
Capital Project Support		
Cooling Tower Fill		
IP Turbine Overhaul		
Turbine/Generator Base Overhaul		
Condenser Tube Replacement		
Total:		

A brief description of each of these projects is provided below. Some estimated 2023 costs relate to preparation for the Unit 4 major maintenance event that will take place in 2024. The largest of those capital expenses will be the replacement of the Unit 4 Superheat section. Additional information and explanations from

Talen MT will not be available until the proposed budgets are released in September of each year beginning in 2022.

Q. Please describe the planned Unit 4 Final Superheat Section Replacement project.

A. This project is intended to replace the final superheat section of the Unit 4 boiler and to remove a portion of the boiler radiant reheat tubes. The replacement superheat section will help achieve design superheat temperatures and improve efficiency and heat rate on the Unit. This project does not change the function of the superheat section and will not increase steam flow nor fuel firing rate. The primary justifications for this project include:

- **Improve the Efficiency of Unit 4.** The project is expected to lower the net plant heat rate of Unit 4 by approximately 200 BTU/kwhr.
- **Emission Reduction.** This project is expected to reduce Particulate Matter emissions, reduce Opacity, and reduce NOx emissions.
- **Status quo.** Generate at higher heat rate/full load, which increases the difficulty of tuning for combustion, thus increasing compliance risk.
- **Preventative Maintenance.** The existing final superheat section will be over 33 years old. If a forced outage due to a failed tube on this equipment were to occur in the future, it could cost approximately $2,000,000 including lost generation and repair costs.

The superheat project was proposed by Talen MT for the 2020 major maintenance event at Colstrip Unit 4. However the Owners did not approve the project at that time.

Q. Please describe the Heavy Equipment Replacement project.

A. A 1983 vintage 992C loader requires replacement. The loader is primarily necessary to move coal at the facility.

F. Dry Disposal system

Q. Please describe the dry waste disposal system and its function.

A. The dry waste disposal system, which will go into operation at Colstrip Units 3 and 4 in 2022, will be an extension of the current coal ash water management system used for those units. The original operation design of the effluent holding pond for Colstrip Units 3 and 4 was to use time and gravity to settle/separate the solids contained in the effluent coming from the plant's scrubbers. The scrubber effluent from the plant is approximately 18 percent solids with the remainder water. This process required a large pond footprint and a significant inventory of water.

In 2004, a paste plant was installed on Units 3and 4 that mechanically separates and thickens the effluent down to approximately 50-60 percent solids using a deep tank thickening process. The "paste" is placed in the disposal ponds and the water returned to the plant.

Due to a legal settlement in 2012, explained in more depth below, the plant must convert to a 'non-liquid' disposal system for coal ash residuals no later than July

1, 2022. This system has been named the Dry Waste Disposal Project ("dry waste system").

After the material leaves the currently operating paste plant it will move to the dry waste system where it is further treated in a filtration system that further dries the paste and separate remaining water. The system must meet the definition used in RCRA Solid Waste Disposal Rules, including 40 CFR 258.28(c)(1). Please see Exh. RJR-21 for a copy of the system description.

Q. Why is the dry waste disposal system necessary?

A. In 2012, the Montana Department of Environmental Quality ("DEQ") and the Colstrip owners were legally challenged under the terms of the Colstrip Wastewater Administrative Order on Consent ("AOC") for Colstrip by Sierra Club, Montana Environmental Information Center, and the National Wildlife Federation. In order to resolve the dispute to the AOC the Colstrip owners agreed to an additional settlement agreement. Please see Exh. RJR-22 for a copy of the 2016 General Release and Settlement Agreement.

Q. Please provide a summary of the Settlement Agreement.

A. The Dry Waste Disposal Project is a legal obligation under the General Release and Settlement Agreement resulting from the case MEIC, et al. v. MDEQ, et al., cause no. DV 12-42. This litigation resulted in Sierra Club, Montana Environmental Information Center, and the National Wildlife Federation

challenging the legality of the AOC and other claims related to disposal of CCR material in impoundments at Colstrip.

The settlement released the Colstrip Owners and MDEQ from any and all actions, claims, etc. related to the operation of CCR units that receive or have received CCR material generated by Colstrip Units 1-4 and alleged contamination of groundwater from such operation through the active life of such CCR facilities. The Settlement required, among other things, that the Colstrip Owners convert to a 'non-liquid' disposal system for CCR material generated by Colstrip Units 3 and 4 scrubbers, which is deposited in the effluent holding ponds for Units 3 and 4, no later than July 1, 2022.[37]

If equipment to convert CCR material to a non-liquid form is unavailable due to unexpected equipment failure or planned maintenance, such unavailability in total cannot exceed 15 percent of any calendar year.

Decant water that is a result of dewatering liquid CCR material will be sent to a single clearwell cell and then eliminated by reusing it in plant processes or in conjunction with forced evaporation. As such, the Dry Waste Disposal Project is not a part of the Colstrip Wastewater AOC or Asset Retirement Obligations ("ARO") activities.

[37] CCR has the same meaning as in 40 CFR 257.53. The term 'non-liquid' has the same meaning that is used in Resource Conservation and Recovery Act ("RCRA") Solid Waste Disposal Rules, including 40 CFR 258.28(c)(1)

This settlement requires that the process which results in a dry product be operational by July 1, 2022. Additionally, this settlement ties the performance of the facilities at the effluent holding pond to Colstrip plants operation. These facilities, the original paste plant, and the new dry paste facility, must be in service 85 percent of the time.

Q. Does the Settlement provide for an option for delay of implementation of the Dry Waste Disposal System?

A. Yes and no. In section 2 A ii, the Settlement allows for a delay in implementation of the system should it prove to be infeasible to convert to non-liquid disposal or a force majeure event occurs:

> If through reasonable and diligent efforts, the conversion of liquid CCR material to non-liquid CCR material proves to be infeasible after a performance test of a pilot project or as a result of a force majeure event, the Conversion Date will be extended until a reasonable time agreed to by the parties taking into account the timing needed to complete a successful pilot project or the resolution of the force majeure event. In addition, the Conversion Date may be extended by mutual agreement of the parties for any reason.[38]

However, Talen MT has engaged national level consultants to design a Dry Waste Disposal System that will meet the Settlement criteria. It is currently in construction with a target operation date prior to July 1, 2022. Therefore, it is not considered that dry waste disposal is infeasible at this point in time, so no delay of implementation is appropriate to consider.

[38] See, Exh. RJR-22.

In February of 2021 the counterparties to the Settlement, Sierra Club, Montana Environmental Information Center, and the National Wildlife Federation, sent a letter to the Colstrip Owners to offer a dialogue on delay if a compromise could be reached that included a firm closure date of Units 3 and 4. PSE welcomed the invitation for discussion and informally spoke with one of the parties about having a joint discussion on the topic. The pacific northwest owners wrote to the National Wildlife Federation on February 23, 2021 asking them to engage in a conversation on the topic. Please see Exh. RJR-23 for a copy the counterparties' February 19, 2021, letter and the pacific northwest owners' February 23, 2021, response thereto. On April 31, 2021 the Colstrip Owners and counterparties to the settlement held a call to discuss the non-liquid clause in the settlement, however Northwestern Energy indicated they would not be willing to discuss a closure date for the Units 3 and 4.

Q. What means did Talen MT take to design and construct the Dry Waste Disposal System?

A. Talen MT engaged Golder Consulting to explore the options for and design of a dry waste disposal system meeting the Settlement criteria. Golder worked on determining technology to use to meet the Settlement criteria and intended to do a pilot test. Unfortunately, for reasons still unknown, Golder stopped communicating with Talen MT and ceased to provide work product for the project. Golder's failure to deliver on the work product caused a delay in project

implementation which forced Talen MT to find other consultants to do design and budget development concurrently.

Talen subsequently engaged Worley and Patterson and Cooke to work on the dry waste disposal project. Worley is the project integrator and Patterson Cooke led design. Additionally, they have defined the overall operating philosophy and functional specification for the filter plant. Their work led to a new final estimate for the dry waste disposal system that encompassed final design and construction costs. Please see Exh. RJR-24 for a copy of an email containing multiple documents that provide technical overviews of the project, costs, descriptions, and evaluations. The final Talen MT estimate came to $[redacted] for a three-year project that included design, construction and commissioning of the project. Please see Exh. RJR-25 for a copy of a letter from Talen MT outlining the estimated costs. Also see Capital Justification Summaries for 2022, provided as Exh. RJR-26C.

Q. Please provide a timeline for completion of the Dry Waste Disposal System

A. The Dry Waste Disposal System is currently in construction phase. The earthwork for the site began in approximately July of 2020. The building construction began in approximately February 2021 and is scheduled to conclude February of 2022 pending material and labor availability. While building construction was taking place, equipment was set inside the structure to allow for proper placement and to

streamline timing of completion of the project. Equipment is intended to be in place and operational by June 2022.

G. Remediation and Decommissioning Spending

1. Remediation

Q. Please explain in general the remediation requirements at Colstrip Units 1-4.

A. PSE, in keeping with its "Annual Colstrip Report on Decommissioning and Remediation" to the Commission, defines remediation as additional requirements (state or federal) associated with soil or groundwater.

Remediation work at Colstrip is driven mainly by two regulations, the Federal Environmental Protection Agency's ("EPA") Coal Combustion Residuals Rule ("CCR") and the Montana Administrative Order on Consent ("AOC"). The CCR was published by EPA on April 17, 2015 and became effective October 19, 2015. In 2016 the U.S. Senate passed legislation amending the Rule. The Rule's intent is to regulate coal combustion residuals under the Resource Conservation and Recovery Act, Subtitle D. The CCR rule addresses the risks from coal ash disposal and sets out recordkeeping and reporting.

The AOC addresses impacts to groundwater from Colstrip. It was entered into in 2012 by the Colstrip operator, which was PPL Montana at that time. The AOC was assumed by the current operator, Talen MT, and the Montana Department of Environmental Quality ("DEQ"). Please see Exh. RJR-27 for a copy of the AOC.

The AOC provides an extensive process for determining groundwater impact and assessing previous work to address impacts, as well as, laying out standards for addressing contamination and evaluating options for ultimate clean-up. It also provides a framework for investigation and for the development of reports and plans necessary for the remediation of Colstrip. It requires that investigations are overseen by the DEQ and it is the DEQ that reviews and approve all reports and plans. The AOC splits Colstrip environmental impact into the following three areas for working purposes:

- The Plant Site (including the area near the physical plant structures, some of which are common structures for Units 1-4);
- Units 1 and 2; and
- Units 3 and 4.

DEQ has approved final plans for remediation of the Plant Site and the Unit 3 and 4 areas.

For Units 1 and 2 MDEQ has chosen a remediation plan, but through a settlement agreement, Talen MT may continue to investigate an alternative plan for Units 1 and 2 and present the alternative plan to MDEQ within two years of the settlement agreement for reconsideration of their plan choice. Please see Exh. RJR-28 for a copy of the settlement agreement between DEQ and Talen MT on the Units 1 and 2 plan remediation choice. In the two year investigation period Talen MT will proceed with remediation work that will apply to any final plan choice.

The AOC activities encompass a vast majority of the work which is also necessary under the federal CCR. Please see DEQ's website[39] to access the reports and further information on DEQ's oversight of the Colstrip ash pond cleanup.

Q. How are the estimates of Colstrip remediation spending prepared?

A. Estimated spending for remediation work related to coal ash ponds at Colstrip is based on Remedy Evaluation Reports and the Closure Reports that are approved by the DEQ.

These reports are largely developed by a team of outside consultants who are led by consulting firm Geoysentc, with input and oversight of Talen MT staff. The consultants include:

- Hydrometrics – working on groundwater issues at Colstrip since 1979
- Newfields – provides modeling work
- HDR – working on the ground water treatment system
- Veolia – design and operate the brine concentrator system
- Neptune –clean up criteria and risk assessment

The individual remediation activity cost estimates are developed by looking at three different methods. One method is to use consultants experience at other sites where they have worked on similar projects to develop estimates. Another method is to use actual costs for similar work previously performed onsite at Colstrip.

[39] https://deq.mt.gov/cleanupandrec/Programs/colstrip

Finally, if neither of those information sources are available the facility uses a software program called Remedy Action Cost Engineering Requirements ("RACER") developed by the worldwide infrastructure consulting firm AECOM, to develop a cost estimate.

The Geosyntec reports with estimated future remediation costs are included as part of PSE's Annual Colstrip Report filing[40] and provided as Exh. RJR-29.

Q. What specific costs has PSE included in this rate case for remediation at Colstrip?

A. From January 2019, the end of the test period in PSE's 2019 general rate case, through June 30, 2021, PSE has included remediation expenditures for Units 1-4.[41] During this period PSE has spent $15.3 million at Units 1 and 2 and $11.2 million at Units 3 and 4 in remediation costs during this period. Overall, PSE has spent $16.8 million at Units 1 and 2 and $20.1 million at Units 3 and 4 as of June 30, 2021. Refer to Table 14 below for a further breakdown of the costs included in this proceeding.

[40] See "Annual Colstrip Report on Decommissioning and Remediation" filed with the Commission under Docket UE-190529.

[41] As discussed in the testimony of Ms. Free, SEF-1T, ARO expenditures are accounted for as either an offset to Treasury Grants (Units 1 and 2) or ARO balances (Units 3 and 4) which are reported as of the end of the test year in this filing.

Table 14: Remediation Expenditures (1/1/2019-6/30/2021)

Units 1&2	Total Cost
U12 Monitor Capture Syst Maint ARO	$156,960
U12 Forced Evaporation - ARO	25,129
U14 Monit Capt Sys Maint - ARO	67,422
Close A Pond - ARO	1,621,485
Comm Capt Well Trtmnt Sys - ARO	14,229
Fresh Water Injection Wells - ARO	366,929
Additional Capture Wells - ARO	217,749
Design STEP A Cell Closure - ARO	153,917
GWCSP - ARO	3,719,914
Capt. Well Treat Sys. U12 (60%)	6,010,145
Close STEP A Cell	428,205
Design STEP E Cell Dewatering Wells	61,680
PlantSite Mon/Cap Sys Maint. 1&2	179,082
PlantSite Mon/Cap Sys Maint. Un 1-4	107,214
Mon/Cap Sys Maint. 1&2	117,628
Mon/Cap Sys Maint. 1-4	31,711
Forced Evaporation 1&2	36,634
Forced Evaporation 1-4	68,249
Dewater/Close STEP Cells-ARO	340,182
Freshwater Flush Pilot Test/Install	66,701
Design/Close Bottom Ash Pond	22,728
Cap Trtmnt Sys Solid Disposal Area	1,873
Mon/Cap Sys Maint	6,064
PSE Overheads	1,463,485
Total:	**$15,285,318**

Table 14: Remediation Expenditures (1/1/2019-6/30/2021)(continued)

Units 3&4	Total Cost
Water Management System	$2,027,965
U34 Monit Capt Syst Maint ARO	103,433
U34 Forced Evaporation	145,984
U14 Monit Capt Sys Maint	72,112
Comm Capt Well Trtmnt Sys	15,217
Fresh Water Injection Wells	392,297
Additional Capture Wells	232,848
U34 Design Ash Pond Closure	801,484
GWCSP 3&4	1,192,189
Capt. Well Treat Sys. U34 (40%)	2,134,611
Install New Capture Wells	999,286
Design/Install Insitu Flushing Sys	451,618
PlantSite Mon/Cap Sys Maint. Un 1-4	88,679
PlantSite Mon/Cap Sys Maint. 3&4	105,596
Mon/Cap Sys Maint. 3&4	254,084
Forced Evaporation 3&4	100,095
Post Closure Care 3&4	8,984
Design/Close D/E Cell	732,030
Forced Evaporation 1-4	69,347
EHP Cell Closure Design	189,643
Cap Trtmnt Sys Solid Disposal Area	2,595
PSE Overheads	1,083,601
Total:	**$11,203,716**

Q. Does PSE include remediation costs in the multiyear rate plan?

A. Yes. PSE has forecasted remediation costs included as part of its five-year plan. Refer to the testimony of Mr. Kensok, Exh. JAK-1T for details of this. Also, refer to Ms. Susan Free, Exh. SEF-1T for discussion of the treatment of forecasted remediation in the multi-year rate plan.

2. Decommissioning

Q. Please explain decommissioning activities related to Colstrip Unit 1 and 2.

A. PSE defines decommissioning generally as costs to suspend operations and remove some or all of the above grade structures associated with Colstrip Units, followed by reasonable restoration in these areas. [40]

Colstrip Units 1 and 2 underwent decommissioning activities in 2020. PSE and Talen MT, the other 50 percent owner of the Units, agreed to undertake work to make the retired facility safe, in place, until Units 3 and 4 cease to generate electricity. Units 1 and 2 and Units 3 and 4 are physically near each other and previously shared work spaces and some operational systems. The risk and higher cost of removing the Unit 1 and 2 equipment and buildings while Units 3 and 4 are operating did not meet a common sense threshold.

Decommissioning activities to bring Units 1 and 2 to a safe, dark, cold and dry condition for long term holding were largely complete in 2020 with transformer salvage and removal concluding in April/May of 2021. The main structures and equipment remain in place, as well as activities and equipment for water management and the continuing coal ash pond remediation work. In the process of decommissioning there were additional costs for settling coal contract remediation, employee severance/retention and removing parts and tools which were unique to the facilities from the site.

There will be continued monitoring of the structures for security and safety purposes going forward, and certain legacy costs will be necessary to keep the site safe. Those cost would include things such as maintenance and lighting of the stacks, periodic walk through of the generator building for issue like pest control and safety hazards, and maintenance of storm water systems. In addition to making the generation building area safe, PSE and Talen undertook demolition of selected accessory structures that would no longer be needed due cessation of generation. Those included the cooling towers, clarifier tanks and some conveyors. Also removed from the site were the main transformers.

Q. What specific costs has PSE included in this rate case for decommissioning at Colstrip Units 1 and 2?

A. From January 2019, the end of the test period in PSE's 2019 general rate case, through June, 30, 2021, PSE has included decommissioning expenditures for Units 1-2 which were offset by Treasury Grants, as discussed by Ms. Free in SEF-1T. During this period PSE offset $18.1 million at Units 1 and 2 against Treasury Grants. Refer to Table 15 below for a further breakdown of these costs.

Table 15: Decommissioning Expenditures (1/1/2019-6/30/2021)

Units 1&2	Total Cost
Invoiced Decommissioning Expenses	[redacted]
Legal Costs	139,817
Salvage	(9,692)
Severance/Retention	948,443
Tools Removal/Write-off	4,413,948
Settling Coal Contract Reclamation	6,297,098
PSE Overheads	744,178
Total	**18,087,527**

Q. Please explain decommissioning activities at Colstrip Unit 3 and 4.

A. The owners of Colstrip Units 3 and 4 have not determined a retirement date for Colstrip Units 3 and 4. As mentioned earlier, PSE is not able to unilaterally decide when retirement of the Units may occur. Therefore, no decommissioning activities or costs related to those activities have been realized.

V. CONCLUSION

Q. Does this conclude your prefiled testimony?

A. Yes, this concludes my prefiled testimony.

REDACTED VERSION