

**EXH. RJR-3  
DOCKETS UE-22\_\_\_/UG-22\_\_\_  
2022 PSE GENERAL RATE CASE**

**BEFORE THE  
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**WASHINGTON UTILITIES AND  
TRANSPORTATION COMMISSION,**

**Complainant,**

**v.**

**PUGET SOUND ENERGY,**

**Respondent.**

**Docket UE-22\_\_\_  
Docket UG-22\_\_\_**

**SECOND EXHIBIT TO THE  
PREFILED DIRECT TESTIMONY OF**

**RONALD J. ROBERTS**

**ON BEHALF OF PUGET SOUND ENERGY**

**JANUARY 31, 2022**

## Table of Contents

<b>I.</b>	<b>DEVELOPMENT PHASE OF THE TACOMA LNG PROJECT .....</b>	<b>2</b>
<b>A.</b>	<b>Development Activities for the Tacoma LNG Project Conducted Prior to Calendar Year 2014... ..</b>	<b>2</b>
1.	May 30, 2009 – The 2009 IRP Identified a Potential Need for a Regional LNG Storage Facility.....	2
2.	May 30, 2011 – The 2011 IRP Projected a Need for a Regional LNG Storage Facility for Winter 2024-25 .....	3
3.	May 9, 2012 – The PSE Board of Directors Approves a Recommendation That PSE Pursue an LNG Business Strategy .....	4
4.	August 16, 2012 – The F12 Load Forecast Projects a Need for an LNG Storage Facility Beginning in Winter 2019-20 .....	8
5.	January 23, 2013 – The PSE Board of Directors Approves a Recommendation that PSE Continue to Pursue an LNG Business Strategy .....	8
6.	February 28, 2013 – PSE and the PSE Board of Directors Re-Examined the LNG Business Strategy.....	10
7.	May 30, 2013 – The 2013 IRP Identifies an LNG Storage Project as Cost-Effective in All Scenarios.....	11
8.	July 2013 – The F13 Load Forecast Projects an Immediate Need for an LNG Storage Project.....	12
9.	November 8, 2013 – The PSE Board of Directors Authorizes Continued Execution of an LNG Business Strategy.....	12
<b>B.</b>	<b>Major Activities in Calendar Year 2014.....</b>	<b>13</b>
1.	January 2014 – The F14 Load Forecast Projects an Immediate Need for the Tacoma LNG Project .....	13
2.	January 22, 2014 – The PSE Board of Directors Authorizes Continued Execution of the LNG Strategy .....	13
3.	July 2 and July 30, 2014 – The PSE Board of Directors Authorizes PSE to Enter Into a Fuel Supply Agreement with TOTE and a Ground Lease with the Port of Tacoma .....	15
4.	December 2014 – The F15 Load Forecast Projects an Immediate Need for the Tacoma LNG Project .....	18
<b>C.</b>	<b>Major Activities in Calendar Year 2015 .....</b>	<b>18</b>

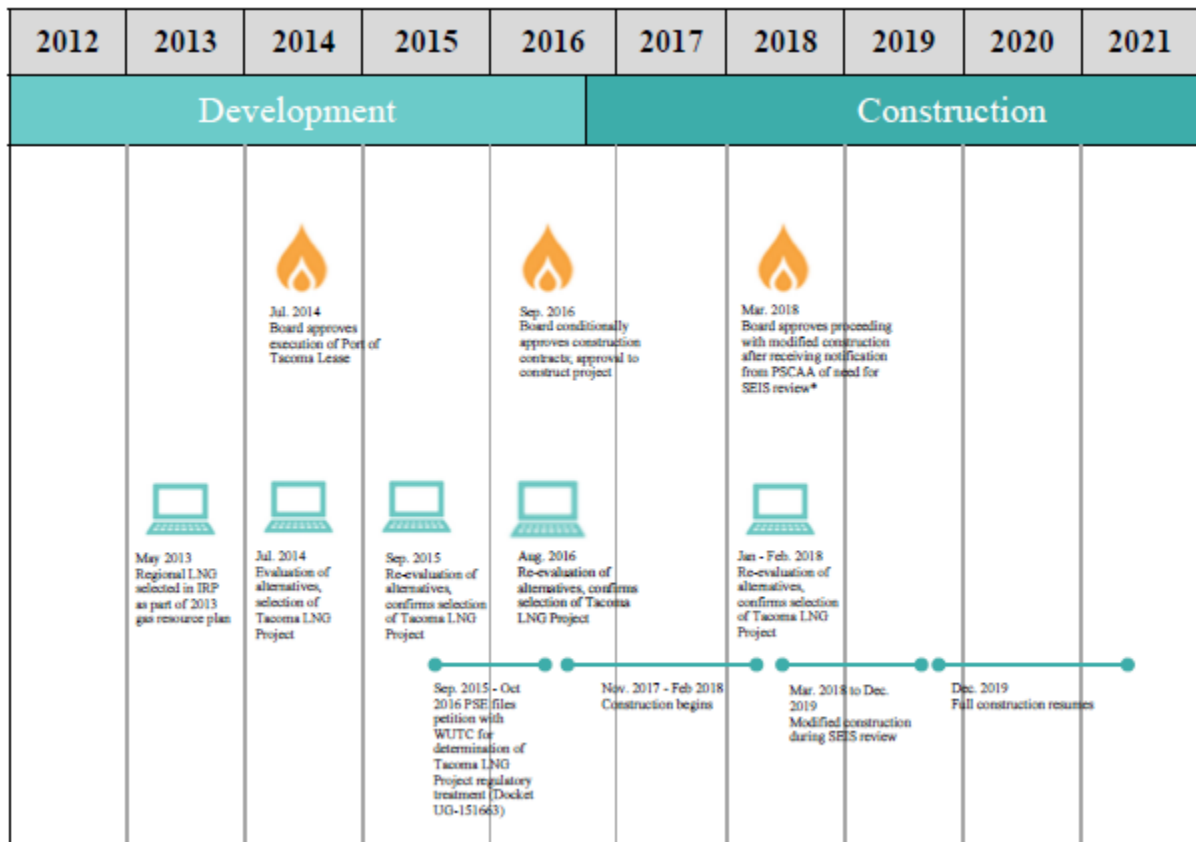
1.	January 22, 2015 – Update to the PSE Board of Directors Regarding Additional Risk Analysis and Mitigation Plan.....	18
2.	February 27, 2015 – Reexamination of the Tacoma LNG Project In Light of Decreases in Oil Prices.....	20
3.	April 28, 2015 – PSE Management Presented Four Alternatives for the Tacoma LNG Facility to the PSE Board of Directors .....	24
4.	May 30, 2015– The 2015 IRP Projected Net Present Values to Customers in the Range of \$8.4 million to \$103 million.....	25
5.	June 25, 2015 – PSE Management Updates the PSE Board of Directors Regarding New Capital Cost Projections for the Tacoma LNG Project .....	29
6.	August 6, 2015 – PSE Management Recommends Chicago Bridge & Iron as the EPC Contractor for the Tacoma LNG Facility .....	31
7.	September 24, 2015 – Update to PSE Board of Directors in Anticipation of Entering Into EPC Contract with Chicago Bridge & Iron.....	39
8.	October 1, 2015 – SS El Faro Tragically Sinks in the Caribbean .....	39
9.	November 5, 2015 – PSE Management Did Not Seek Approval of Construction Contracts for the Tacoma LNG Facility .....	40
10.	November and December 2015 – Permits Issued and Meetings Held.....	41
<b>D.</b>	<b>Major Activities in Calendar Year 2016.....</b>	<b>41</b>
1.	Early January 2016 – Additional Permits are Issued.....	41
2.	January 21, 2016 – The PSE Board of Directors Considers the Tacoma LNG Project in Light of Commission Activities and Permit Appeals .....	42
3.	February 26, 2016 – The PSE Board of Directors Authorizes PSE to Pursue a Path for Unregulated Sales of LNG as a Vehicular Fuel.....	43
4.	March and April 2016 – PSE Obtains Additional Permits Necessary for the Tacoma LNG Project .....	43
5.	May 5, 2016 – Informational Update to the PSE Board of Directors.....	43
6.	May and June 2016 – Additional Permitting Activities .....	44

7.	June 23, 2016 – Informational Update to the PSE Board of Directors.....	44
8.	July 2016 – Additional Permitting Activities .....	44
9.	July 2016 – The F16 Load Forecast Projects an Immediate Need for the Tacoma LNG Project .....	45
10.	August 4, 2016 – The PSE Board of Directors Affirmed the Overall Strategy for Development and Construction of the Tacoma LNG Project .....	45
11.	September 22, 2016 – The PSE Board of Directors Authorized Contingent Start of Construction of the Tacoma LNG Facility, .....	52
<b>II.</b>	<b>CONSTRUCTION PHASE OF THE TACOMA LNG PROJECT.....</b>	<b>53</b>
<b>A.</b>	<b>Major Activities in Calendar Year 2017 .....</b>	<b>54</b>
1.	Informational Report to the PSE Board of Directors -- April 6, 2017 and June 22, 2017 .....	54
2.	July 2017 – The F17 Load Forecast Projects an Immediate Need for the Tacoma LNG Project .....	56
3.	November 2, 2017 – PSE Management Informs the PSE Board of Directors that the Tacoma LNG Project Has Exceeded Budget .....	56
4.	November 2017 – The 2017 IRP Identified a Need for the Tacoma LNG Facility .....	56
<b>B.</b>	<b>Major Activities in Calendar Year 2018.....</b>	<b>57</b>
1.	January 2018 – Update to the PSE Board of Directors Regarding the Tacoma LNG Project.....	57
2.	January 24, 2018 – The Puget Sound Clean Air Agency Determined a Supplemental Environmental Impact Statement Was Necessary for the Tacoma LNG Facility .....	59
3.	March 1, 2018 – The PSE Board of Directors Re-evaluated Options Available to PSE for the Tacoma LNG Project .....	59
4.	May 3, 2018– Update to the PSE Board of Directors Regarding the Tacoma LNG Project.....	66
5.	June 21, 2018 – Update to the PSE Board of Directors Regarding the Tacoma LNG Project.....	67
6.	July 2018 – The F18 Load Forecast Projects an Immediate Need for the Tacoma LNG Project .....	68

7.	August 2, 2018 and September 20, 2018 – Informational Updates to the PSE Board of Directors.....	68
8.	October 8, 2018 – The Puget Sound Clean Air Agency Releases a Draft Supplemental Environmental Impact Statement for the Tacoma LNG Project Finding That the Project Will Reduce Greenhouse Gas Emissions .....	68
9.	November 1, 2018 – Update to the PSE Board of Directors Regarding the Draft Supplemental Environmental Impact Statement Issued by the Puget Sound Clean Air Agency .....	69
<b>C.</b>	<b>Major Activities in Calendar Year 2019 .....</b>	<b>69</b>
1.	March 29, 2019 – The Puget Sound Clean Air Agency Issued a Final Supplemental Environmental Impact Statement.....	69
2.	June 20, 2019 – The F19 Load Forecast Projected an Immediate Need for the Tacoma LNG Project .....	70
3.	September 19, 2019 – Update to the PSE Board of Directors.....	70
4.	December 1, 2019 – The 2019 IRP Progress Report Projected That the Tacoma LNG Project Would Be Necessary and Become Used and Useful in the Winter of 2021-22 .....	70
5.	December 10, 2019 – The Puget Sound Clean Air Agency Issued a Notice of Construction Permit for the Tacoma LNG Facility .....	71
6.	December 19, 2019 – The Puyallup Tribe and Earthjustice Appeal the Final Supplemental Environmental Impact Statement and the Notice of Construction Permit for the Tacoma LNG Facility .....	71
<b>D.</b>	<b>May 6, 2020 – Update to PSE Board of Directors Regarding Impact of COVID-19 on Construction Activities for the Tacoma LNG Facility .....</b>	<b>71</b>
<b>E.</b>	<b>Major Activities in Calendar Year 2021 .....</b>	<b>71</b>
1.	February 5, 2021 – The Tacoma LNG Facility Achieves Mechanical Completion .....	71
2.	March 2021 to January 2022 – Natural Gas Is Delivered to the Tacoma LNG Facility .....	72

PSE divided the processes involving the Tacoma LNG Project into two distinct phases: (i) the development phase and (ii) the construction phase. Development activities include the work PSE undertook prior to executing the construction contracts to build the Tacoma LNG Facility. The construction phase began with the execution of the Engineering, Procurement and Construction (“EPC”) contract and other construction contracts and continued through mechanical completion when site control was turned over to PSE and its operations contractor, NAES Corporation. Figure 1 below presents a high-level overview of the phases and key decision points associated with the Tacoma LNG Project.

**Figure 1. High-Level Overview of Tacoma LNG Project Phases and Key Decision Points**



\*Puget Sound Clean Air Agency (PSCAA), Supplemental Environmental Impact Statement (SEIS)

## **I. DEVELOPMENT PHASE OF THE TACOMA LNG PROJECT**

The development phase associated with the Tacoma LNG Project included the following major project development work:

- commercial and technical feasibility and due diligence;
- identifying and securing the site for the Tacoma LNG Facility and procuring all required real estate rights for the Tacoma LNG Project;
- preliminary facility design;
- preliminary distribution upgrades design;
- contracting with potential long-term LNG transportation fuel customers (unregulated service); and
- permitting.

As described in Section III.D.2 of my testimony, the Prefiled Direct Testimony of Ronald J. Roberts, Exh. RJR-1CT, PSE received conditional approval from the PSE Board of Directors to execute an EPC agreement for the Tacoma LNG Facility in September 2016. PSE satisfied the conditions for executing the EPC agreement in October 2016. On November 1, 2016, PSE and Chicago Bridge & Iron entered into an EPC agreement for the construction of the Tacoma LNG Facility, thereby concluding the development phase and commencing the construction phase.

### **A. Development Activities for the Tacoma LNG Project Conducted Prior to Calendar Year 2014**

#### **1. May 30, 2009 – The 2009 IRP Identified a Potential Need for a Regional LNG Storage Facility**

PSE first identified a potential need for an LNG storage facility to meet demand in its

2009 Integrated Resource Plan (the “2009 IRP”)<sup>1</sup> that was filed with the Commission on May 30, 2009 in Dockets UG-080948 and UE-080949. The 2009 IRP stated that PSE’s gas sales portfolio had sufficient resources through the winter of 2014-2015 but would need additional gas supply resources thereafter.<sup>2</sup> LNG storage resources were among the resources that PSE identified for consideration:

Participation in a regional LNG storage facility is also being considered. PSE’s evaluation assumes costs and operating characteristics similar to the Mount Haynes LNG storage project currently under construction on Vancouver Island by Terasen Gas. LNG storage projects offer “needle peaking” capability, i.e. delivery of stored gas over a relatively short period of time (this analysis assumes approximately 10 days).<sup>3</sup>

Although the 2009 IRP did not identify an LNG liquefaction and storage facility owned by PSE, it did identify a regional LNG liquefaction and storage facility as a resource to meet PSE’s needs.

**2. May 30, 2011 – The 2011 IRP Projected a Need for a Regional LNG Storage Facility for Winter 2024-25**

Next, PSE identified a need for an LNG liquefaction and storage facility to meet demand in its 2011 Integrated Resource Plan (the “2011 IRP”)<sup>4</sup> that was filed with the Commission on May 30, 2011, in Docket UG-100960. The 2011 IRP explained that PSE plans its resource need for the gas sales portfolio based on peak-day capacity. Specifically, the 2011 IRP stated that PSE planned supply to meet firm loads on a thirteen (13) degree Fahrenheit design peak day, which corresponds to a 52 Heating Degree Day. The 2011 IRP determined that PSE’s gas load and resources were in balance until about 2017 and identified

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<sup>1</sup> Puget Sound Energy, *2009 Integrated Resource Plan*, Dockets UG-080948 & UG-080949 (May 30, 2009).

<sup>2</sup> See 2009 IRP at 6-29.

<sup>3</sup> See 2009 IRP at 6-33.

<sup>4</sup> Puget Sound Energy, *2011 Integrated Resource Plan*, Docket UG-100960 (May 30, 2011).



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.<sup>5</sup>

The lowest reasonable cost plan identified in the 2011 IRP included the combination of a regional LNG facility and cross-Cascades pipeline capacity to meet future demand:

A relatively small amount of regional LNG storage (51 MDth per day) is included in the resource plan beginning in 2021, and 31 MDth per day of cross-Cascades pipeline capacity is included later in the planning horizon. To achieve “economies of scale,” development of either of these projects will require substantial size to be cost effective. For example, a regional LNG storage facility would need deliverability of perhaps 150 MDth per day to be cost effective, and a cross-Cascades pipeline would need a capacity of perhaps 250-300 MDth per day, depending on the specific project. It is unlikely that PSE would proceed with either project without partners.<sup>6</sup>

Given the potential need for LNG storage resources in both the 2009 IRP and 2011 IRP, PSE started considering how it might be able to develop such a facility.

**3. May 9, 2012 – The PSE Board of Directors Approves a Recommendation That PSE Pursue an LNG Business Strategy**

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. Please see Exh. RJR-5C at 4-61 for a copy of materials presented to the PSE Board of Directors at the May 9, 2012 meeting which included three potential LNG business models:

1. Provide Distribution and Commodity to Third Party LNG Suppliers.
2. Own LNG facilities with an Anchor Customer, with a strategy to grow the business over the longer term.

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<sup>5</sup> See 2011 IRP at 1-13.

<sup>6</sup> See 2011 IRP at 2-12.

3. Own Retail LNG Fueling Stations, in addition to LNG infrastructure.

All three of these business models contemplated PSE's involvement in the fuel supply portion of the value chain, as opposed to any consideration of involvement in the end-use part of the value chain. *See* Exh. RJR-5C at 53.

The first business model involved providing distribution service and natural gas commodity to third-party LNG suppliers; third parties would own and operate an LNG facility, and PSE would supply the natural gas commodity and distribution service to the LNG facility. PSE believed that the Port of Tacoma would be the most likely location for such a facility with TOTE Maritime ("TOTE") as an anchor customer. *See* Exh. RJR-5C at 39-40.

PSE believed that this business model easily fit within PSE's core competencies as a natural gas distribution company, yet PSE identified several risks to the model. First, a large customer of natural gas commodity, such as an LNG facility, could bypass PSE's distribution with a lateral at the Port of Tacoma, thereby potentially leaving PSE's investments as stranded assets. Second, having an intermediary between PSE and the ultimate end-use customers, would reduce PSE's ability to participate in growth in a future LNG market. Finally, and most importantly, this business model hindered PSE's ability to cost-effectively use an LNG facility to meet its need for system uses, including Gig Harbor, Kittitas County and a system peaking capability. *See* Exh. RJR-5C at 40.

The second business model considered by PSE was owning an LNG liquefaction and storage facility with a long-term anchor customer under a regulated tariff or special contract. PSE would secure a long-term contract with a large LNG customer and then permit and construct the liquefaction facility and appropriate storage. *See* Exh. RJR-5C at 55.

PSE believed that the ownership and operation of an LNG liquefaction and storage facility was a strong fit with PSE's core competencies and long history of safe operation of complex energy generation facilities, underground gas storage, LNG storage, and wind power plants. PSE's consultants explained that the operation of an LNG facility requires the same skill set as one would find in power generation plant management (i.e., a highly structured, procedure-oriented view towards efficient operation and a priority on safety). The ownership of an LNG liquefaction and storage facility would allow PSE to serve an anchor customer, and it would also provide benefits to PSE's natural gas business by supplying LNG to Gig Harbor and Kittitas County, and operating as a system peaking resource to serve the southern portion of PSE's natural gas distribution territory. *See* Exh. RJR-5C at 56.

The third business model analyzed by PSE was considerably more ambitious than the first two business models; PSE would own unregulated retail LNG gas stations as an extension of its ownership of the regulated LNG liquefaction and storage facility. *See* Exh. RJR-5C at 57. PSE concluded, however, that ownership of retail fueling stations would not comport with PSE's core competencies. *See* Exh. RJR-5C at 58-59.

Ultimately, PSE management recommended that the PSE Board of Directors authorize PSE to adopt the second business model whereby PSE would own an LNG liquefaction and storage facility and make LNG sales to a long-term anchor customer. PSE management based its recommendations five key findings that the second business model:

1. offered PSE the best opportunity to invest capital to serve a customer's need while simultaneously providing system benefits.
2. was within PSE's core competencies (operating energy facilities in a safe, efficient, and dependable manner).

3. presented risks in permitting, development, construction, and safe operation of complex energy facilities with which PSE has expertise in mitigation and control.
4. presented PSE with an opportunity to participate in market growth in LNG transportation usage, especially as a fuel for the maritime and trucking industries.
5. presented PSE with an advantage in the marketplace because PSE could offer pricing for the service on a cost-of-service basis rather than pricing tied to the cost of diesel.

*See* Exh. RJR-5C at 59-60.

PSE management also recognized that the first business model (i.e., providing natural gas commodity and distribution service to third-party LNG suppliers) could serve as a fallback option if PSE were to fail to procure an anchor customer for a liquefaction facility.

*See* Exh. RJR-5C at 60.

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, including the following activities:

- continued pursuit of potential customers for use of LNG fuel, including TOTE, the Washington State Ferries, other maritime fleets, and customers in the operating long-haul trucking fleets;
- identify potential partners in an LNG liquefaction and storage facility, including exploring preferred technology providers and fuel bunkering solutions, and identifying potential marketing partners and consultants;
- explore siting and permitting opportunities, including the Port of Tacoma, the Port of Everett, and Puyallup tribal property; and
- establish a community and regulatory strategy to meet community and business needs and concerns.

*See* Exh. RJR-5C at 60-61.

On October 19, 2012, PSE's Energy Management Committee approved a development budget of \$10 million to pursue the development of an LNG liquefaction and storage facility.

**4. August 16, 2012 – The F12 Load Forecast Projects a Need for an LNG Storage Facility Beginning in Winter 2019-20**

In August 2012, PSE approved the F12 Load Forecast, projected that PSE would be short core gas resources in the winter of 2019 - 20 without the development of an LNG liquefaction and storage facility. *See* Exh. RJR-8 at 5 (column F2012).

**5. January 23, 2013 – The PSE Board of Directors Approves a Recommendation that PSE Continue to Pursue an LNG Business Strategy**

At a meeting on January 23, 2013, PSE management provided an update to the PSE Board of Directors regarding the PSE LNG business strategy. *See* Exh. RJR-5C at 63-135 for materials presented to the PSE Board of Directors at the January 23, 2013 meeting. PSE management updated the PSE Board of Directors on the following activities that PSE had undertaken since the May 9, 2012 meeting of the PSE Board of Directors:

- (i) conducted sited evaluation to identify a preferred location for an LNG liquefaction and storage facility, (ii) selected the Port of Tacoma as the preferred site, and (iii) begun long-term lease negotiations with the Port of Tacoma;
- analyzed the regulatory requirements for the supply and use of LNG as a maritime fuel, including LNG exclusion zones and requirements of the U.S. Coast Guard;
- developed a permitting strategy and started the initial meetings with key agencies regarding permitting issues;
- selected and engaged consulting firms to support the PSE permitting strategies and activities;
- begun the process for selection of engineering firms to provide front-end engineering and design of an LNG liquefaction and storage facility; and

- conducted preliminary commercial negotiations with potential anchor customers, including TOTE.

*See* Exh. RJR-5C at 63-135.

PSE management presented the PSE Board of Directors with an analysis of likely market opportunities for the use of LNG as a fuel prepared by a respected energy consulting firm. *See* Exh. RJR-5C at 98-135. The LNG market analysis concluded there was potential for significant market growth of distributed LNG in PSE's market area due to (i) the projected costs of LNG versus oil-based fuels, such as ultra-low sulfur diesel and low-sulfur marine fuel, (ii) environmental initiatives, and (iii) advancement of LNG engine and storage technologies. The market analysis described the limited availability of LNG infrastructure as the largest factor preventing wide scale adoption of LNG as a fuel, especially in the marine and heavy-duty trucking markets, and identified PSE's proposed LNG liquefaction and storage facility as a potential catalyst in the development of a regional market for the use of LNG as a transportation fuel.

The market analysis identified factors establishing a need to move quickly in development and construction of a proposed LNG liquefaction and storage facility, including:

- the spread between oil and natural gas-based fuels was then at a high level, which increased interest in the use of natural gas as a transportation fuel;
- large marine customers, such as TOTE, interested in converting to comply with emission control area requirements must begin permitting, capital allocation, engineering, design and fleet planning to begin using LNG within three to five years; and
- distributors interested in investing in LNG fueling infrastructure for the on-road transportation market can be assured of a local source of LNG supply.

The market analysis concluded that the demand for LNG in PSE's market area should be sufficient by 2020 to absorb the production capacity of the LNG liquefaction and storage facility contemplated by PSE. *See* Exh. RJR-5C at 129.

**6. February 28, 2013 – PSE and the PSE Board of Directors Re-Examined the LNG Business Strategy**

At a meeting on February 28, 2013, PSE management and the PSE Board of Directors reexamined the PSE LNG business strategy. *See* Exh. RJR-5C at 137-155 for materials presented to the PSE Board of Directors at the February 28, 2013 meeting. This reexamination of the PSE LNG business strategy resulted from a TOTE decision that it would likely not decide on its preferred LNG supplier until the late spring/early summer of 2013 and that contract negotiations would likely extend through the same period. Accordingly, PSE dramatically reduced its permitting activities but continued to advance the front-end engineering and design activities with Chicago Bridge & Iron to gain a better understanding of the cost and site capability of the project.

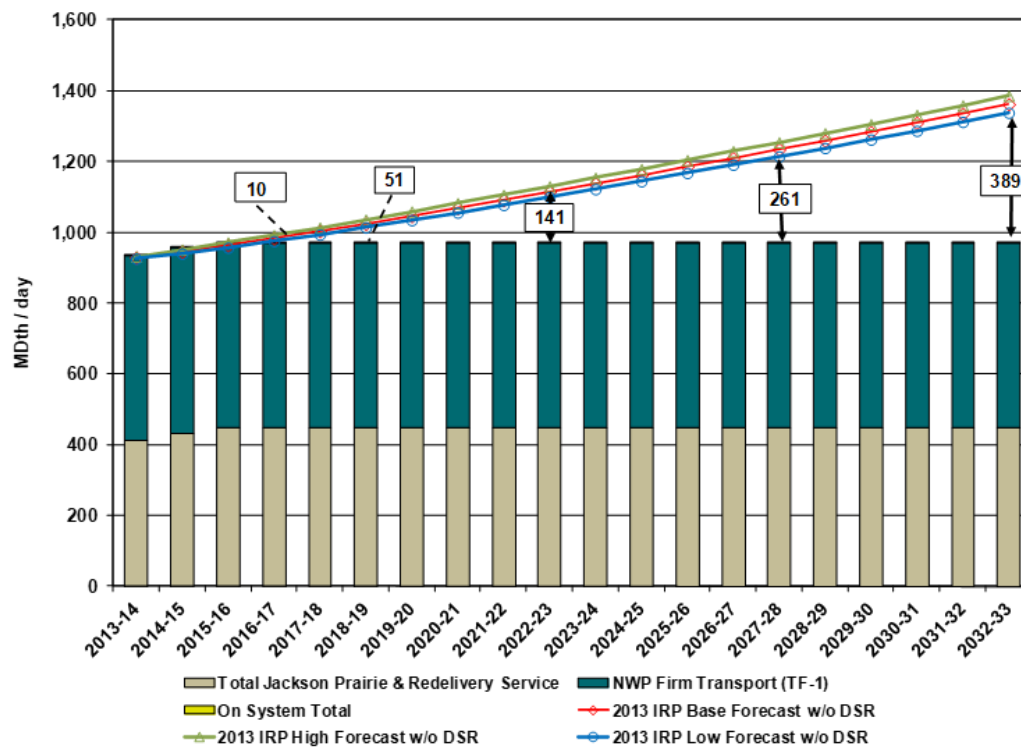
PSE management presented additional analyses to the PSE Board of Directors at the February 28, 2013 meeting that provided insight into the projected competitive market for LNG supply in the Pacific Northwest and credit analyses for each of the potential counterparties, either as partners in, or customers of, the proposed LNG liquefaction and storage facility. *See* Exh. RJR-5C at 143-155. The analysis suggested that an LNG facility at the Port of Tacoma would be well-positioned (i) to supply LNG as a transportation fuel to the maritime and long-haul trucking industries, and (ii) provide peak day support to PSE's regulated gas distribution business. Although the location at the Port of Tacoma may have been more expensive than alternate sites, PSE would gain TOTE as an anchor customer by locating at the Port of Tacoma, and this sale of LNG as a maritime fuel made the entire project possible.

Moreover, the Port of Tacoma is in the heart of PSE’s gas distribution system and siting the LNG facility there would provide system benefits for PSE’s core gas customers. *See* Exh. RJR-5C at 143-155.

**7. May 30, 2013 – The 2013 IRP Identifies an LNG Storage Project as Cost-Effective in All Scenarios**

PSE’s 2013 IRP demonstrated a need for additional peak-day resources beginning in the winter of 2016-17. Figure 2 below represents PSE’s gas peak-day resource need forecast over a 20-year planning horizon and compares existing resources to peak-day demand on the coldest day of the year.

**Figure 2. 2013 IRP Gas Peak Need<sup>7</sup>**



<sup>7</sup> Figure 6-1 from the 2013 IRP.



PSE's analysis tested three customer demand forecasts over the planning horizon: (i) the 2013 IRP Base Demand Forecast; (ii) the 2013 IRP High Demand Forecast; and (iii) the 2013 IRP Low Demand Forecast. In all three cases, the forecast demonstrated that PSE had sufficient peak resources for PSE to meet peak day need until the winter of 2016-17, and a need for additional resources beginning in the winter of 2017-18.

**8. July 2013 – The F13 Load Forecast Projects an Immediate Need for an LNG Storage Project**

In July 2013, PSE approved the F13 Load Forecast, which projected that PSE would be short core gas resources in the winter of 2017-18 without the development of a LNG liquefaction and storage facility. *See* Exh. RJR-8 at 5 (column F2013).

**9. November 8, 2013 – The PSE Board of Directors Authorizes Continued Execution of an LNG Business Strategy**

On November 8, 2013, PSE management sought approval from the PSE Board of Directors to continue to execute on PSE's proposed LNG business strategy. Please see Exh. RJR-5C at 157-63 for materials presented to the PSE Board of Directors at the November 8, 2013 meeting. PSE management projected total capital expenditures in a range with a low cost of \$243 million, an anticipated cost of \$266 million, and a high cost of \$312 million. *See* Exh. RJR-5C at 158. PSE projected that approximately 41 percent of the capital expenses would be allocated to regulated natural gas service for use as a peaking plant and the remaining 59 percent of the capital expenses would be allocated to sales of LNG as a transportation fuel. *See* Exh. RJR-5C at 159. The PSE Board of Directors authorized PSE to continue to execute on the LNG business strategy.

**B. Major Activities in Calendar Year 2014**

**1. January 2014 – The F14 Load Forecast Projects an Immediate Need for the Tacoma LNG Project**

In January 2014, PSE approved the F14 Load Forecast, which projected that PSE would be short core gas resources in the winter of 2015-16 without the development of a LNG liquefaction and storage facility. *See* Exh. RJR-8 at 5 (column F2014).

**2. January 22, 2014 – The PSE Board of Directors Authorizes Continued Execution of the LNG Strategy**

On January 22, 2014, PSE management updated the PSE Board of Directors on development activities for the Tacoma LNG Project. Please see Exh. RJR-5C at 165-83 for materials presented to the Board of Directors at the January 22, 2014 meeting. PSE management presented Table 1, a matrix of the potential risks and opportunities associated with the Tacoma LNG Project to the PSE Board of Directors:

**Table 1. Risks/Opportunities Matrix**

<b>Risk</b>	<b>What</b>	<b>Probability</b>	<b>Magnitude</b>	<b>Mitigation Plan</b>
Financial	TOTE credit	Low	Medium	Saltchuk parental guaranty/letter of credit; plant will be in rate base.
	Blu credit	Low	Low	If adequate/ acceptable credit can't be provided, Blu will invest equity.
	Project costs	Medium	Low	Contract pricing will be established with EPC guaranteed pricing.
	Fuel oil price trigger	Low	Low	Termination fees will recover TOTE's remaining allocated plant cost in the first five years.
Political (Opportunity)	Help Governor Inslee meet transportation emission/clean energy goals	Medium	High	Working with the governor and staff to promote benefits of natural gas.

**Table 1. Risks/Opportunities Matrix**

<b>Risk</b>	<b>What</b>	<b>Probability</b>	<b>Magnitude</b>	<b>Mitigation Plan</b>
Regulatory	WUTC could deny regulated rate-base treatment	Medium	High	Working with WUTC commissioners and staff (and Governor's office) to promote peaking resource benefit and espouse clean energy and economic regional benefits. Considering legislation.
Permitting	Permits are appealed; delays ensue	Low	High	Supplementing an existing Port of Tacoma EIS to mitigate environmental challenges. Talk early and often to stakeholders.
Competition (Opportunity)	Project scale provides lower cost peaking resource	High	Low	Find complimentary markets (TOTE/others) to optimize LNG facility pricing.
Reputational	LNG facilities attract NIMBYs and environmental activists	Medium	Low	Develop public outreach programs. PSE builds and operates many NIMBY-attracting facilities.

See Exh. RJR-5C at 173-74.

PSE management presented the following next steps in development of the Tacoma LNG Project:

- negotiate a letter of intent and fuel supply agreement with TOTE;
- negotiate an agreement for interim fuel supply to TOTE;
- negotiate a letter of intent and joint venture agreement with a potential third-party marketer;
- negotiate a lease with the Port of Tacoma;
- recommence permitting studies and application preparations;
- recommence geotechnical investigation and soil stabilization engineering;

- accelerate engineering work associated with natural gas distribution system upgrades;
- reexamine and finalize the design for liquefaction and pretreatment equipment; and
- finalize a tariff schedule and special contracts for the sale of LNG as a transportation fuel for filing with the Commission.

*See* Exh. RJR-5C at 178.

PSE sought and received approval from the PSE Board of Directors to:

- continue negotiating a letter of intent with TOTE for a fuel supply agreement;
- pursue discussions of a potential partnership with a third-party marketer; and
- restart plant development and permitting activities.

*See* Exh. RJR-5C at 180.

**3. July 2 and July 30, 2014 – The PSE Board of Directors Authorizes PSE to Enter Into a Fuel Supply Agreement with TOTE and a Ground Lease with the Port of Tacoma**

On July 2, 2014, PSE management updated the PSE Board of Directors regarding development activities of the Tacoma LNG Project. Please see Exh. RJR-5C at 185-588 for materials presented to the PSE Board of Directors at the July 2, 2014 meeting. PSE management specifically recommended that the PSE Board of Directors authorize PSE to enter into three agreements:

1. a fuel supply agreement with TOTE for a ten-year term, commencing January 1, 2019, with possible extensions for up to a total of fifteen additional years.
2. an interim fuel supply agreement with TOTE with a three-year term (January 1, 2016, through January 1, 2018).
3. a ground lease for 33 acres at the Port of Tacoma, which includes a two-year due diligence period, followed by a three-year

construction period, followed by a 25-year term commencing upon commercial operation of the Tacoma LNG Facility.

*See* Exh. RJR-5C at 185-233.

PSE is not addressing the terms and conditions of the fuel supply agreement and the interim fuel supply agreement with TOTE in this proceeding. Following the outcome in Docket UG-151663, PSE's parent company, Puget Energy, Inc., created a non-regulated subsidiary, Puget LNG LLC ("Puget LNG"), and sister company of PSE that will undertake all non-regulated activities associated with the Tacoma LNG Facility. Subsequent to the creation of Puget LNG, PSE assigned the fuel supply and interim fuel supply agreements with TOTE to Puget LNG and those agreements are Puget LNG obligations have no impact on PSE. Accordingly, the terms and conditions of the fuel supply and interim fuel supply agreement need not be addressed by the Commission in this proceeding.

The lease with the Port of Tacoma for the Tacoma LNG Facility is for approximately 30.15 acres of uplands and approximately three acres of submerged lands for the purpose of LNG production, storage, and distribution. Key terms and conditions of the Port of Tacoma lease are:

- Term. 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;
- Renewal Rights. With timely notice, the lease provides for a 25-year renewal, provided at least 45 percent of the capacity involves marine uses (either fueling or transported by marine vessel); otherwise, the renewal is at the Port of Tacoma's discretion;
- Termination Prior to Construction. The lease can be terminated during the due diligence and permitting phase upon notice, subject to a termination payment that is not applicable if termination is due to existing environmental contamination;

- Rent. The rental rate of the Port of Tacoma lease depends on the period of time and status of the Tacoma LNG Facility:
  - Due diligence phase (initial 12 months): \$49,725 per month;
  - Extended due diligence period: the lease payment increases \$10,000 each month of the extended due diligence period (for up to 12 additional months) eventually growing to \$169,725 in month 24;
  - Construction period: \$212,445 per month, commencing the earlier of beginning site improvements or month 25;
  - Operating term: \$212,445 per month, commencing on the first date of commercial operations;
  - Volumetric charge: \$0.085/barrel for all bulk volumes sold, with the Port reserving the right to establish an LNG specific tariff;
  - Escalation: the lease pricing components escalate annually at CPI;
- Allocation of Environmental Obligations. Environmental responsibilities are allocated between the Port of Tacoma and PSE, as follows:
  - During construction of the Tacoma LNG Facility, the Port of Tacoma will be responsible for removal and disposal of (1) any contaminated media that PSE encounters up to a depth of five feet below ground surface, and (2) any hazardous substances, such as asbestos or lead paint, encountered during site demolition;
  - PSE will be responsible for removal and disposal of any contamination encountered beneath depths of five feet below ground surface during construction;
  - PSE will be responsible for any additional remedial investigations or cleanup work caused solely by construction of the Tacoma LNG Facility; and
  - During construction and operation of the Tacoma LNG Facility, PSE must demonstrate that its use of the

property complies with all environmental laws and is responsible for any related spills or releases;

- Indemnification. In addition to typical indemnification language, PSE must indemnify the Port of Tacoma if PSE's activities adversely inhibit the normal course of operations in the port;
- Removal and Restoration. Upon termination of the lease, the Port of Tacoma reserves the right to retain or have PSE remove the leasehold improvements.

PSE also leases a small portion of the TOTE terminal (less than an acre) from the Northwest Seaport Alliance to accommodate marine fueling infrastructure at the TOTE terminal.

At a meeting on July 30, 2014, the PSE Board of Directors authorized PSE to enter into a fuel supply agreement, an interim fuel supply agreement, and the Port of Tacoma lease. Please see Exh. RJR-5C at 590-822 for materials presented to the PSE Board of Directors at the July 30, 2014 meeting. The lease was then approved by the Port of Tacoma at a public meeting on August 24, 2014. PSE and the Port of Tacoma executed the lease on September 4, 2014. Please see Exh. RJR-4C for a copy of the lease between the Port of Tacoma and PSE.

**4. December 2014 – The F15 Load Forecast Projects an Immediate Need for the Tacoma LNG Project**

In December 2014, PSE approved the F15 Load Forecast, which projected that PSE would be short core gas resources in the winter of 2016-17 without the development of an LNG liquefaction and storage facility. *See* Exh. RJR-9 at 5 (column F2015).

**C. Major Activities in Calendar Year 2015**

**1. January 22, 2015 – Update to the PSE Board of Directors Regarding Additional Risk Analysis and Mitigation Plan**

At a meeting on January 22, 2015, PSE management updated the PSE Board of Directors regarding the status of development of the Tacoma LNG Project. Please see Exh. RJR-5C at 824-38 for materials presented to the PSE Board of Directors at the January 22,

2015 meeting. PSE management provided the following updates:

- Budget and Schedule – Total capital spend for calendar year 2014 was \$1.1 million below the revised 2014 budget, and total project development was expected to be \$13.8 million;
- Permitting
  - Environmental Impact Statement – PSE subject matter experts were reviewing resource reports that would (i) serve as the basis for the draft Environmental Impact Statement and (ii) be filed with the City of Tacoma before the end of January 2015;
  - Conditional Use Permit for the Golden Givens Limit Station – PSE had submitted conditional use permits for the Golden Givens Limit Station in December 2014;
  - U.S. Coast Guard – PSE had submitted a Letter of Intent and Preliminary Waterway Suitability Assessment to the U.S. Coast Guard in December 2014 and planned to meet with the U.S. Coast Guard and emergency response stakeholders in January of 2015;
- Real Estate – PSE continued to work with Port of Tacoma on real estate rights needed for the Tacoma LNG Project at the Port of Tacoma;
- Rights of Way – PSE was evaluating alternatives to secure the right to use city streets;
- Distribution Upgrades – PSE purchased the land in December of 2014 for limit stations necessary to increase the natural gas distribution system in the Tacoma area; and
- Community Outreach – PSE had engaged with the City of Tacoma and key stakeholders regarding development of the Tacoma LNG Project.

See Exh. RJR-5C at 831.

PSE management provided the PSE Board of Directors a risk analysis from a third-party consulting firm regarding the likely impact of the decrease in oil prices in the second half of



2014 on the Tacoma LNG Project and the potential for PSE to find marketers or others to partner in the Tacoma LNG Facility. *See* Exh. RJR-5C at 832-838.

**2. February 27, 2015 – Reexamination of the Tacoma LNG Project In Light of Decreases in Oil Prices**

At a meeting on February 27, 2015, the PSE Board of Directors reexamined the economics of the Tacoma LNG Project in light of the decrease in oil prices in the second half of 2014. Please see Exh. RJR-5C at 840-863 for materials presented to the PSE Board of Directors at the February 27, 2015 meeting. Among the alternatives considered as part of this reexamination were the following:

1. Stay the Course – PSE would continue with the plan to build an LNG liquefaction and storage facility with a capacity of 250,000 gallons per day.
2. Downsize the Facility – PSE would build an LNG liquefaction and storage facility with a capacity of 140,000 gallons per day (enough to meet the TOTE and PSE demand only).
3. Delay the Decision – PSE would delay the execution of an EPC Contract up to January 1, 2017. and
4. Stop the Project – PSE would immediately cease all development activities and no longer pursue construction activities for the Tacoma LNG Project.

PSE management identified benefits and risks associated with the “stay the course” alternative. Benefits of the “stay the course” alternative were that it would:

- not require a change in PSE’s plans regarding an engineering, procurement, and construction (“EPC”) contractor or the permitting applications already filed;
- not deliver the same LNG liquefaction and storage facility discussed with regulators and permitting agencies;
- position PSE to meet the projected market demand for additional LNG for use as a transportation fuel in the region;

- allow core gas customers to benefit from spreading fixed costs of the facility over a higher customer base (assuming additional customers); and
- maintain consistency with the Integrated Resource Plans and PSE's financial plans.

See Exh. RJR-5C at 859. Among the risks of the “stay the course” alternative identified by PSE were projected capital expenditures (including AFUDC) of approximately \$97 million allocated to unsubscribed capacity of the larger facility and that PSE may not get rate recovery for costs associated with such unsubscribed capacity. See Exh. RJR-5C at 859.

PSE management identified benefits and risks associated with the “downsize the facility” alternative. Benefits of the “downsize the facility” alternative were that it would:

- enable PSE to meet peak day resource needs of its core gas customers and the transportation fuel required by TOTE;
- result in a smaller LNG liquefaction and storage facility, and position PSE to meet future growth with the installation of a second liquefaction train as the LNG market developed; and
- maintain consistency with the Integrated Resource Plans and PSE's financial plans.

See Exh. RJR-5C at 859. Among the risks of the “downsize the facility” alternative were that it would:

- reduce the volume of LNG over which fixed costs could be spread;
- result in a smaller facility, which diminishes the value of an LNG liquefaction and storage facility vis-à-vis an additional pipeline capacity alternative;
- not substantially reduce the costs to construct an LNG liquefaction and storage facility because the larger facility offers economies of scale and the cost of the facility is not a linear function of the capacity of the facility; and

- reduce total peaking resource capacity by 12% due to a reduction in diversion of firm delivery volumes.

*See* Exh. RJR-5C at 859.

PSE management identified benefits and risks associated with the “delay the decision” alternative. Among the benefits of the “delay the decision” alternative was that it would delay execution of the EPC contract to December 2016 (a projected delay of about fourteen months), during which time PSE could continue to market the LNG project and decide later in 2016 whether to continue with or stop the project. *See* Exh. RJR-5C at 860.

Risks of the “delay the decision” alternative were that it:

- would likely increase construction costs within a range of 4 percent and 7 percent, and there was no guarantee that PSE could find additional customers over the 14-month period;
- could hinder the development of an LNG market for transportation fuels in the region;
- was inconsistent with representations made by PSE to regulators and permitting agencies with respect to the development and construction of the Tacoma LNG Project; and
- would continue to leave PSE with a gas resource need to meet 2019 peak system loads.

*See* Exh. RJR-5C at 860.

PSE management did not identify any benefits associated with the “stop the project” alternative. Among the risks of the “stop the project” alternative were that it would:

- require PSE to write off all development costs, which PSE management projected to be \$15.4 million (including AFUDC);
- likely lead to litigation between PSE and TOTE regarding the terms and conditions of the TOTE Fuel Supply Agreement;
- cause PSE to lose credibility with regulators, politicians, and customers;

- make it difficult for PSE to pursue innovative projects in the future; and
- continue to leave PSE with a gas resource need to meet 2019 peak system loads.

*See* Exh. RJR-5C at 861.

PSE management recommended a hybrid approach to the PSE Board of Directors whereby PSE would:

1. continue a marketing effort over the next three to six months to find additional customers.
2. simultaneously and immediately develop a pricing option for a smaller LNG liquefaction and storage facility to serve primarily PSE and TOTE.
3. select an appropriate option such that final approval for the Tacoma LNG Project remains on schedule for late 2015.

*See* Exh. RJR-5C at 855. PSE identified potential benefits associated with the hybrid approach, including that it:

- maintains favorable benefits for the core gas customers when compared to an additional pipeline capacity alternative;
- mitigates the likelihood of litigation between PSE and TOTE over the TOTE Fuel Supply Agreement and eliminates the need to write off development costs;
- maintains flexibility for PSE to consider a smaller LNG liquefaction and storage facility, while preserving the option to add liquefaction trains to meet future growth in the LNG transportation fuel market; and
- preserves the system reliability and supply benefits that the LNG liquefaction and storage facility has over an additional pipeline capacity alternative.

*See* Exh. RJR-5C at 855.

Ultimately, the PSE Board of Directors did not elect any of the scenarios presented at the February 27, 2015 meeting. Instead, the PSE Board of Directors directed PSE management

to continue with its risk analysis and propose a mitigation plan at a meeting to be held in a few months.

**3. April 28, 2015 – PSE Management Presented Four Alternatives for the Tacoma LNG Facility to the PSE Board of Directors**

As directed, PSE management continued with its risk analysis and proposed a mitigation plan to the PSE Board of Directors at a meeting on April 28, 2015. Please see Exh. RJR-5C at 864-872 for materials presented to the PSE Board of Directors at the April 28, 2015 meeting. Specifically, PSE management presented the following four alternatives:

1. Fully-Regulated Model – PSE would continue development of an LNG liquefaction and storage facility with a capacity of 250,000 gallons per day, but all facility services would be fully regulated by the Commission.
2. Fully-Unregulated Model – PSE would continue development of an LNG liquefaction and storage facility with a capacity of 250,000 gallons per day, but all facility services would be unregulated.
3. Hybrid Model – PSE would continue development of an LNG liquefaction and storage facility with a capacity of 250,000 gallons per day, but (i) PSE would own only that portion of the assets necessary to meet peak system loads, and (ii) Puget Energy, Inc. would create an unregulated subsidiary that would own the remainder of the assets and make sales of LNG as a transportation fuel on an unregulated basis.
4. Hybrid Model With “Below the Line” Sharing – identical to the hybrid model alternative in part (iii) above, but Puget LNG and PSE’s core gas customers would share in the profits and losses of the unregulated sales of LNG as a transportation fuel.

*See Exh. RJR-5C at 867.*

At the meeting on April 28, 2015, PSE management recommended that the PSE Board of Directors authorize PSE to proceed with the hybrid model alternative in which PSE and an unregulated subsidiary of Puget Energy, Inc. would own the Tacoma LNG Facility as tenants

in common; PSE would own that portion of the assets necessary to meet peak system loads and the unregulated subsidiary would own the remainder of the assets and make sales of LNG as a transportation fuel on an unregulated basis. PSE management recommended the fully-regulated alternative as a fallback position if the PSE Board of Directors elected not to authorize the hybrid alternative. *See* Exh. RJR-5C at 871. The PSE Board of Directors authorized PSE to proceed with the hybrid model.

**4. May 30, 2015– The 2015 IRP Projected Net Present Values to Customers in the Range of \$8.4 million to \$103 million**

On May 30, 2015, PSE issued its 2015 IRP, which recommended a resource plan that included the Tacoma LNG Project (called the “PSE LNG Project” in the 2015 IRP and in Table 2 below).

**Table 2. Gas Resource Plan, Cumulative Additions  
MDth/Day of Capacity<sup>8</sup>**

<b>Resource</b>	<b>2018-2019</b>	<b>2022-2023</b>	<b>2026-2027</b>	<b>2034-2035</b>
Demand-Side Resources	12	28	3	37
PSE LNG Project	69	50	50	50
Swarr Upgrade	30	30	30	30
NWP/Westcoast Expansion	0	50	50	50
Mist Storage Expansion	0	54	150	150
Cross Cascades to AECO Expansion	0	0	0	78
Cross Cascades to Malin Expansion	0	0	0	78

Whereas the 2013 IRP modeled a 50 MDth/day generic regional LNG peaking plant, the 2015 IRP specifically evaluated the Tacoma LNG Project alongside other potentially available

<sup>8</sup> Figure 1-12 from 2015 IRP.

resource options. The Tacoma LNG Plant was selected as part of the 2015 IRP least-cost resource solution.

PSE considered a range of demand- and supply-side resource options, including long-haul interstate pipeline capacity as well as regional underground natural gas storage service and interstate pipeline storage redelivery service. Since interstate pipeline capacity in PSE's service territory is generally fully subscribed, and given the level of PSE's resource needs, the resource alternatives analysis evaluated expansion of the regional pipeline grid.

PSE uses the SENDOUT® gas portfolio model (GPM) from ABB Ventyx to model gas resources for long-term planning and long-term gas resource acquisition activities. SENDOUT is a widely used software tool that employs a linear programming algorithm to help identify the long-term, least-cost combination of resources to meet an established need. It is an integrated tool for gas resource analysis that models the gas supply network and the portfolio of supply, storage, transportation, and demand-side resources (including associated costs and contractual or physical constraints) to determine how a portfolio of resources should be added and dispatched to meet demand requirements in a least-cost fashion. The linear program considers thousands of variables and evaluates tens of thousands of possible solutions in order to generate a solution. A resource-mix dispatch can look at a range of potential capacity and size resources, including their fixed and variable costs.

Scenario analysis allows PSE to understand how different resources perform across a variety of economic and regulatory conditions that may occur in the future. Scenario analysis also clarifies the robustness of a particular resource strategy. In other words, it helps determine if a particular strategy is reasonable under a wide range of possible circumstances. For its 2015 IRP, PSE developed ten scenarios to consider various levels of customer demand, long-term

gas prices and a range of CO<sub>2</sub> emissions prices. As shown in Figure 3 below, the Tacoma LNG Project was chosen as a preferred resource in all ten scenarios presented in the IRP.

**Figure 3. 2015 IRP Tacoma LNG Project Resource Addition by Scenario<sup>9</sup>  
(in MDth/day)**

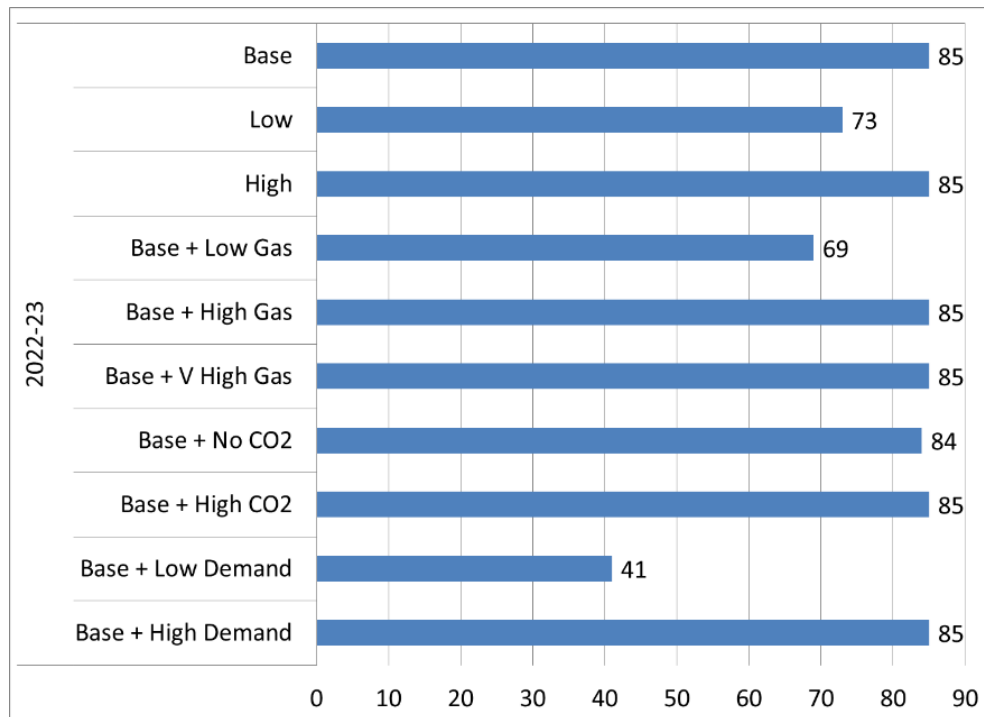


Figure 3 above appears to show that the model chose less than the full 85 MDth per day Tacoma LNG Project peaking resource in several scenarios because the gas portfolio model may not optimize on an all-or-nothing basis, but rather, it determines the optimal size of a resource to meet peak needs in a particular scenario. To further determine the cost or benefit of the Tacoma LNG Project versus other alternatives for each scenario, PSE compared two cases: one where 100 percent of the fixed capacity resource of Tacoma LNG Project is included (“with”), and another where the Tacoma LNG Project is not an available resource (“without”). The following Table 3 compares the net present value of the portfolio “with” 100

<sup>9</sup> Figure 7-25 from 2015 IRP



percent of the Tacoma LNG Project’s 85 MDth per day (85,000 decatherms “Dth” per day) to the portfolio “without” Tacoma LNG. This comparison shows there are portfolio benefits (cost savings) from including the full Tacoma LNG Project as a resource in every scenario. The 2015 IRP confirmed the Tacoma LNG Project to be a least-cost resource to serve customer demand in various future scenarios.

**Table 3. 2015 IRP scenario portfolio benefit of the Tacoma LNG Project (Table 7-26 from 2015 IRP)**

Scenario	Gas Portfolio Costs Net Present Value (2016\$ in thousands)		Benefit / (Cost) of LNG
	With LNG	Without LNG	
BASE	\$9,366,925	\$9,464,726	\$97,801
LOW	\$6,257,998	\$6,294,659	\$36,661
HIGH	\$12,963,307	\$13,052,452	\$89,146
BASE + LOW GAS	\$8,212,622	\$8,263,903	\$51,281
BASE + HIGH GAS	\$10,719,839	\$10,823,632	\$103,794
BASE+VERY HIGH GAS	\$11,906,047	\$11,994,805	\$88,758
BASE+NO CO2	\$7,775,728	\$7,846,172	\$70,444
BASE+HIGH CO2	\$10,465,655	\$10,565,404	\$99,748
BASE+LOW DEMAND	\$9,031,721	\$9,040,101	\$8,379
BASE+HIGH DEMAND	\$10,450,532	\$10,550,911	\$100,379

The portfolio costs include both the fixed and variable costs and operating assumptions of the LNG facility (e.g., inventory capacity, daily injection capacity, storage operating limits, etc.). The annual variable costs are those calculated by the Tacoma LNG Project pro forma financial model at the time of the analysis. To consider the full financial impact of the facility, the annual fixed costs include those of the pro forma model plus the net present value of the “end effects” of the LNG facility. The end effects represent the cost difference between

meeting gas sales peaking needs with the Tacoma LNG Project versus other resource alternatives at the end of the 50-year depreciable life of the Tacoma LNG Project in years 2036 through 2068.

The levels of customer demand, long-term gas prices and CO<sub>2</sub> emissions prices included within each of the ten scenarios analyzed in the 2015 IRP are summarized in the following Table 4.

**Table 4. 2015 IRP scenarios**

	<b>Scenario</b>	<b>Demand</b>	<b>Gas Price</b>	<b>CO<sub>2</sub> Price</b>
1	Low	Low	Low	None
2	Base	Mid	Mid	Mid
3	High	High	High	High
4	Base + Low Gas Price	Mid	Low	Mid
5	Base + High Gas Price	Mid	High	Mid
6	Base + Very High Gas Price	Mid	Very High	Mid
7	Base + No CO <sub>2</sub>	Mid	Mid	None
8	Base + High CO <sub>2</sub>	Mid	Mid	High
9	Base + Low Demand	Low	Mid	Mid
10	Base + High Demand	High	Mid	Mid

**5. June 25, 2015 – PSE Management Updates the PSE Board of Directors Regarding New Capital Cost Projections for the Tacoma LNG Project**

At a meeting on June 25, 2015, PSE management provided another update to the PSE Board of Directors regarding development activities for the Tacoma LNG Project. Please see Exh. RJR-5C at 874-878 for copies of materials presented to the PSE Board of Directors at the June 25, 2015 meeting. The primary purpose of the June 25, 2015 update was to update the

PSE Board of Directors on the projected capital costs of the Tacoma LNG Project. On June 1, 2015, Chicago Bridge & Iron submitted had revised pricing for an EPC contract that was \$46 million higher than the costs projected in the FEED study undertaken in 2015. The projected costs that had the highest increase over the projected costs in the 2013 FEED study were:

- estimates for demolition and geotechnical work increased by about \$3 million (\$4.5 million with contingency);
- substation costs increased by \$2 million (\$3 million with contingency);
- in-water work at the TOTE site increased by \$1 million (\$1.5 million with contingency); and
- other updates included revised estimates for support from outside services as well as permitting mitigations.

See Exh. RJR-5C at 876.

Table 5 below presents a comparison of the updated projected capital costs for the Tacoma LNG Project with the prior projected capital costs presented in the 2013 FEED Study:

**Table 5. Comparison of Updated Tacoma LNG Project Capital Budget to Previous Estimate**

<b>Tacoma LNG Capital Budget (\$ in millions)</b>	<b>Current Total</b>	<b>Previous Estimate</b>	<b>Delta</b>
Tacoma LNG Facility Total	311	274	37
Gas System Improvements	54	49	4
Tacoma LNG Project Total	364	323	41
AFUDC	46	47	(1)
Capitalized Interest	5	-	5
Closing Gross Plant	415	370	46

See Exh. RJR-5C at 876.

**6. August 6, 2015 – PSE Management Recommends Chicago Bridge & Iron as the EPC Contractor for the Tacoma LNG Facility**

At a meeting on August 6, 2015, PSE management recommended that the Board of Directors select Chicago Bridge & Iron as the EPC Contractor for the Tacoma LNG Facility. Please see Exh. RJR-5C at 879-930 for materials presented to the Board of Directors at the August 6, 2015 meeting. This recommendation grew out of a multiyear process undertaken by PSE to identify an EPC contractor for the Tacoma LNG Facility.

PSE originally retained the national engineering firm CH-IV International to assist with feasibility studies for the Tacoma LNG Facility. In 2012, based upon input from CH-IV International and a study of the marketplace, PSE determined that an EPC contracting methodology would be the preferred method for the Tacoma LNG Facility. *See* Exh. RJR-5C at 885. An EPC contract is a firm, fixed price contract with performance guarantees and liquidated damages. In exchange for having control of all elements of the project (engineering, procurement, and construction), the EPC contractor retains cost and schedule risks during project delivery. *See* Exh. RJR-5C at 886.

EPC contracts are particularly suitable for manufacturing or process plants where the owner can set specific performance criteria (in PSE's case, production quantity, storage quantity, and send-out requirements), but is not heavily vested in the methodology of producing the product (i.e., technology neutral and/or the design of the facility is outside the owner's core business or skill set). *See* Exh. RJR-5C at 886.

The EPC contractor is responsible for process design, including specifying, procuring, installing, and commissioning all elements of the project as required to meet performance specifications and guarantees stipulated by the owner in the contract. Since the EPC contractor also constructs the project, the owner has a single point of contact throughout the life of the

project. Also, because a single entity is responsible for both design and construction, a more active consideration of constructability and construction efficiency in the design of the project is more likely than it would be with alternative contracting methodologies. *See* Exh. RJR-5C at 886.

During the development phase of the Tacoma LNG Project, PSE selected a single EPC contractor, Chicago Bridge & Iron, an international leader in LNG plant and tank engineering and construction, to perform an initial FEED study to develop the plant to a conceptual level and provide budgetary pricing. PSE selected Chicago Bridge & Iron from a field of seven candidate firms or teams to perform the FEED study for the Tacoma LNG Project in January 2013, with the expectation that the EPC contract would most likely be executed with Chicago Bridge & Iron based upon satisfactory completion of the FEED study. *See* Exh. RJR-5C at 886.

Due to the commercial uncertainty of the Tacoma LNG Project, completion of the Chicago Bridge & Iron initial FEED study culminated in an open book price review and firm bid price in fall 2013. Although PSE did not intend to execute on the firm price proposal at that time, PSE used the work product to support continued project development, including permitting, regulatory oversight, and business origination. *See* Exh. RJR-5C at 887.

After receiving the first FEED study and pricing, PSE retained Chicago Bridge & Iron to continue value engineering and other plant design changes, as required, to support ongoing changes to the Tacoma LNG Project (e.g., TOTE direct loading line, permit preparation, developments in regulations, etc.). Chicago Bridge & Iron also played an active role in permitting activities, including providing content for the Draft Environmental Impact Statement and attending meetings with city and state regulators. *See* Exh. RJR-5C at 887.

Chicago Bridge & Iron continued to refine and improve the design after the 2013 FEED study and submitted a revised formal proposal for the Tacoma LNG Facility in June of 2015. This design reflected scope changes and value engineering improvements developed collaboratively with PSE since the 2013 proposal. *See* Exh. RJR-5C at 887.

The target completion date of January 1, 2019, for the Tacoma LNG Facility provided the opportunity to seek a competitive bid for the EPC contract. In fall of 2014, PSE had contracted with Black & Veatch to perform a parallel FEED study to develop pricing for a facility based upon the same design criteria as used by Chicago Bridge & Iron. Black & Veatch was a top contender for the original FEED study contract and has experience designing and building LNG facilities outside the U.S., as well as a domestic presence in the power generation and water treatment industries. Black & Veatch, however, does not have the capability to build an LNG tank, so the scope of work for the tank would remain with Chicago Bridge & Iron, regardless of the selection of the EPC contractor. Given the relatively small cost of a FEED study (approximately 0.5 percent of the plant cost), PSE viewed a competitive proposal as valuable from a commercial and prudence standpoint. *See* Exh. RJR-5C at 888.

In early 2015, PSE directed Chicago Bridge & Iron to initiate a design and proposal for a 140,000 gallon-per-day (gpd) liquefier that would serve the currently subscribed capacity of the plant (PSE and TOTE needs only), in addition to the 250,000 gpd plant. PSE did not engage Black & Veatch in this alternate design because Chicago Bridge & Iron had shown a greater willingness and capability to design to meet PSE-specific needs. *See* Exh. RJR-5C at 888.

In July 2015, Chicago Bridge & Iron provided a proposal for the plant with a smaller liquefier. It created only an 8 percent reduction in overall cost for a 44 percent reduction in production capacity because the pre-treatment and liquefaction portion of the plant represents

just 21 percent of the plant cost. Most of the components that could be de-rated for the smaller production capacity (e.g., compressors, electrical equipment, etc.) do not scale down linearly in price. Nor did the smaller production level significantly reduce the linear footage of piping, pipe rack and foundations, electrical cabling, or instrumentation. *See* Exh. RJR-5C at 888.

PSE identified the following strengths of the bid submitted by Chicago Bridge & Iron:

1. Chicago Bridge & Iron was successful in designing and building similar plants in the United States; Black & Veatch had no experience building similar facilities in the United States.
2. Chicago Bridge & Iron had engaged with PSE in the Tacoma LNG Project since early 2013 and demonstrated a complete grasp of the project requirements; Black & Veatch lacked creativity in its design or a willingness to deviate from the Black & Veatch “standard” package.
3. Chicago Bridge & Iron had knowledge and experience with applicable codes and standards, as well as experience navigating the regulatory process; did not demonstrate a thorough comprehension of regulatory issues or the seismic issues at the Port of Tacoma site.
4. Chicago Bridge & Iron proposed a strong project team with decades of experience who would stay with the Tacoma LNG Facility through completion; the Black & Veatch team was inexperienced, and there was little involvement from more senior Black & Veatch staff.
5. The ability of Chicago Bridge & Iron to build both the tank and the plant results in a single EPC contractor and negates the risk of design and construction conflicts between two firms; several components of the final Black & Veatch design would not have met project requirements and others (e.g., LNG pipeline to TOTE, control building, seismic design, and fire protection system) would require further development.
6. Chicago Bridge & Iron was transparent with pricing and hosted a multi-day open book review of all vendor and subcontractor quotes, labor estimates, and contingencies; Black & Veatch provided little pricing transparency.

*See* Exh. RJR-5C at 889.

Chicago Bridge & Iron presented a proposed EPC contract with its June 2015 proposal. The proposed EPC contract was a firm, fixed-price, lump sum that included all engineering, materials, construction, overhead, contingency, and markup, subject the following exclusions:

1. Key Material Escalation on Nine Percent Nickel Plate and Aluminum Plate: Due to worldwide fluctuations of raw material prices, plating for the steel plate was quoted based upon pricing on the London Metals Exchange on a given day. The proposal passed through the fluctuations in commodity prices, with a material cost adjustment up or down based upon the actual price on the day of the material order.
2. Builder's Risk Insurance: PSE generally elects to procure this insurance, rather than have it procured by the contractor.
3. Soil Removal or Hazardous Materials: PSE would provide a clean and ready site for construction, no hazardous materials will be encountered during foundation construction and any spoils created during construction would be disposed of elsewhere onsite or removed by PSE.
4. Underground LNG Pipeline to TOTE: This element was presented as a Time and Materials (T&M) reimbursable provision at approximately \$10 million (5% of overall contract price) due to uncertainties regarding installation methods and risks that could not be fully quantified in time to meet the proposal due date. Due to the fact that This separate T&M element of the work reduced PSE's overall cost because Chicago Bridge & Iron did not have to carry excess contingency in its lump sum price.

PSE completed an open book review of Chicago Bridge & Iron's pricing in June of 2015. During this multi-day review, Chicago Bridge & Iron shared all vendor and subcontractor quotes, labor estimates, contingencies, and mark-up. During and after this review, PSE worked collaboratively with Chicago Bridge & Iron to make equipment and scope changes, which resulted in over \$2 million of cost reductions.

The EPC contract submitted by Chicago Bridge & Iron proposed that PSE make payments according to an agreed-upon milestone schedule based upon actual work completed.



It also included performance guarantees and associated penalties for completion delay, liquefaction, vaporization, utilities consumption, power factor, LNG tank volume, truck loading rate, and marine loading rate.

PSE planned to have PSE staff co-located onsite to provide overall project management, quality assurance of EPC work product, and project management of ancillary activities occurring in parallel on the Tacoma LNG Facility site (marine construction, Tacoma Power substation construction, and PSE-provided metering and odorization at the pipeline tie-in point). PSE also planned to manage and coordinate with TOTE for construction activities taking place at the TOTE terminal (i.e., the direct LNG line to TOTE and the loading platform on the Blair waterway). *See* Exh. RJR-5C at 890. The design team for the work performed by PSE included the following firms:

- Geotechnical Design – GeoEngineers;
- Marine Design – Moffatt & Nichol;
- Owner’s Engineer – Sanborn Head & Associates;
- Civil Design – Sitts & Hill Engineers, and
- Substation Design and Construction – Tacoma Power.

*See* Exh. RJR-5C at 890-91.

PSE selected GeoEngineers, a regional engineering firm that has worked on projects with PSE for over 25 years, for geotechnical design services. GeoEngineers has extensive experience working in the Port of Tacoma and other port facilities in the Northwest. The scope of work for GeoEngineers included developing ground improvement strategies to meet federal and local seismic design requirements, coordinating structural and foundation requirements

with the EPC firm, and providing contracting and quality assurance support for the execution of the ground improvement program. *See* Exh. RJR-5C at 890.

PSE selected Moffatt & Nichol, an international engineering firm specializing in infrastructure projects on coastlines, harbors, and rivers, to provide the marine design services. Moffatt & Nichol has been involved in many of the LNG import/export terminal projects in North America, has ongoing working relationships with the Port of Tacoma, GeoEngineers, and Chicago Bridge & Iron, and successfully participated in two prior projects for PSE (both the Upper and Lower Baker Dam Floating Surface Collectors). Moffatt & Nichol's scope of work included development of a demolition plan for the existing timber pier and design of a new concrete pier on the Hylebos Waterway, the design of a new loading platform on the Blair Waterway, and marine construction oversight as necessary. *See* Exh. RJR-5C at 890.

PSE selected Sitts & Hill Engineers to perform site civil design work. Sitts & Hill, a local Tacoma civil engineering and surveying firm, was responsible for designing all elements of site preparation (abatement, demolition, site grading, and utility reconfiguration), the storm water system, the fire water system, and for permitting assistance. *See* Exh. RJR-5C at 891.

PSE selected Sanborn Head & Associates, a regional engineering company located in New England, to serve as Owner's Engineer. Sanborn Head & Associates has experience consulting on a number of LNG projects on the East Coast and has worked on projects with Chicago Bridge & Iron. Sanborn Head & Associates' scope of work included review of EPC design work product, peer review of GeoEngineers work product, assist with EPC contract preparation, and provide support on permitting and community outreach efforts, as needed. *See* Exh. RJR-5C at 891. Tacoma Power provides electric service to the Port of Tacoma where the Tacoma LNG Facility is located. *See* Exh. RJR-5C at 891.

PSE awarded the three major construction scopes, demolition, ground improvement, and marine construction, via competitively bid fixed price contracts. In each case a request for qualifications process was conducted to develop a list of three to five qualified bidders. After the bidder list was established, PSE used a formal request for proposal process to solicit detailed price and execution proposals, which led to formal interviews, reference checks, and selection of the winning contractor.

The demolition abatement contractor was Dickson Company, a specialty demolition contractor headquartered in Tacoma, Washington. The ground improvement contractor was Condon Johnson & Associates, a west coast engineering and civil construction company headquartered in Oakland, California. The marine construction contractor was Orion Marine Group, a national contractor headquartered in Houston, Texas.

Ongoing site work throughout the duration of the project—including site preparation, storm water management, storm water system installation, spoils handling and disposal, sanitary sewer installation, potable water installation, miscellaneous civil work, and other day-to-day owner support activities outside the scope of the EPC contract—was awarded under negotiated time and material contracts using contractors previously vetted by PSE. Due to the uncertain nature and duration of many of these tasks, it was not efficient or appropriate to individually bid out small work scopes. Most of this site work was performed by Western Refinery Services located in Ferndale, Washington, with some supplemental plumbing and electrical work performed by Diamond B Constructors in Bellingham, Washington, and Valley Electric in Seattle, Washington.

**7. September 24, 2015 – Update to PSE Board of Directors in Anticipation of Entering Into EPC Contract with Chicago Bridge & Iron**

On September 24, 2015, PSE management presented information to the PSE Board of Directors to provide details of the Tacoma LNG Project prior to recommending final approval of the EPC Contract with Chicago Bridge & Iron. Please see Exh. RJR-5 at 932-1281 for materials presented to the Board of Directors at the September 24, 2015 meeting. PSE management informed the PSE Board of Directors that it expected to seek authorization to execute various contracts for engineering and construction of the Tacoma LNG Facility at the PSE Board of Directors meeting on November 5, 2015. The most substantial contract would be the EPC Contract with Chicago Bridge & Iron. PSE management also expected to seek authorization to execute smaller contracts for demolition and ground improvement.

**8. October 1, 2015 – SS El Faro Tragically Sinks in the Caribbean**

SS El Faro was a U.S.-flagged, combination roll-on/roll-off and lift-on/lift-off cargo ship crewed by U.S. merchant mariners and owned and operated by TOTE at its operations in Jacksonville, Florida. TOTE intended to convert the SS El Faro to use LNG as fuel and it was slated to be used by TOTE in its round-trip Tacoma-to-Anchorage sailings. On September 29, 2015, the SS El Faro departed Jacksonville, bound for Puerto Rico. At the time of departure, then-Tropical Storm Joaquin was several hundred miles to the east. By October 1, 2015, Tropical Storm Joaquin had become a Category 3 hurricane. Around 7:30 a.m. on October 1, 2015, communications from the ship reported that it had taken on water; the final communication from the ship was a report from the captain that the crew had contained the flooding. On October 2, 2015, the U.S. Coast Guard, with help from the Air Force, Air National Guard, and Navy started a search for SS El Faro. Search crews recovered only debris and a

damaged lifeboat. On October 5, 2015, SS El Faro was officially declared sunk. All 33 members of the crew of the SS El Faro were tragically lost at sea.

The tragic sinking of SS El Faro had understandable repercussions on TOTE and its need for LNG fuel. TOTE leadership contacted the U.S. Environmental Protection Agency and reaffirmed TOTE's commitment to move forward with the conversion of its Tacoma-to-Anchorage vessels to use LNG as a maritime fuel. TOTE also notified the Environmental Protection Agency and the U.S. Coast Guard that the sinking of SS El Faro would delay the conversion to LNG of TOTE's Tacoma-to-Anchorage vessels by at least one year, with one vessel expected converted by spring of 2017 and a second by spring of 2018.

**9. November 5, 2015 – PSE Management Did Not Seek Approval of Construction Contracts for the Tacoma LNG Facility**

On November 5, 2015, PSE management met with the PSE Board of Directors but did not seek authorization to enter into construction contracts for the Tacoma LNG Facility, as previously planned, in light of the tragic sinking of SS El Faro. Please see Exh. RJR-5C at 1283-1291 for a copy of materials presented to the PSE Board of Directors at the November 5, 2015 meeting. PSE management recommended, and the PSE Board of Directors approved, a strategy that included the following:

1. Permitting: Coordinate with agencies and pursue timely issuance of necessary permits.
2. Government & Community Outreach: Address concerns of the Puyallup Tribe to mitigate threat of appeal of permits or EIS.
3. Regulatory: Obtain regulatory approvals, including jurisdictional approvals outlined in the current WUTC filing.
4. Engineering and Construction: Prepare for mobilization of selected EPC, general contractor, demolition contractors and ground improvement contractors as soon as January 2016.

5. Commercial: Grow business development team and strategy to market the balance of the plant

See Exh. RJR-5C at 1291.

#### **10. November and December 2015 – Permits Issued and Meetings Held**

In November and December of 2015, several important permits were issued for and meetings were held to discuss the Tacoma LNG Project, including:

- November 9, 2015, City of Tacoma released the Final Environmental Impact Statement;
- November 9, 2015, U.S. Army Corps of Engineers and the Puyallup Tribe met for a consultation meeting;
- November 18, 2015, City of Tacoma issued Demolition Permits for structures on the site that required removal;
- December 7, 2015, Pierce County issued a Conditional Use Permit for the Golden Givens Limit Station;
- December 16, 2015, City of Tacoma issued the Preliminary Shoreline Substantial Development Permit; and
- December 31, 2015, City of Tacoma issued the Final (Revised) Shoreline Substantial Development Permit.

#### **D. Major Activities in Calendar Year 2016**

##### **1. Early January 2016 – Additional Permits are Issued**

In early January of 2016, important reviews were completed, and permits were issued for the Tacoma LNG Project, including:

- January 7, 2016, U.S. Fish and Wildlife Service completed concurrency review of Underwater Noise Monitoring Plan under the Essential Fish Habitat, Magnuson Stevens Fishery;
- January 7, 2016, U.S. Fish and Wildlife Service provided biological concurrence on marine species that are federally-listed as threatened or endangered and on managed fisheries under Section 7 of Endangered Species Act; and

- January 14, 2016, Washington State Department of Transportation issued a State Highway Crossing Permit for occupancy of highway rights of way on Highway 509 for distribution upgrades.

**2. January 21, 2016 – The PSE Board of Directors Considers the Tacoma LNG Project in Light of Commission Activities and Permit Appeals**

On January 21, 2016, the PSE Board of Directors met to reexamine the Tacoma LNG Project in light of: (i) recent activities before the Commission that raised doubts over whether it would exercise jurisdiction over sales of LNG to TOTE; and (ii) an appeal of the EIS and project permits by the Puyallup Tribe. Please see Exh. RJR-5C at 1293-1320 for a copy of materials presented to the PSE Board of Directors at the January 21, 2016 meeting.

PSE management presented three potential scenarios to address the Commission's order casting doubt over the regulated nature of LNG sales to TOTE:

- continue regulatory and legal opportunities to seek to provide LNG to TOTE under a fully-regulated model;
- seek to have all LNG sales as transportation fuel provided on an unregulated basis through a new Puget Energy subsidiary; and
- stop development of the Tacoma LNG Facility.

At that meeting, PSE management recommended pursuit of a strategy in which all LNG sales for transportation fuels would be unregulated.

PSE management also reported on recent legal actions undertaken by the Puyallup Tribe (i) to appeal the Environmental Impact Statement and demolition permits issued for the Tacoma LNG Facility to Superior Court, and (ii) to seek reconsideration and potential appeal of the Shoreline Permit to the Shoreline Hearings Board.

On January 27, 2016, the Superior Court dismissed the appeal by the Puyallup Tribe of the Final Environmental Impact Statement and the Demolition Permits. On January 28, 2016,

PSE stipulated to the Shoreline Hearings Board that PSE would not engage in any in-water development in the Hylebos Waterway, rendering irrelevant three of the four issues raised by the Puyallup Tribe to the Shoreline Hearings Board.

**3. February 26, 2016 – The PSE Board of Directors Authorizes PSE to Pursue a Path for Unregulated Sales of LNG as a Vehicular Fuel**

On February 26, 2016, the PSE Board of Directors reconvened to consider the possibility of unregulated sales of LNG as a vehicular fuel and the challenges raised by the Puyallup Tribe to certain permits for the Tacoma LNG Project. Please see Exh. RJR-5C at 1321-48 for a copy of materials presented to the PSE Board of Directors at the February 26, 2016 meeting. The PSE Board of Directors approved the recommendation by PSE management of a path for the Tacoma LNG Project that included (i) a regulatory strategy in which the Tacoma LNG Facility would provide peaking capabilities to PSE and all LNG sales would be unregulated, and (ii) an LNG fuel sales marketing strategy. *See* Exh. RJR-5C at 1339.

**4. March and April 2016 – PSE Obtains Additional Permits Necessary for the Tacoma LNG Project**

On March 9, 2016, the Washington State Department of Transportation issued a State Highway Crossing Permit for the occupancy of highway rights of way on Interstate 5. This permit was important for the installation of distribution upgrades in the area north of Tacoma. On April 28, 2016, the Commission issued a Waiver for Underground LNG Pipeline. This waiver was necessary for the installation of the underground pipe that will transport LNG from the Tacoma LNG Facility to the TOTE fueling areas at the Port of Tacoma.

**5. May 5, 2016 – Informational Update to the PSE Board of Directors**

On May 5, 2016, the PSE Board of Directors met for an informational update regarding the development activities for the Tacoma LNG Project. Please see Exh. RJR-5C at 1350-1373



for a copy of materials presented to the PSE Board of Directors at the May 5, 2016 meeting.

**6. May and June 2016 – Additional Permitting Activities**

The Shoreline Hearings Board heard the Puyallup Tribe's appeal of the Shoreline Permit at hearings conducted between May 9 and May 13, 2016. On May 27, 2016, the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) issued its final approval for the Tacoma LNG Project. On June 17, 2016, the City of Tacoma issued a Special Authorization to Discharge (SAD) permit to discharge treated ground or surface waters encountered during construction to the city sanitary sewer system so there will be no construction wastewater discharge to surface waters.

**7. June 23, 2016 – Informational Update to the PSE Board of Directors**

On June 23, 2016, the PSE Board of Directors met for an update regarding the development activities for the Tacoma LNG Project. Please see Exh. RJR-5C at 1375-1385 for a copy of materials presented to the PSE Board of Directors at the June 23, 2016 meeting.

**8. July 2016 – Additional Permitting Activities**

Many activities to obtain permits for the Tacoma LNG Project occurred in July 2016:

- July 1, 2016 - the Washington Department of Fish and Wildlife issued a Hydraulic Project Approval;
- July 8, 2016 - The U.S. Army Corps of Engineers and the Puyallup Tribe engaged in a Technical Government-to-Government meeting;
- July 14, 2016 - The National Marine Fisheries Service provided biological concurrence on marine species that are federally-listed as threatened or endangered and on managed fisheries under Section 7 of Endangered Species Act;
- July 18, 2016 - The Shoreline Hearings Board affirmed the Shoreline Permit; and

- August 2, 2016 - The City of Tacoma approved a Pipeline and Control Measure Easement and Bunkering Easement for the Tacoma LNG Project.

**9. July 2016 – The F16 Load Forecast Projects an Immediate Need for the Tacoma LNG Project**

In July 2016, PSE approved the F16 Load Forecast, which projected an immediate need for an LNG liquefaction and storage facility. *See* Exh. RJR-9 at line 3 (column F2016).

**10. August 4, 2016 – The PSE Board of Directors Affirmed the Overall Strategy for Development and Construction of the Tacoma LNG Project**

On August 4, 2016, the PSE Board of Directors met and affirmed the overall strategy for the development and construction of the Tacoma LNG Project. Please see Exh. RJR-5C at 1387-1693 for a copy of materials presented to the PSE Board of Directors at the August 4, 2016 meeting. PSE management provided a comprehensive overview of the Tacoma LNG Project, including:

- Project construction/execution plan;
- Projection of financial performance;
- Risk analysis and mitigation plans;
- Prudence of peaking portion of LNG Facility based on the determination of need and analysis of alternatives; and
- Project costs and the benefits for customers.

PSE management reported that the Tacoma LNG Project would provide benefits to PSE and its customers. The portfolio benefit analysis generated by the SENDOUT GPM for the report demonstrated a \$54 million net present value portfolio benefit to customers with the Tacoma LNG Project peaking resource compared to alternative resources over the 20-year period from 2016 through 2035. This analysis reaffirmed the conclusion in the 2015 IRP that

the Tacoma LNG Project represented a least-cost resource alternative to meet gas sales peak-day needs as shown in Table 6.

**Table 6. Portfolio Benefit of the Tacoma LNG Project**

2015 IRP Scenario	Gas Portfolio Costs Net Present Value (2016\$ in millions)		Tacoma LNG Project Resource Chosen	
	With 100% LNG	Without LNG	Benefit / Cost of LNG	MDth per days
BASE	9,366.9	9,464.7	97.8	85
LOW	6,258.0	6,294.7	36.7	73
HIGH	12,963.3	13,052.5	89.1	85
BASE + LOW GAS	8,212.6	8,263.9	51.3	69
BASE + HIGH GAS	10,719.8	10,823.6	103.8	85
BASE+VERY HIGH GAS	11,906.0	11,994.8	88.8	85
BASE+NO CO2	7,775.7	7,846.2	70.4	84
BASE+HIGH CO2	10,465.7	10,565.4	99.7	85
BASE+LOW DEMAND	9,031.7	9,040.1	8.4	41
BASE+HIGH DEMAND	10,450.5	10,550.9	100.4	85
2016 BASE RE-EVALUATION in 2019\$	9,141.6	9,195.7	54.1	82

Exh. RJR-5C at 1664.

The \$54.1 million benefit in the 2016 base re-evaluation scenario is higher than the \$36.7 million benefit in the 2015 IRP low scenario, which is especially noteworthy since the low scenario assumed low gas prices and low load forecast – both assumptions that are inherent in the 2016 re-evaluation. The key factor increasing the base scenario benefit above the low scenario benefit in the 2016 re-evaluation is lower fixed Tacoma LNG Project costs, due in part to an updated methodology for allocating costs between regulated and unregulated gas customers consistent with the methodology later established in Docket UG-151663.

For the 2016 analysis, PSE refreshed its resource need analysis with more current information for forecasted gas sales peak demand. PSE also updated natural gas prices, pipeline rates, foreign exchange rates (Canadian pipelines tariffs are in Canadian dollars), and modified cost and timing assumptions for potential resource alternatives – including the Tacoma LNG Project. Exh. RJR-5C at 1671.

As market information, including the plans of other utilities and major industrial projects, became known, PSE updated its expectations of the availability of various resource alternatives. The following Table 7 compares the timing of the resource alternatives included in the 2015 IRP and in the 2016 updated analysis.

**Table 7. Timing Assumptions for Resource Alternatives**

<b>Resource Alternative</b>	<b>2015 IRP Availability Assumptions</b>	<b>2016 Analysis Availability Assumptions</b>
Swarr Propane-Air Facility Upgrade.	Winter 2016-2017	Winter 2018, 2021, 2023, 2025, 2028, 2030
Tacoma LNG Project.	65 MDth/day 2018-2019 and 85 MDth/day 2020-2021	66 MDth/day 2019-2020 and 85 MDth/day 2025-2026
Short Term NWP Capacity and Sumas Gas Supply.	Winter 2016-2017 through Winter 2017-2018	Winter 2016-2017 through Winter 2024-2025
NWP and Westcoast Energy Pipeline Capacity and Station 2 or Sumas Gas Supply.	Winter 2018, 2022, 2026 and 2030	Winter 2020, 2023, 2025, 2028, 2033
Cross Cascades Pipeline, Upstream Pipeline and AECO Gas Supply.	Winter 2018, 2022, 2026 and 2030	Winter 2023, 2025, 2028, 2033
Cross Cascades Pipeline, Downstream Pipeline and Malin or Rockies Gas Supply.	Winter 2018, 2022, 2026 and 2030	Winter 2023, 2025, 2028, 2033
Mist Storage and NWP Interstate Pipeline Capacity.	Winter 2018, 2022, 2026 and 2030	Winter 2021, 2023, 2025, 2028, 2033
Kingsvale-Oliver Reinforcement Project (KORP), Westcoast Energy Pipeline Capacity and AECO Gas Supply.	Winter 2018, 2022, 2026 and 2030	Winter 2023, 2025, 2028, 2033

Exh. RJR-5C at 1668.

Cost assumptions for pipeline alternatives evaluated in the 2016 analysis are shown below in Table 8.

**Table 8. Cost Assumptions for Pipeline Alternatives**

Alt No.	Alternative	From/To	Years Available beginning October	Maximum Capacity Available in Sendout (MDth per Day)	Capacity Demand (\$ per Dth per Day)	Variable Commodity (\$ per Dth per Day)	Fuel Use (%)	Comments
1A	Short Term NWP TF-1	Sumas to PSE	2016 - 2018	100	0.56	0.03	1.9	Potential available in marketplace from third parties from 2016-2018.
1	Westcoast + NWP Expansions	Station 2 to PSE	2018, 2022, 2026 and 2030	400 in 2018, 2022, 2026; 500 in 2030	0.52 + 0.56	0.01 + 0.03	1.6 + 1.9	Westcoast expansion coupled with NWP. Expansion expected to be available 2018 at the earliest.
2	FortisBC / Westcoast (KORP) + NWP Expansions	Kingsgate to PSE via Sumas	2018, 2022, 2026 and 2030	50 in 2018, 2022; 100 in 2026, 2030	0.42 + 0.56	0.01 + 0.03	1.0 + 1.4	Prospective projects & estimated project cost - expected to be available 2018 at the earliest. (Requires NGTL and Foothills pipelines.)
3	NGTL (Nova) Pipeline	AECO to Alberta / BC border	2018, 2022, 2026 and 2030	100 in 2018, 2022; 200 in 2026, 2030	0.16	0	0	Prospective projects & estimated project cost - expected to be available 2018 at the earliest.
3	Foothills Pipeline	Alberta / BC Border to Kingsgate	2018, 2022, 2026 and 2030	100 in 2018, 2022; 200 in 2026, 2030	0.097	0	1.0	Uncontracted capacity is available. (Requires NGTL.)
3	GTN Pipeline	Kingsgate to Stanfield	2018, 2022, 2026 and 2030	100	0.177	0.044	1.4	Uncontracted capacity is available. (Requires NGTL and Foothills pipelines.)
3 & 4	Cross Cascades	Stanfield to PSE	2018, 2022, 2026 and 2030	150	0.80	0.005	2.0	Prospective project & estimated project cost - expected available 2018 at the earliest. (Requires GTN Backhaul or NGTL/Foothills/GT N.)
4	Ruby Pipeline	Opal to Malin	2018, 2022, 2026 and 2030	100	0.15	0	2.0	Published tariff is \$1.14 but discounted rates are expected to

**Table 8. Cost Assumptions for Pipeline Alternatives**

Alt No.	Alternative	From/To	Years Available beginning October	Maximum Capacity Available in Sendout (MDth per Day)	Capacity Demand (\$ per Dth per Day)	Variable Commodity (\$ per Dth per Day)	Fuel Use (%)	Comments
								be available for several years.
4	GTN "Backhaul"	Malin to Stanfield	2018,2022, 2026 and 2030	100	0.21	0.005	0	Uncontracted capacity is available.
6	Mist	Mist Storage to PSE	2018,2022, 2026 and 2030	50	0.56	.03	1.9	Expansion on NWP for delivery of gas from Mist Storage
3	GTN Pipeline	Kingsgate to Stanfield	2018, 2022, 2026 and 2030	100	0.177	0.044	1.4	Uncontracted capacity is available. (Requires NGTL and Foothills pipelines.)
3 & 4	Cross Cascades	Stanfield to PSE	2018, 2022, 2026 and 2030	150	0.80	0.005	2.0	Prospective project & estimated cost - expected available 2018 at the earliest. (Requires GTN Backhaul or NGTL/ Foothills/GTN.)
4	Ruby Pipeline	Opal to Malin	2018,2022, 2026 and 2030	100	0.15	0	2.0	Published tariff is \$1.14 but discounted rates are expected to be available for several years.
4	GTN "Backhaul"	Malin to Stanfield	2018,2022, 2026 and 2030	100	0.21	0.005	0	Uncontracted capacity is available.
6	Mist	Mist Storage to PSE	2018,2022, 2026 and 2030	50	0.56	.03	1.9	Expansion on NWP for delivery of gas from Mist Storage

Cost assumptions for storage alternatives evaluated in the 2016 analysis are shown in Table 9 below.

**Table 9. Cost Assumptions for Storage Alternatives**

Alt No.	Alternative	Location	Years Storage Capacity Estimated to be Available	Storage Capacity (MDth)	Maximum Withdrawal Capacity (MDth per day)	Days of Full Withdrawal (days)	Max. Injection Capacity (MDth per day)	Comments
5	PSE LNG Project	PSE System	winter 2018-19	538	66	8.2	2	Prospective confidential project, estimated size and costs

**Table 9. Cost Assumptions for Storage Alternatives**

	(PSE portion) (1)							
5	LNG Peak Gas Supply	PSE System	winter 2020-21	-	19	-	-	Only available with PSE LNG Project
6	Mist Expansion (1)	Portland, OR	winter 2018-19	1000	50	20	22.5	PSE to lease storage capacity from NW Natural after an expansion of the Mist storage facility
7	Swarr	PSE System	Winter 2016-2017	90	30	3	-	Existing plant requiring upgrades

Pipeline costs were updated to reflect then-current tariffs and knowledge of the costs to acquire firm pipeline or storage capacity for each of the expansion options. PSE assumed a 2.5 percent inflation rate on cost estimates for all expansion projects and an annual 1.25 percent cost escalation on pipeline transportation capacity upon placement into service. For pipelines priced in Canadian dollars, PSE used a long-term U.S. dollar to Canadian dollar exchange rate of 0.831.

To determine the portfolio benefit of the Tacoma LNG Project, PSE ran the SENDOUT GM with and without the project. In the scenario without the Tacoma LNG Project, SENDOUT identified expanded pipeline capacity as the most likely alternative based on availability and cost. The peaking costs of the Tacoma LNG Facility were then benchmarked against the costs of incremental transmission pipeline capacity. There was a fair amount of uncertainty in the firm cost of capacity on the NWP and Westcoast pipeline systems due to projected new demand from future LNG projects, particularly those in the Vancouver, British Columbia area. NWP and Westcoast are both fully contracted; therefore, acquiring sizeable volumes of long-term pipeline capacity on either system would require an expansion.

The following Table 10 compares the pipeline cost assumptions PSE used to calculate benchmark pipeline costs in the 2015 IRP analysis and updated 2016 analysis.

**Table 10. Pipeline Cost Assumptions**

Assumptions	2015 IRP	2016 Re-evaluation
NWP Costs (\$/Dth/Day)	.56	.56
Westcoast Pipeline Costs (\$/Dth/Day):	.52	.63
Westcoast Capacity (% of Firm):	100%	100%

The NWP year-round firm shipping costs assume expansion in October 2018 for the 2015 IRP analysis and as early as October 2020 for the 2016 analysis equal to the volumes under consideration, escalated annually. Westcoast pipeline delivers gas from northern British Columbia to NWP near Sumas, Washington. The 2015 IRP assumption was based on 2015 tolls, and the 2016 analysis assumption was based on 2016 tolls, escalating annually.

PSE's Energy Management Committee approved a strategy to purchase Westcoast capacity for up to one hundred percent (100%) of PSE's peak-day Sumas/Huntingdon supply requirements, given the projected increase in demand in the Vancouver, British Columbia area and that Westcoast was fully contracted. Therefore, PSE assumed it would contract for one hundred percent (100%) of the demand requirement on Westcoast. Pipeline capacity does not include a supply resource, so the analysis assumed that gas supply will be available at Station 2 or Sumas at an index-based price.

PSE management indicated at the meeting on August 4, 2016, that it expected to request final authorization from the PSE Board of Directors at a meeting on September 22, 2016, pending resolution of three final key authorizations:

- Receipt of the U.S. Army Corps of Engineers Permits;



- Approval of the Pipeline and Control Measure Easement and Bunkering Easement (which, as previously indicated was approved on August 2, 2016); and
- Commission approval of the regulatory strategy for sales of LNG as vehicular fuel by a non-regulated PSE affiliate.

Exh. RJR-5C at 1420.

**11. September 22, 2016 – The PSE Board of Directors Authorized Contingent Start of Construction of the Tacoma LNG Facility,**

At a meeting on September 22, 2016, the PSE Board of Directors authorized the start of construction of the Tacoma LNG Facility, contingent upon the following:

- receipt of the U.S. Army Corps of Engineers permits (expected the week of September 19, 2016); and
- a Commission order approving a regulatory settlement that included the following (expected by October 31):
  - limited exemption from certain merger commitments, if applicable;
  - allocating capital costs of the Tacoma LNG Facility between regulated and non-regulated entities as proposed (i.e., 43% regulated, 57% non-regulated).

Please see Exh. RJR-5C at 1695-1719 for a copy of materials presented to the PSE Board of Directors at the September 22, 2016 meeting.

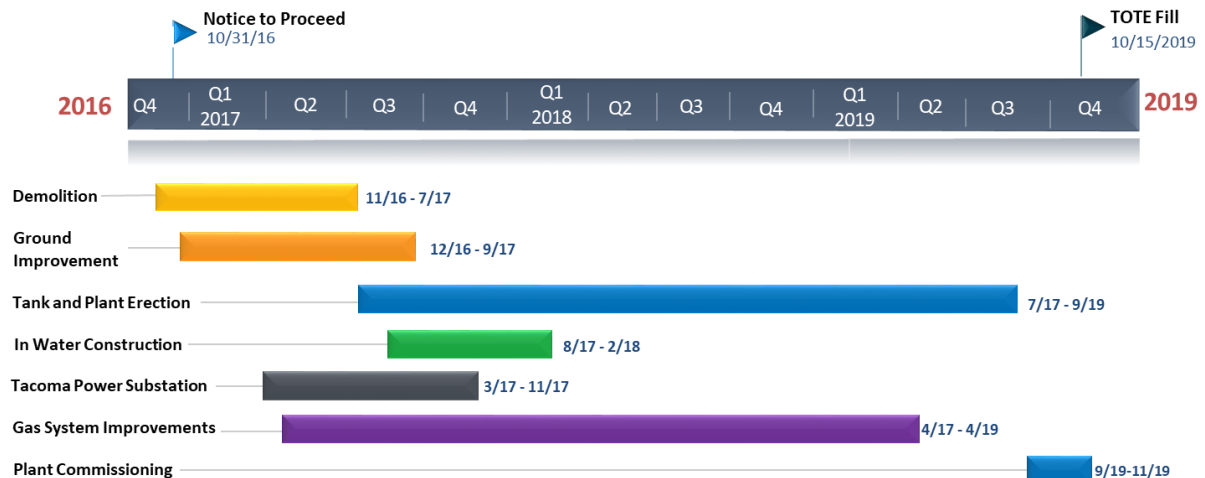
Around the same time as the meeting on September 22, 2016, PSE received the required U.S. Army Corps of Engineers permits. On October 31, 2016, the Commission issued a Final Order approving the Settlement Stipulation in Docket UG-151663. On November 1, 2016, PSE and Chicago Bridge & Iron executed the EPC Contract, ending the development phase and commencing the construction phase of the Tacoma LNG Project. Please see Exh. RJR-8C for a copy of the EPC Contract and relevant attachments thereto.

## II. CONSTRUCTION PHASE OF THE TACOMA LNG PROJECT

The construction phase of the Tacoma LNG Project commenced with PSE executing the EPC Contract with Chicago Bridge & Iron and issuing the notice to proceed on November 1, 2016. PSE also awarded contracts for building demolition, ground improvement, and underground utilities to several subcontractors. Clearing and grading performed by PSE subcontractors began in November 2016, and Chicago Bridge & Iron mobilized on site to begin the construction work in April of 2017.

PSE presented the construction schedule in Figure 4 to the PSE Board of Directors on September 22, 2016, as part of its request for approval to construct the Tacoma LNG Project.

**Figure 4. Schedule at Start of Construction of the Tacoma LNG Project**



Exh. RJR-5C at 1704.

PSE presented the budget in Table 11 to the board of directors on September 22, 2016 as part of its request for approval to construct the facility.

**Table 11. Budget for the Tacoma LNG Project  
at Start of Construction**

Tacoma LNG Capital Budget (\$ millions)	Total
Development	\$20
Fixed Price EPC	\$197
Miscellaneous Construction	\$55
PM & Outside Services	\$16
Insurance	\$2
Sales Tax	\$14
Contingency	\$19
Construction OHs	\$10
LNG FACILITY TOTAL	\$332
Gas System Upgrades	\$31
Contingency	\$4
Permitting Mitigations	\$4
GAS SYSTEM IMPROVEMENTS TOTAL	\$39
PROJECT CAPITAL COST	\$371
AFUDC / IDC	\$51
CLOSING GROSS PLANT	\$422
O&M (for development and construction)	\$2

Exh. RJR-5C at 1703.

**A. Major Activities in Calendar Year 2017**

**1. Informational Report to the PSE Board of Directors -- April 6, 2017 and June 22, 2017**

On April 6, 2017, PSE management provided an informational report to the PSE Board of Directors regarding initial work performed during the construction phase of the Tacoma LNG Project. Please see Exh. RJR-5C at 1721-1724 for a copy of materials presented to the PSE Board of Directors at the April 26, 2017 meeting. The informational report stated that

demolition work at the site of the Tacoma LNG Facility was approximately 95 percent complete as of mid-March of 2017. Exh. RJR-5C at 1722.

On June 22, 2017, PSE management provided an informational report to the PSE Board of Directors regarding construction and other activities for the Tacoma LNG Project. Please see Exh. RJR-5C at 1726-1743 for a copy of materials presented to the PSE Board of Directors at the June 22, 2017 meeting. PSE management relayed to the PSE Board of Directors that construction of the Tacoma LNG Project was on budget and on schedule. *See* Exh. RJR-5C at 1730-31.

PSE management also apprised the PSE Board of Directors of changes in pipeline gas quality over the previous 12 to 18 months and that the then-current pipeline gas quality was significantly different from the design basis for the Tacoma LNG Facility. PSE had authorized Chicago Bridge & Iron under a change order to modify the Tacoma LNG Facility design at an estimated increase in cost of \$8 million. *See* Exh. RJR-5C at 1733.

PSE management also updated the PSE Board of Directors regarding opposition to the Tacoma LNG Project. The opposition groups were focused on contacting permitting agencies, public protests, and civil disobedience; protestors had recently entered the Tacoma LNG Facility site, chained themselves to equipment, creating a potentially unsafe situation. Following this civil disobedience, PSE reviewed and affirmed its site and project security plans and protocols. *See* Exh. RJR-5C at 1734.

PSE management also updated the PSE Board of Directors regarding the permitting process with the Puget Sound Clean Air Agency. At the time, PSE represented that the Tacoma LNG Facility was considered a minor source and the project plan was based upon securing notice of construction/order of approval permit from Puget Sound Clean Air Agency during

the early phase of construction work. PSE had submitted the permit application in May of 2017 and completed the application in June 2017. *See* Exh. RJR-5C at 1736.

**2. July 2017 – The F17 Load Forecast Projects an Immediate Need for the Tacoma LNG Project**

In July 2017, PSE approved the F17 Load Forecast, which projected an immediate need for an LNG liquefaction and storage facility. *See* Exh. RJR-9 at line 4 (column F2017).

**3. November 2, 2017 – PSE Management Informs the PSE Board of Directors that the Tacoma LNG Project Has Exceeded Budget**

On November 2, 2017, PSE management informed the PSE Board of Directors that the Tacoma LNG Project had exceeded budget. Please see Exh. RJR-5C at 1745-1755 for a copy of materials presented to the PSE Board of Directors at the November 2, 2017 meeting. The cost increases resulted from a number of issues, including changes to the Tacoma LNG Facility to reflect changes in pipeline gas quality, delays associated with the air permit, flare and vaporizer changes, the LNG cryogenic pipeline, legal costs for various appeals, development phase overruns, and project management. *See* Exh. RJR-5C at 1746. PSE requested an increase in the total project budget of \$29.6 million, with \$11.0 million allocable to PSE. *See* Exh. RJR-5C at 1748, 1754. This budget authorization increased the overall budget for the Tacoma LNG Project from \$422 million to \$451 million. *See* Exh. RJR-5C at 1748.

**4. November 2017 – The 2017 IRP Identified a Need for the Tacoma LNG Facility**

In November of 2017, PSE issued the 2017 Integrated Resource Plan, which projected the following needs for the gas portfolio:

- the Base Case scenario projected an immediate need for the Tacoma LNG Facility, with the project becoming used and useful in the winter of 2019-20;

- the high demand projected an immediate need for the Tacoma LNG Facility, with the project becoming used and useful in the winter of 2019-20; and
- the low demand forecast projected adequate gas portfolio resources until approximately the winter of 2030-31.

**B. Major Activities in Calendar Year 2018**

**1. January 2018 – Update to the PSE Board of Directors Regarding the Tacoma LNG Project**

In January of 2018, PSE management provided an informational update to the PSE Board of Directors that largely focused on permitting, construction, and other matters with respect to the Tacoma LNG Project. Please see Exh. RJR-5C at 1757-1765 for materials presented to the PSE Board of Directors at the January 2018 meeting.

A considerable portion of the January 2018 meeting of the Board of Directors focused on permitting activities with the Puget Sound Clean Air Agency. The permitting process with the Puget Sound Clean Air Agency began, in earnest, on August 6, 2015, when the agency issued a communication to PSE confirming that it was acceptable to undertake activities not directly part of LNG processing and that have no emissions prior to the issuance of an air permit. As previously mentioned, the construction phase began a little over a year after issuance of the communication (November 2016), when site demolition, clearing, grading, and soil stabilization work began. *See* Exh. RJR-5C at 1759.

On April 19, 2017, PSE received a Notice of Violation from the Puget Sound Clean Air Agency stating that PSE had committed a violation by commencing construction of the Tacoma LNG Facility without filing a Notice of Construction application and without receiving an Order of Approval. The Notice of Violation required PSE to submit the Notice of Construction application within thirty days. Subsequently, the Puget Sound Clean Air Agency

provided PSE with an extension of the thirty-day filing requirement, and PSE filed the Notice of Construction application on May 22, 2017. *See* Exh. RJR-5C at 1759.

After additional submittals, questions, and answers, the Puget Sound Clean Air Agency issued a determination on October 3, 2017, confirming that PSE's Notice of Construction application was complete. At the time, PSE expected that the Puget Sound Clean Air Agency would issue a draft air permit by December 5, 2017, followed by a 45-day comment period. On November 27, 2017, and December 1, 2017 the Puget Sound Clean Air Agency held public information meetings. *See* Exh. RJR-5C at 1759.

On December 20, 2017, the Puget Sound Clean Air Agency posted a communication on the agency web site indicating that it would be extending the timing of publication of a draft air permit, stating in particular as follows:

based on information we heard at [the] information meetings, we concluded that we have more work to completed before we will be ready to start a comment period. We do not anticipate completing this review work before January 25, 2018. That means the comment period has not started yet and will not start until the review work is complete (after the holidays). Also, this additional time will not shorten the time period originally identified for the public comment period (60 days). We will update our review status on this [web] page as we get closer to completing the work.

Based on this posting, PSE anticipated that the comment process would not be complete until March 25, 2018. *See* Exh. RJR-5C at 1759.

At the PSE Board of Directors meeting in January of 2018, PSE management identified three potential outcomes associated with the Puget Sound Clean Air Agency consideration of the air permit. First, the Puget Sound Clean Air Agency could deny the air permit, which PSE identified as having a low probability but a high impact. Second, the Puget Sound Clean Air Agency could reopen the State Environmental Protection Act process, which PSE projected

would result in a major delay. PSE estimated the probability of this outcome as low with a high impact on the Tacoma LNG Facility. Finally, the Puget Sound Clean Air Agency could delay the issuance of an air permit, which PSE estimated had a high probability with a medium impact on the Tacoma LNG Facility—namely a financial impact of approximately \$500,000 per week of delay. *See* Exh. RJR-5C at 1760.

PSE management also identified activities it had undertaken to mitigate the potential impacts of these various outcomes. PSE retained a consultant to perform an independent review of the permit. PSE also retained Dennis McLerran, former Executive Director of the Puget Sound Clean Air Agency and Region X Director for the Environmental Protection Agency, for advice and consultation. Finally, PSE continued to maintain an ongoing dialogue with personnel at all levels of the Puget Sound Clean Air Agency. *See* Exh. RJR-5C at 1760.

**2. January 24, 2018 – The Puget Sound Clean Air Agency Determined a Supplemental Environmental Impact Statement Was Necessary for the Tacoma LNG Facility**

On January 24, 2018, the Puget Sound Clean Air Agency determined that a Supplemental Environmental Impact Statement was necessary for the Tacoma LNG Facility. The agency based its determination on a finding that it must evaluate the greenhouse gas life-cycle emissions associated with the Tacoma LNG Facility. As PSE management had identified in the risks communicated to the PSE Board of Directors earlier in January, this would likely result in a major delay and increased costs for construction of the Tacoma LNG Facility.

**3. March 1, 2018 – The PSE Board of Directors Re-evaluated Options Available to PSE for the Tacoma LNG Project**

On March 1, 2018, PSE management informed the PSE Board of Directors of actions undertaken since the Puget Sound Clean Air Agency determined that a Supplemental Environmental Impact Statement was necessary for the Tacoma LNG Facility. Please see



Exh. RJR-5C at 1767-1796 for materials presented to the PSE Board of Directors at the March 1, 2018 meeting. The following actions had occurred following the Puget Sound Clean Air Agency determination:

- The Puget Sound Clean Air Agency issued a Request for Proposals for a consultant for the Supplemental Environmental Impact Statement, with a completion date of October 31, 2018;
- PSE had notified Chicago Bridge & Iron of the determination and provided notice that PSE considered the determination to be a force majeure event under the EPC Contract, a claim that Chicago Bridge & Iron rejected; and
- Chicago Bridge & Iron provided PSE with estimates for alternative construction scenarios; construction of those elements of the Tacoma LNG Facility that would have no emissions (i.e., the LNG storage tank, the Blair fueling pier, the pipeline boring, and the electric substation) could continue, but construction on emitting equipment (i.e., LNG processing equipment) would remain on hold until PSE received a Notice of Construction from the Puget Sound Clean Air Agency.

See Exh. RJR-5C at 1769.

Given the likely cost and schedule impacts expected as a result of the delay, PSE management identified three potential construction scenarios for the Tacoma LNG Project:

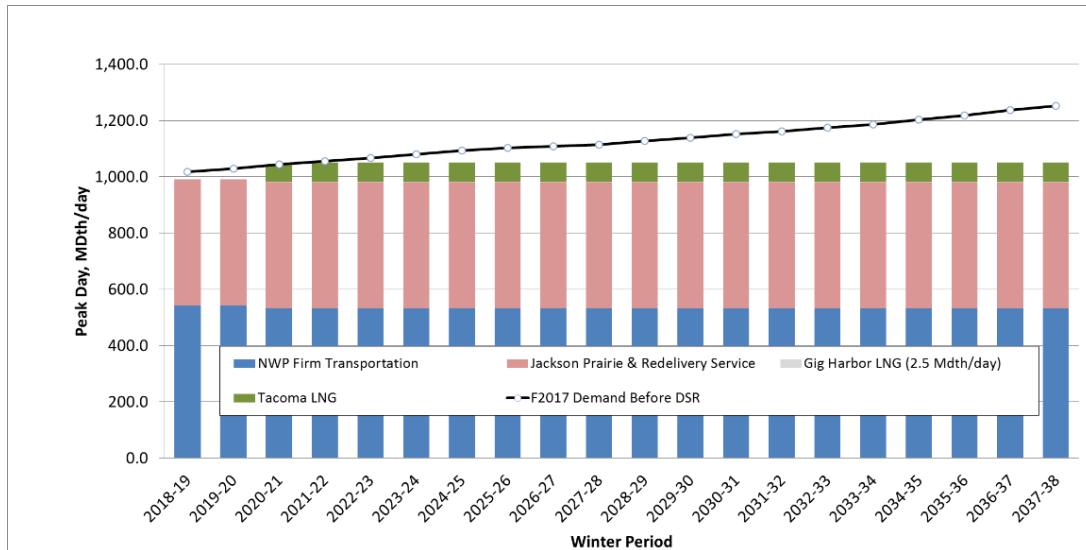
1. Modified construction - suspend construction involving emissions regulated by Puget Sound Clean Air Agency until the air permit is issued, but continue with other parts of construction
2. Pause and wait - suspend all elements of construction until the air permit is issued.
3. Terminate the Tacoma LNG Project.

See Exh. RJR-5C at 1775.

In preparation for the PSE Board of Directors meeting on March 1, 2018, PSE management launched a re-evaluation of the resource need, alternatives analysis, and Tacoma

LNG Project cost and availability analysis. The following Figure 5 presents the results of PSE’s February 2018 peak-day gas resource need analysis.

**Figure 5. February 2018 Gas Resource Need Update (No DSR)**



Updates included: a change to the available online date for the Tacoma LNG Project (winter 2020-2021), which is shown in green; a revised gas price forecast (based on a fall 2017 update from Wood-Mackenzie and forward marks in the early years); and an updated load forecast (F2017). The F2017 load forecast showed a peak-day need of 27.22 MDth/day (27,200 Dth/day) in 2017-2018. See Exh. RJR-9 at line 5 (column F2017).

PSE also considered the costs and benefits of the Tacoma LNG Project by considering the project with and without sunk costs and compared those scenarios to a portfolio without LNG. As shown in Table 12 below, as of February 1, 2018, PSE had spent roughly \$212 million on the Tacoma LNG Project, of which \$95.4 million was allocable to PSE.

**Table 12. Sunk Costs Analysis for  
Tacoma LNG Project Peaking Resource**

	At 2/28/2018	Peaking Portion 0.45
<b>Sunk CapEx</b>		
As of 12/31/17	\$186,937,530	\$84,121,889
Jan/Feb 2018	\$25,000,000	\$11,250,000
	\$211,937,530	\$95,371,889
Termination Costs	\$40,741,000	\$18,333,450
Lease Termination	\$20,115,328	\$9,051,898
Other Termination Costs*	\$60,856,328	\$27,385,348
Total Sunk + Termination Costs	\$272,793,858	\$122,757,236

\* Includes Site Restoration and Resolution of Contracts

To bookend the costs for the “With Tacoma LNG” portfolio, PSE considered a “With Tacoma LNG and 47 percent CAPEX” scenario, which represented the incremental cost to complete the project; and a “With Tacoma LNG and 100 percent CAPEX” scenario, which represented the total cost of the project from start to finish. Additionally, PSE evaluated a “Without LNG alternative.” For this portfolio, the SENDOUT GM assumed the Tacoma LNG Facility was not available and selected the least-cost resource alternative to meet PSE’s peak capacity need. In this case, the least-cost resource alternative was additional pipeline capacity on Westcoast and Northwest Pipeline from northern British Columbia to PSE’s system. For comparison purposes, PSE added the Tacoma LNG sunk costs incurred to date and the termination costs that PSE would incur if PSE were to stop construction of the project and pursue an alternative resource, to the “Without Tacoma LNG” scenario.

PSE used the SENDOUT GM to compare the net present value portfolio cost of meeting PSE’s gas resource need over a 20-year planning horizon at the least cost, with and without the Tacoma LNG Facility. To do this, PSE began by updating its cost and availability assumptions for the Tacoma LNG Facility and the gas resource alternatives included in the

SENDOUT GM. As described above, PSE first ran SENDOUT with the Tacoma LNG Facility unavailable as a resource to identify the least-cost portfolio of resources without the Tacoma LNG Facility. PSE then ran SENDOUT again, this time with the Tacoma LNG Facility available as a resource. In this way, SENDOUT derived a portfolio cost with and without LNG, which PSE compared to determine the portfolio benefit or cost of continuing to build the Tacoma LNG Facility.

Because the SENDOUT analysis evaluates a 20-year planning period and the useful life of the Tacoma LNG Facility is 50 years, PSE considered the end effects of the “Without Tacoma LNG” portfolio in years 21 through 50 to align with the full useful life of the plant. That is, PSE compared the benefits of the Tacoma LNG Facility over its entire useful life to the entire cost of a “Without Tacoma LNG” portfolio over the same time period.

The following Table 13 compares the “With Tacoma LNG” and “Without Tacoma LNG” scenarios. The results reaffirm that the Tacoma LNG Facility continued to be the least-cost resource alternative to meet PSE’s gas peak-day resource need. When compared to the “Without Tacoma LNG” scenario, the “With Tacoma LNG (full 100% of CAPEX)” scenario demonstrated a \$112.5 million benefit to the existing gas portfolio.

**Table 13. Summary of February 2018 Portfolio Benefit Analysis**

Scenario	NPV @7.777 - 2018-2070 (millions)	Portfolio benefit compared to Without Tacoma LNG scenario (millions)
With Tacoma LNG (only 47% CAPEX to go)	\$13,109	\$190.6
With Tacoma LNG (full 100% of CAPEX)	\$13,187	\$112.5
Without Tacoma LNG (includes sunk CAPEX and termination costs)	\$13,300	

Absent the Tacoma LNG Facility, the long-term (defined as winter 2023-2024 and beyond) alternative identified by the SENDOUT GM remained additional natural gas pipeline capacity from Station 2 in Canada to Sumas on Westcoast’s system, as well as pipeline additions on the Northwest Pipeline (NWP) system from Sumas to PSE’s system. This pipeline alternative had been updated to include current pricing and availability. In the short-term (winter 2018-2019 to 2022-2023), additional interim resources were assumed to be utilized, including short-term NWP contracts, an earlier upgrade to SWARR, and LNG from Plymouth. The following Table 14 shows the updated resource stack from SENDOUT, which represents the alternatives to the Tacoma LNG Facility.

**Table 14. Least Cost Gas Portfolio, if Tacoma LNG is Not Available as a Resource**

Winter Period	NWP Additions + Westcoast	Short Term NWP	Cross Cascades - AECO	Cross Cascades - Malin	Swarr	LNG Distr. Upgrade	LNG PLY	DSR (Incl Standard Bundle)	Total New Resources	Sendout Resource Surplus/(Need)	
Option	#1	#2	#3	#4	#7	#5	#6				
2018-19		9						15	2	26	1
2019-20		16						15	6	37	0
2020-21		0			30			15	11	56	5
2021-22		4			30			15	15	64	1
2022-23		11			30			15	19	75	0
2023-24	68				30			23		121	33.5
2024-25	68				30			27		125	25
2025-26	68				30			32		130	20
2026-27	68				30			37		135	18
2027-28	68				30			41		139	17
2028-29	68				30			45		143	9
2029-30	68				30			49		147	1
2030-31	68		30		30			54		182	23
2031-32	68		30		30			58		186	17
2032-33	68		30		30			63		191	8
2033-34	68		30		30			67		195	1
2034-35	68		80		30			72		250	40
2035-36	68		80		30			76		254	28
2036-37	68		80		30			80		258	14
2037-38	68		80		30			84		262	2

The following Table 15 shows the cost and timing assumptions for the incremental pipeline capacity alternative in which Spectra’s Westcoast pipeline delivers gas from northern British Columbia to NWP near Sumas, Washington, and NWP delivers to PSE.

**Table 15: 2018 Analysis Pipeline Assumptions**

<b>Assumption</b>	<b>Cost</b>	<b>Timing available</b>
NWP Costs (\$/Dth/Day):	.61	Nov. of 2023, 24, 25, 30 & 2035
Westcoast Pipeline Costs (\$/Dth/Day):	.63	Nov. of 2023, 24, 25, 30 & 2035
Westcoast Capacity (% of Firm):	100%	

The updated analysis assumed a commercial online date of the fourth quarter of 2021 (winter 2021-2022), which represents a delay of roughly one year from the schedule approved by the PSE Board of Directors in September of 2016. A more detailed version of the results and further discussion of the scenario assumptions is provided in Exh. RJR-5C at 1794.

At the March 1, 2018 meeting, PSE management presented updated analysis results, as well as an updated costs, schedule, and assessment of qualitative risks of the three potential construction alternatives. The analysis showed that as of March 1, 2018, the Tacoma LNG Facility continued to be the least-cost resource alternative to meet PSE’s gas peak-day resource need and, as described above, the “with Tacoma LNG” demonstrated a \$112.5 million benefit to the existing gas portfolio. PSE management recommended that the PSE Board of Directors approve the “modified construction” process based on the scenario analysis that PSE conducted with Chicago Bridge & Iron in the month between the determination of the Puget Sound Clean Air Agency and the March 1, 2018 meeting that included:

- PSE and Chicago Bridge & Iron would modify the existing work schedule using the change order procedure in the EPC Contract;

- Work on “emitter” aspects of the Tacoma LNG Facility, such as the LNG processing equipment, would await issuance of the air permit by the Puget Sound Clean Air Agency;
- PSE and Chicago Bridge & Iron would agree up front on an escalation rate or cost-adder applicable to the delayed work, depending on the length of the delay; and.
- PSE would not trigger the option of formal suspension of the EPC Contract, thus avoiding the possibility that Chicago Bridge & Iron could exercise a right to terminate the agreement within 180 days.

Exh. RJR-5C at 1778. The project costs for the modified construction process were estimated to be nearly \$483 million. *See*, Exh. RJR-5C at 1776. The PSE Board of Directors accepted management’s recommendation to pursue a “modified” construction process and affirmed its commitment to complete the Tacoma LNG Project as a system peaking resource.

**4. May 3, 2018– Update to the PSE Board of Directors Regarding the Tacoma LNG Project**

On May 3, 2018, PSE management provided an update to the PSE Board of Directors regarding permitting, construction, and other matters with respect to the Tacoma LNG Project. Please see Exh. RJR-5C at 1798-1809 for materials presented to the PSE Board of Directors at the May 3, 2018 meeting. PSE management apprised the PSE Board of Directors that construction of the non-emitting portions of the Tacoma LNG Facility was ongoing in accordance with the modified construction process. Notable items included: site preparation was complete; roof raising for outer tank inner lining of the storage tank was complete; form work for the first concrete tank ring was complete; excavation of the send-out pit for the LNG cryogenic pipeline was underway; deck pour for the Blair Waterway fueling pier was complete; procurement of materials was 88% complete and fabrication was 81% complete with items

stored on site; the Frederickson gate station and 4-mile 16" pipeline were complete; and civil work and steel erection at the Tacoma Power station were complete. *See* Exh. RJR-5 at 1799.

PSE management also reported that the Puget Sound Clean Air Agency SEIS requirement was estimated to delay the Tacoma LNG Project completion by approximately 15 months and PSE was negotiating with Chicago Bridge & Iron to mitigate costs and schedule of project delay. *See* Exh. RJR-5C at 1800-1801.

**5. June 21, 2018 – Update to the PSE Board of Directors Regarding the Tacoma LNG Project**

On June 21, 2018, PSE management provided an update to the PSE Board of Directors regarding permitting, construction, and other matters with respect to the Tacoma LNG Project. Please see Exh. RJR-5C at 1811-1820 for materials presented to the PSE Board of Directors at the June 21, 2018 meeting. PSE management provided the PSE Board of Directors with information regarding the potential increase in costs for the Tacoma LNG Project associated with the delay resulting from the Puget Sound Clean Air Agency process for the issuance of the Supplemental Environmental Impact Statement.

As PSE and Chicago Bridge & Iron learned more about the potential timing for the issuance of a Supplemental Environmental Impact Statement, the two companies worked together to reach resolution of the likely cost impacts. Ultimately, PSE and Chicago Bridge & Iron agreed upon pricing and terms and conditions for the change order necessitated by the delay to accommodate the Puget Sound Clean Air Agency process. Under that change order, PSE agreed to pay a firm price of \$10,837,951 to Chicago Bridge & Iron for the delay, with an approximate \$2 million PSE allowance for escalation and an approximate \$100,000 PSE allowance for additional warranty exposure. *See* Exh. RJR-5C at 1813. All told, 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—from the \$451 million approved by the PSE Board of Directors in November of 2017 to a total of \$507 million.<sup>10</sup> *See* Exh. RJR-5C at 1816.

**6. July 2018 – The F18 Load Forecast Projects an Immediate Need for the Tacoma LNG Project**

In July 2018, PSE approved the F18 Load Forecast, which projected an immediate need for an LNG liquefaction and storage facility. *See* Exh. RJR-9 at line 6 (column F2018).

**7. August 2, 2018 and September 20, 2018 – Informational Updates to the PSE Board of Directors**

On August 2, 2018, PSE management updated the PSE Board of Directors on the status of the construction of the Tacoma LNG Project. Please see Exh. RJR-5C at 1821-1828 for materials presented to the PSE Board of Directors at the August 2, 2018 meeting. On September 20, 2018, PSE management updated the PSE Board of Directors on the status of the construction of the Tacoma LNG Project. Please see Exh. RJR-5C at 1830-1835 for materials presented to the PSE Board of Directors at the September 20, 2018 meeting. The presentation included a construction status summary, and that PSE expected a lull in construction activity between February and June 2019, the anticipated receipt of the air permit from the Puget Sound Clean Air Agency. *See* Exh. RJR-5C at 1831.

**8. October 8, 2018 – The Puget Sound Clean Air Agency Releases a Draft Supplemental Environmental Impact Statement for the Tacoma LNG Project Finding That the Project Will Reduce Greenhouse Gas Emissions**

On October 8, 2018, the Puget Sound Clean Air Agency released a Draft Supplemental Environmental Impact Statement for the Tacoma LNG Project and initiated a public process to work towards a final Supplemental Environmental Impact Statement. In the Draft Supplemental Environmental Impact Statement, the Puget Sound Clean Air Agency

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<sup>10</sup> This represented an additional \$24 million above the estimated increase of \$32 million that was projected at the time of the PSE board of directors meeting on March 1, 2018.

determined that the Tacoma LNG Project would result in a reduction of greenhouse gas emissions. The Supplemental Environmental Impact Statement included a recommended condition that PSE source all gas from British Columbia.

**9. November 1, 2018 – Update to the PSE Board of Directors Regarding the Draft Supplemental Environmental Impact Statement Issued by the Puget Sound Clean Air Agency**

On November 1, 2018, PSE management informed the PSE Board of Directors that the Draft Supplemental Environmental Impact Statement released by the Puget Sound Clean Air Agency included a finding that the Tacoma LNG Project would reduce greenhouse gas emissions. Please see Exh. RJR-5C at 1837-1846 for materials presented to the PSE Board of Directors on November 1, 2018. PSE management recommended a permitting strategy that would support the determination in the Draft Supplemental Environmental Impact Statement in comments, while pointing out certain analytical areas that would further increase the amount of greenhouse gases emissions reduced by the project. PSE management informed the PSE Board of Directors that PSE anticipated a Final Supplemental Environmental Impact Statement would be issued on or about February 1, 2019, and that the Puget Sound Clean Air Agency would issue a final air permit on or about June 1, 2019. *See* Exh. RJR-5C at 1839.

**C. Major Activities in Calendar Year 2019**

**1. March 29, 2019 – The Puget Sound Clean Air Agency Issued a Final Supplemental Environmental Impact Statement**

On March 29, 2019, the Puget Sound Clean Air Agency issued the Final Supplemental Environmental Impact Statement, which concluded that the Tacoma LNG Project would result in a net decrease in greenhouse gas emissions and included a condition that required PSE to source the natural gas for the Tacoma LNG Facility from British Columbia or Alberta.

**2. June 20, 2019 – The F19 Load Forecast Projected an Immediate Need for the Tacoma LNG Project**

In June 2019, PSE approved the F19 Load Forecast, which projected an immediate need for an LNG liquefaction and storage facility. *See* Exh. RJR-9 at line 7 (column F2019).

**3. September 19, 2019 – Update to the PSE Board of Directors**

On September 19, 2019, PSE management provided an informational update to the PSE Board of Directors. Please see Exh. RJR-5C at 1848-1862 for materials presented to the PSE Board of Directors at the September 19, 2019 meeting. PSE management informed the PSE Board of Directors of plans to retain NAES Corporation, a third-party operator in Issaquah, Washington, to operate the Tacoma LNG Facility.<sup>11</sup> At the time, PSE anticipated that retention of NAES would cost approximately \$4 million per year, shared between PSE and Puget LNG, and that the Tacoma LNG Facility would have annual information technology maintenance costs of approximately \$2 million. *See* Exh. RJR-5C at 1858.

**4. December 1, 2019 – The 2019 IRP Progress Report Projected That the Tacoma LNG Project Would Be Necessary and Become Used and Useful in the Winter of 2021-22**

On December 1, 2019, PSE issued an IRP Progress Report in lieu of a full IRP. The 2019 IRP Progress Report, based on the 2018 forecast, projected the following needs for the PSE core gas portfolio:

- the Base Case scenario projected an immediate need for the Tacoma LNG Facility, with the project becoming used and useful in the winter of 2021-22;
- the high demand projected an immediate need for the Tacoma LNG Facility, with the project becoming used and useful in the winter of 2021-22; and

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<sup>11</sup> A copy of the NAES Operating Agreement is included as the Sixth Exhibit to the Prefiled Testimony of Ronald J. Roberts, Exh. RJR-7C.

- the low demand forecast projected adequate gas portfolio resources until approximately the winter of 2039-40.

**5. December 10, 2019 – The Puget Sound Clean Air Agency Issued a Notice of Construction Permit for the Tacoma LNG Facility**

On December 10, 2019, the Puget Sound Clean Air Agency issued the Notice of Construction permit for the Tacoma LNG Facility.

**6. December 19, 2019 – The Puyallup Tribe and Earthjustice Appeal the Final Supplemental Environmental Impact Statement and the Notice of Construction Permit for the Tacoma LNG Facility**

On December 19, 2019, the Puyallup Tribe and Earthjustice appealed the Final Supplemental Environmental Impact Statement and the Notice of Construction permit issued by the Puget Sound Clean Air Agency to the Pollution Control Hearings Board and both filed motions to stay construction of the Tacoma LNG Facility pending outcome of the appeals.

**D. May 6, 2020 – Update to PSE Board of Directors Regarding Impact of COVID-19 on Construction Activities for the Tacoma LNG Facility**

On May 6, 2020, PSE management provided an informational update to the PSE Board of Directors. Please see Exh. RJR-5C at 1863 to 1872 for materials presented to the PSE Board of Directors at the May 6, 2020 meeting. PSE management informed the PSE Board of Directors that construction activity was ongoing and that the impact of the COVID-19 pandemic on construction activities for the Tacoma LNG Facility had been minimal and likely resulted in delays of 10 days or less.

**E. Major Activities in Calendar Year 2021**

**1. February 5, 2021 – The Tacoma LNG Facility Achieves Mechanical Completion**

On February 5, 2021, the Tacoma LNG Facility was declared mechanically complete, and care, custody, and control were turned over from the EPC Contractor, Chicago Bridge & Iron, to PSE's operations contractor, NAES Corporation.

**2. March 2021 to January 2022 – Natural Gas Is Delivered to the Tacoma LNG Facility**

On March 15, 2021, PSE began delivering natural gas to the Tacoma LNG Facility for commissioning purposes. From March 2021 through January 2022, the Tacoma LNG Facility underwent a series of performance tests to ensure all systems performed in accordance with construction contract requirements. Commissioning of the liquefaction equipment and the vaporization equipment is expected to be complete by the end of January 2022, at which time the Tacoma LNG Facility will be operational for purposes of natural gas injection into PSE's gas distribution system.