

**POLLUTION CONTROL HEARINGS BOARD
STATE OF WASHINGTON**

ADVOCATES FOR A CLEANER
TACOMA, SIERRA CLUB, WASHINGTON
ENVIRONMENTAL COUNCIL,
WASHINGTON PHYSICIANS FOR
SOCIAL RESPONSIBILITY,
STAND.EARTH, and THE PUYALLUP
TRIBE OF INDIANS,

Appellants,

v.

PUGET SOUND CLEAN AIR AGENCY and
PUGET SOUND ENERGY,

Respondents.

PCHB No. 19-087c

FINDINGS OF FACT, CONCLUSIONS OF
LAW AND ORDER ON STATE
ENVIRONMENTAL POLICY ACT
ISSUES 2a, 2c, 2d, 2e, 2f, and 9

I. INTRODUCTION

This case concerns challenges to a Permit and accompanying supplemental environmental impact statement (SEIS) issued by the Puget Sound Clean Air Agency (PSCAA) authorizing greenhouse gas and other emissions from a specific project. Against the backdrop of the pressing effects of climate change, the Pollution Control Hearings Board's (Board) resolution of the case is a narrow one: whether the Permit and SEIS complies with the State Environmental Policy Act (SEPA), ch. 43.21C RCW, and applicable federal and state Clean Air Act statutes and regulations. *See* 42 U.S.C. §§ 7401-7671q; ch. 70.94 RCW. Concluding that they do, the Board affirms the Permit and SEIS, but remands to add a condition to the Permit.

1 On December 19, 2019, the Puyallup Tribe of Indians' (Tribe) and Advocates for a
2 Cleaner Tacoma, Sierra Club, Washington Environmental Council, Washington Physicians for
3 Social Responsibility, and Stand.Earth (collectively, ACT) each separately appealed the Order of
4 Approval for Notice of Construction (NOC) No. 11386 (Permit) issued to Puget Sound Energy
5 (PSE) by PSCAA to construct the Tacoma Liquefied Natural Gas facility (TLNG) and related
6 equipment. The Appeals challenged both the Permit and SEPA supplemental environmental
7 impact statement supporting the Permit. On January 24, 2020, the Presiding Officer consolidated
8 the Appeals. *Consolidation and Amended Prehearing Order*, PCHB No. 19-087c.

9 The administrative record in this case reflects the protracted discovery and voluminous
10 motions filed. The ten-day hearing on the consolidated appeals took place before the Board via
11 Zoom videoconference in April 2021. The Board was comprised of Board Chair Neil L. Wise,
12 and Members Carolina Sun-Widrow and Michelle Gonzalez. Administrative Appeals Judge
13 Heather C. Francks, presided for the Board.

14 At the hearing, the parties presented expert and fact witnesses for direct examination,
15 cross-examination, and questioning by the Board members. The Board also viewed portions of
16 certain video deposition testimony as part of the evidence in the case, and PSE counter-
17 designated portions of deposition testimony. Approximately 1,500 exhibits were filed, of which
18 around 350 exhibits were ultimately admitted.

19 At the hearing, attorneys Jan E. Hasselman and Jaimini Parekh appeared on behalf of
20 ACT. Attorneys Geoff Bridgman, Nicholas G. Thomas, and Andrew S. Fuller appeared for the
21 Tribe. Attorneys Tadas A. Kisielius, Joshua B. Frank, Allison Watkins Mallick, and Sterling

1 Marchand appeared for PSE. Attorneys Jennifer A. Dold and Jennifer Elias appeared on behalf
2 of PSCAA.

3 The parties agreed to present evidence on the SEPA legal issues during the first five
4 hearing days and to present the Permit legal issues during the remaining five hearing days. As
5 the Board's Findings of Fact, Conclusions of Law, and Order on the consolidated appeals total
6 180 pages, they are divided into two documents for ease of reading. The instant findings,
7 conclusions, and order addresses the legal issues relating to whether PSCAA's SEIS adhered to
8 SEPA requirements. A separate order issued the same day addresses the Permit issues. *See*
9 *Findings of Fact, Conclusions of Law, and Order on NOC Issues 4, 4a, 4b, 4c, 4d, 4e, 4f, 4g, 4h,*
10 *4i, 4j, 4k, 4o, 4p, 4u, 6, and 8.*

11 Together, they comprise the Board's sole decision in this case, which affirms the Permit
12 and SEIS, but remands to add a condition in the Permit to install a continuous emission
13 monitoring system to monitor SO₂ and VOC emissions from TLNG's enclosed ground flare.

14 II. PROCEDURAL HISTORY

15 On January 2, 2020, ACT filed a Motion for Stay seeking a stay of the effectiveness of
16 the Permit. On January 10, 2020, the Tribe filed a Motion for Stay of the Permit, joining ACT's
17 Motion for Stay and providing additional reasons for a stay. PSE opposed both Motions.
18 PSCAA took no position on whether a stay should be issued in the consolidated appeal but filed
19 a response on the issue of whether ACT or the Tribe has established a required element for
20 obtaining a stay from the Board: the likelihood of success on the merits of the appeal. On March
21 17, 2020, the Board denied the Appellants' Motions for Stay.

1 On May 6, 2020, PSE filed a Motion to Dismiss and for Partial Summary Judgment
2 (PSE's Motion). PSCAA joined PSE's Motion. The Tribe opposed PSE's Motion. ACT joined
3 the Tribe's opposition and filed a cross motion for Partial Summary Judgment on Issue 1. On
4 March 26, 2021, the Board granted in part and denied in part PSE's Motion and denied ACT's
5 cross motion. Issues 1, 3b-f, 4f (as to WAC 173-400-111 -WAC 173-400-112), 4l and 4m were
6 dismissed. Issues 4n, 4q, 4r, 4s, 4t and 5 were dismissed by agreement of the parties.

7 On August 3, 2020, the Tribe moved to bifurcate the SEPA issues from the non-SEPA
8 issues on the grounds that resolution of the SEPA issues may eliminate the need for a hearing on
9 the non-SEPA issues. The Presiding Officer denied the motion on the grounds that bifurcation
10 may result in piecemeal litigation and continued the case until March 2021. On January 6, 2021,
11 the Tribe renewed its motion to bifurcate the SEPA issues from the Permit issues and continue
12 the hearing on the Permit issues to allow time to complete discovery and for a stay of the Order
13 of Approval. The Presiding Officer denied the motion on the grounds that bifurcation may result
14 in piecemeal litigation. In the course of the briefing, a two-week block of hearing time became
15 available in the Board's calendar and all parties agreed to continue the case from March 2021, to
16 April 2021.

17 On November 30, 2020, PSE filed a Second Dispositive Motion. PSE moved to dismiss
18 Issues 2a-2d and 2f, 3a, 4o, 4p, 4v and 4w. PSCAA joined the motion. ACT and the Tribe
19 opposed the motion. On March 26, 2021, the Board granted in part and denied in part PSE's
20 Second Dispositive Motion. Summary Judgment was granted as to Issues 2b and 3a and denied
21

as to Issues 2a, 2c, 2d, 2f and 4o and p. Issues 4v and 4w were dismissed by agreement of the parties.

The parties filed numerous Motions in Limine prior to hearing including motions related to the order of witness testimony and the use of videotaped deposition testimony of corporate representatives and former employees.

The hearing took place April 12-16, 20-23, and 27, 2021, by Zoom videoconference. On May 28, 2021, the parties filed Closing Briefs. On June 30, 2021, ACT submitted *Washington State Dairy Federation v. Dept' of Ecology*, 18 Wn. App. 2d 259, 490 P.3d 290 (2021) as supplemental authority on consideration of climate change.

The Board received sworn testimony of witnesses, admitted exhibits, and heard argument on behalf of the parties. Based upon the evidence presented, the Board makes the following Findings of Fact and Conclusions of Law.

III. LEGAL ISSUES

The following legal issues proceeded to hearing, grouped into SEPA issues and Permit issues:¹

SEPA Issues

2. Whether the supplemental environmental impact statement ("SEIS") assessing lifecycle greenhouse gas emissions that supported the Order of Approval was arbitrary, unreasonable, incorrect, or otherwise not in compliance with the State Environmental Policy Act ("SEPA"), including but not limited to the following:

¹ Issue 2b was dismissed on summary judgment. See *Order on PSE's Second Dispositive Motion*, PCHB No. 19-087c (March 26, 2021).

- 1 a. The SEIS relies on an incorrect and unsupported claim of 1-for-1 fuel
2 displacement, and an assumption that fuel use will not change over 40 years, that
3 masks the greenhouse gas ("GHG") impacts of the Order of Approval.
4
5 c. The SEIS fails to acknowledge that maintenance of high-GHG-emissions status
6 quo for the lifetime of the project is a "significant" impact under SEPA.
7
8 d. The SEIS relies on displacement and/or mitigation that is unavailable under the
9 project as currently configured, and otherwise fails to assess the current
10 configuration of the project.
11
12 e. The SEIS fails to properly address the facility's emissions of N₂O, a potent
13 greenhouse gas.
14
15 f. The SEIS relies on scenarios that have not undergone SEPA review.
16
17 9. Whether legally adequate environmental review under SEPA requires either denial or
18 further mitigation of the Project or is a reviewable cause of action under SEPA.

19 Permit Issues

- 20 4. Whether the Puget Sound Clean Air Agency's ("PSCAA") December 10, 2019 Order
21 of Approval ("Order of Approval") violates PSCAA Regulations, the Washington
Clean Air Act (RCW Ch. 70.94), and/or the federal Clean Air Act, including but not
limited to the following:
- a. Whether PSCAA's conclusions concerning Tacoma LNG's emissions and the
impacts from those emissions are erroneous when PSCAA relied on modeling
using non- representative meteorological data.
- b. Whether PSCAA's Order of Approval is premature when the design of Tacoma
LNG was not yet complete and continued to change at the time PSCAA
determined PSE's NOC Application was complete and when the Order of
Approval was issued, and it was likely that the facility's design and its operations
would need to undergo revisions, which would likely result in changes to facility
details having bearing on the facility's emissions.
- c. Whether PSCAA's Order of Approval is invalid, when PSCAA's decision to grant
the Order of Approval was made in reliance on performance specification and
process details that were not provided to PSCAA, including those from Chicago
Bridge & Iron and other unidentified "vendors."

- d. Whether PSCAA erred in concluding that Tacoma LNG is not a Major Source of one or more pollutants, including volatile organic compounds (VOCs)?
- e. Whether PSCAA erroneously concluded that Tacoma LNG's emissions are below the Clean Air Act's regulatory thresholds, emission and air quality standards.
- f. Whether PSCAA erroneously concluded that the emissions from Tacoma LNG will not violate WAC 173-400-113 (i.e., not cause or contribute to a violation of any ambient air quality standard).
- g. Whether PSCAA erroneously concluded that Tacoma LNG's emissions will not exceed applicable acceptable source impact levels (ASIL).
- h. Whether PSCAA erroneously concluded that Tacoma LNG's emissions will not exceed applicable small quantity emission rate (SQER) limits.
- i. Whether PSCAA's Order of Approval is invalid, where a first-tier ambient concentration screening analysis was performed before all emissions of HAPs and TAPs from the flare were estimated.
- j. Whether PSCAA violated WAC 173-460-060 by failing to require a demonstration that Tacoma LNG will employ tBACT for all TAPs for which the increase in emissions will exceed de minimis emission values found in WAC 173-460-150.
- k. Whether the Order of Approval's requirement that "the sole source of natural gas supply used in all operations at the Tacoma LNG facility comes from British Columbia or Alberta, Canada" is enforceable.
- o. Whether PSCAA's Order of Approval incorrectly fails to include the requirements of NSPS Subpart OOOOa (40 C.F.R. § 60.5430a et seq.) relating to the handling of acid gas from the facility.
- p. Whether PSCAA's Order of Approval incorrectly fails to include a requirement that Tacoma LNG monitor and control fugitive GHG and VOC emissions in accordance with NSPS Subpart OOOOa (40 C.F.R. § 60.5430a et seq.).
- u. Did PSCAA violate the Clean Air Act by allowing a known source of significant amounts of pollution to achieve BACT through "good combustion practices", when PSCAA fails to define that standard and when there are known and reasonably available methods which, if implemented, would better ensure the facility is not violating pollution standards?

1 6. Whether PSCAA’s permitting decision is invalid in light of its failure to engage in
2 formal government-to-government consultation with the Puyallup Tribe of Indians.

3 8. Does the Board have jurisdiction over issues raised in Advocates for a Cleaner
4 Tacoma et al.’s appeal and the Puyallup Tribe’s appeal that are outside of the Board’s
5 jurisdiction in this permit appeal, including: facial challenge to Agency regulations
6 and/or provisions of the Washington Clean Air Act, Ch. 70.94 et seq. (“Act”); alleged
constitutional, Civil Rights Act, or treaty-based claims; challenges to an alleged
failure to pursue enforcement; challenge to elements of the City of Tacoma’s 2015
Final Environmental Impact Statement (“2015 FEIS”) not properly before this Board;
and/or issues outside of the Board’s jurisdiction established in Ch. 43.21B et seq.?

7 **IV. GENERAL FINDINGS OF FACT**

8 1.

9 The TLNG is generally located north of East 11th Street, east of Alexander Avenue,
10 south of Commencement Bay, and on the west shoreline of the Hylebos Waterway, adjacent to
11 the Puyallup Indian Reservation. The site is in an area zoned as Port Maritime Industrial. The
12 site is composed of four separate parcels owned by the Port of Tacoma. *Ex. RA-51, p. 6.*²

13 2.

14 The purpose of the project is to receive natural gas from PSE’s distribution system, chill
15 natural gas to produce approximately 250,000 to 500,000 gallons of liquefied natural gas (LNG)
16 daily, and to store up to 8 million gallons of LNG on site. *Ex. RA-51, p. 18.* PSE hired Chicago
17 Bridge & Iron Company (CB&I) to design and construct TLNG. *Stobart Testimony at 969-972.*³

21 ² Page numbers in exhibit citations refer to the pdf page number.

³ Witness hearing testimony citations refer to the transcript pages.

1 3.

2 LNG from the facility would be distributed for use as marine transportation fuel by
3 Totem Ocean Trailer Express (TOTE) at its Port of Tacoma Facility, along with other potential
4 future regional LNG marine fuel customers. During times of peak gas demand, generally in the
5 winter, 66,000 dekatherms per day of LNG would be re-gasified and re-injected into PSE's
6 distribution system. This capability to vaporize LNG back into its gaseous state for injection into
7 the PSE natural gas distribution system is referred to as "peak shaving." *Ex. RA-51, p. 5.* PSE is
8 also proposing to load LNG onto trucks and barges for use by other regional markets seeking an
9 alternative fuel source. *Ex. RA-51, p. 18.*

10 4.

11 LNG is a temporarily liquefied, naturally gaseous fossil fuel, mostly composed of
12 methane. *Ex. ACT-107, p. 3 (Pratt Pre-filed Testimony).* As of 2019, 0.14 percent of ships were
13 powered by LNG, but it is growing in popularity. *Id.* A significant driver of LNG adoption is
14 the establishment of low pollution zones that require low emissions of sulfur and nitrogen
15 oxides. *Id.* LNG contains only trace amounts of sulfur and its combustion processes produce
16 lower nitrogen oxides than production of marine fuels. *Id.*

17 5.

18 The TLNG project requires several permits from various agencies and jurisdictions. *See*
19 *Ex. RA-38, pp. 9-11.* Among them is a Shoreline Substantial Development Permit (SSDP). PSE
20 formally applied to the City of Tacoma (City) for an SSDP for TLNG. In 2014, the City, acting
21 as lead agency under SEPA, issued a SEPA Determination of Significance indicating the City's

1 intention to require an Environmental Impact Statement (EIS) to assess the environmental
2 impacts of the facility. *Ex. RA-38, p. 29.* Upon issuance of the significance determination, the
3 City solicited public comments regarding what issues should be addressed during environmental
4 review and the City held a public scoping meeting. *Id.*

5 6.

6 The City issued a Draft EIS (DEIS), held a public meeting, and accepted comments. On
7 November 9, 2015, the City published the Final EIS (FEIS) for TLNG. *Ex. RA-38, p. 29.*

8 7.

9 The FEIS found, *inter alia*, that the Project would enable TOTE vessels to meet new
10 emissions standards, and that natural gas has been identified as a key resource to implement
11 greenhouse gas (GHG) emission reductions for commercial truck, bus, rail, and marine
12 transportation. *Ex. RA-38, p. 31.* In addition, the FEIS concluded the Proposed Action as
13 mitigated would have nominal adverse effects on water resources, soils and geology, vegetation,
14 climate and air quality, health and safety, socioeconomics, and cultural resources. *Id.*

15 8.

16 In 2017, PSE applied to PSCAA for a Permit for TLNG. In its review of a Permit
17 application, PSCAA engineers are required to ensure that all the proposed processes and
18 equipment will employ best available control technology (BACT), identify and confirm what air
19 contaminants may be emitted, and confirm that all applicable agency, state and federal
20 regulations, and all air quality standards will be met. *Ex. RA-68 (NOC).*

1 9.

2 In late 2017, during PSCAA's review of PSE's Permit application, PSCAA concluded
3 that the FEIS did not account for "upstream" GHG emissions associated with natural gas
4 extraction and transmission. *Ex. RA-39 (Jan. 24, 2018 Notice of SEIS)*. In addition, PSCAA
5 determined that the Washington State Department of Ecology (Ecology) guidance document for
6 identification and evaluation of GHGs, which the FEIS analysis relied upon, had been withdrawn
7 for revision after completion of the FEIS. *Ex. RA-51, p. 17*. As a result, PSCAA required an
8 SEIS using a life cycle analysis (LCA) to identify and analyze GHG emissions. *Ex. RA-39*. An
9 LCA is a cradle-to-grave estimate of the emissions from a production process or a project.
10 *Unnasch Testimony at 634*. LCAs generally look at direct emissions from the facility as well as
11 indirect emissions upstream and downstream of the facility. *Ex. PSE-651, p. 10 (Couch Pre-filed*
12 *Testimony)*.

13 10.

14 Upstream life cycle emissions are the emissions associated with production and transport
15 of fuel to be used at the LNG production plant: natural gas feedstock, natural gas fuel, diesel
16 fuel, and electricity. *Ex. RA-51, p. 24*. Direct emissions include all fuel combustion emissions,
17 as well as fugitive emissions, at the plant. *Id.* The downstream or end-use emissions include the
18 combustion of the fuels by the end-user as well as fugitive emissions from the equipment that is
19 burning the fuel. *Id.* End use emissions refer to the final combustion of LNG for vessel/truck
20 transportation, fugitive emissions from the equipment burning the fuel, and peak shaving
21 applications. *Id.*; *Unnasch Testimony at 643*.

11.

PSCAA retained Life Cycle Associates, LLC to conduct the GHG LCA for the Proposed Action and No Action (no project) Alternative, and Ecology and Environment, Inc., to conduct SEIS research, analysis, and document preparation. *Ex. RA-51, p. 9.* Stefan Unnasch of Life Cycle Associates has over 25 years of experience conducting LCAs for the States of California and Washington and private entities, including experience in LCAs that involved fuel pathways such as diesel fuels and LNG. *Ex. RA-4 (Unnasch CV).* Unnasch has prepared hundreds of LCAs during his work and conducted the LCA for PSCAA. *Unnasch Testimony at 634-35.*

12.

An LCA has many different inputs. Each one of those inputs has a potential range of values. A sensitivity analysis is helpful in identifying which input was selected and what effect a different value would have on the model. *Couch Testimony at 736.*

13.

The sensitivity analysis for the TLNG LCA included variable assumptions that both increased and/or decreased the GHG emissions included in the LCA. *Ex. RA-51, p. 46.* A graph was included in the Final SEIS showing net GHG emissions when different key inputs are used to calculate GHG emissions. *Ex. RA-51, p. 136, Fig. 5.5.*

14.

The TLNG LCA identifies and quantifies all GHG emissions associated with natural gas extraction and transmission, on-site LNG production and storage, and downstream end uses of the LNG. *Ex. RA-51, p. 17.* The TLNG LCA analyzes the primary GHGs: water vapor, carbon

dioxide, methane, and nitrous oxide. *Id.*, p. 75. Carbon dioxide is the most abundant of these gases. *Id.*

15.

As part of the SEIS and LCA, several assumptions were made, including:

- 100 percent of the project's LNG will displace conventional marine fuel. *Ex. RA-51, p. 94.*
- Fuel use will remain static over the 40-year lifetime of TLNG. *Ex. RA-51, pp. 31, 35.*
- Canada would be the source of natural gas for TLNG. *Ex. RA-51, p. 216.*
- Price induced displacement effects would be so small that they could be ignored when calculating GHG emissions. *Ex. RA-51, p. 74.*
- The amount of LNG used for trucking in Scenario A is zero. *Ex. RA-51, p. 29.*
- All of the project's customers will have the same fuel efficiency as the TOTE LNG ships.

Ex. RA-51, (SEIS App. B at 123, 126, 158, 189).

16.

Using the LCA, the draft SEIS included a comparison between a No Action Alternative⁴ to PSE's Proposed Action, and production of 250,000 to 500,000 gallons per day of LNG for use by marine customers and peak shaving. *Ex. RA-51, p. 6.* The end use of the LNG processed at

⁴ The SEIS defined the No Action Alternative as: Construction of the Tacoma LNG Facility, including upgrading of the natural gas distribution system, would not occur. Existing levels of maritime petroleum fuels use would continue. *Ex. RA-51, p. 6.*

1 the facility will go to TOTE marine to fuel their ships, other marine vessels, on-road trucks, and
2 use by PSE residential and commercial natural gas users, long haul trucks or other marine
3 transportation. *Ex. RA-51, pp. 6, 81.*

4 17.

5 The Proposed Action was defined as:

6 The Tacoma LNG Facility would be constructed and produce between
7 approximately 250,000 and 500,000 gallons of LNG per day, for use by marine
8 customers, including TOTE, as well as regasification into the PSE natural gas
9 distribution system for peak-shaving purposes. Additional uses would include
10 providing LNG to other industries or merchants, such as fuel for high-horsepower
11 trucks used in long-haul trucking or other marine transportation uses. The Tacoma
12 LNG Facility would operate and be staffed with approximately 16 to 18 full-time
13 employees 24 hours per day, 365 days a year.

14 *Ex. RA-51, p. 6.* The Proposed Action included two scenarios in the SEIS lifecycle analysis:

15 Scenario A assumed an LNG production rate of 250,000 gallons per day and Scenario B assumed
16 an LNG production rate of 500,000 gallons per day. *Ex. RA-49, p. 29.*

17 18.

18 Scenarios A and B both included the same count of TOTE marine vessels and peak
19 shaving. *Ex. RA-49, p. 29.* Scenario B includes the use of more LNG for marine applications
20 where the LNG is transferred by bunkering barge. *Ex. RA-49, p. 29.* Under the Scenario A, 55
21 percent of the gas produced at the TLNG facility would be sold to other marine vessels. *Ex. RA-51, p. 29, Table 2-1.* Under Scenario B, 73 percent of the gas produced would be sold to other
marine vessels, and two percent to trucks. *Id.* Other marine vessels are not defined in the SEIS.
See Ex. RA-51 generally.

19.

The permitted production capacity for TLNG is 250,000 gallons per day, Scenario A in the SEIS. *Hogan Testimony at 377*. The facility is not currently permitted to produce up to 500,000 gallons per day, and such an expansion would require a revised air permit. *Hogan Testimony at 377*.

20.

The draft SEIS found that the project would generate 687,639 metric tons (tonnes) of CO₂e/year⁵ under Scenario A, and 1.387 million tonnes/year under Scenario B. *Ex. RA-49, pp. 160 (Table 5.1), 164 (Table 5.3)*. The draft SEIS concluded that the Proposed Action would result in an overall decrease in GHG emissions in the Puget Sound region, a net beneficial impact compared to the No Action Alternative. *Ex. RA-49, pp. 18-19*.

21.

On October 8, 2018, PSCAA issued a draft SEIS and initiated a public comment period. *Ex. RA-51, p. 17*. Appendix C to the Final SEIS contains the comments received on the draft SEIS and PSCAA's responses to comments. *Ex. RA-51, pp. 199-283*. In response to comments, PSCAA confirmed the findings of the draft SEIS, and updated and expanded the sensitivity analysis with additional variables and assumptions that would both increase and/or decrease the GHG emissions, including: global warming potential, methane leakage and methane slip values, and a comparison of AR4 and AR5 values. *Van Slyke Testimony at 530-31; Ex. RA-51, pp. 46*,

⁵ Carbon dioxide equivalent means the number of metric tons of CO₂ emissions with the same global warming potential as one metric ton of another greenhouse gas.

136. Those additional variables included an additional Environmental Defense Fund study (referred to as “EDF” or “Alvarez”) value for the natural gas upstream calculation. *Van Slyke Testimony at 532; Ex. RA-51, p. 136.* Methane slip was also added to the updated sensitivity analysis. *Id.*

22.

The Final SEIS concluded overall reductions in GHG emissions are dependent upon the assumption that the sole source of natural gas supply to the facility is from British Columbia or Alberta but entering Washington through British Columbia. *Ex. RA-51, p. 19.* The Final SEIS recommended the Order of Approval, if issued, contain a condition that the source of natural gas supply to the facility be solely from British Columbia or Alberta, with specific permit terms and conditions specifying how compliance with this requirement would be demonstrated on a continuous basis. *Ex. RA-51, p. 48.* This requirement was set as Condition 41 of the Permit which requires the natural gas feeding the facility to come through British Columbia to ensure the facility would remain consistent with the LCA’s calculation of GHG emissions. *Ex. RA-51, pp. 216-218 (SEIS Response to Comments); Van Slyke Testimony at 525-526.*

23.

The Final SEIS also provided additional information on key aspects of the LCA, including: an explanation of how the amount of LNG produced by PSE would displace marine gas oil (MGO); explaining the displacement relationship created between LNG and MGO; identifying a range of GHG emissions that could be created by PSE’s project as compared to the

1 no action alternative; and information regarding the State of Washington's overall GHG
2 emissions inventory. *Ex. RA-51, pp. 39-49.*

3 24.

4 On March 29, 2019, PSCAA finalized the SEIS. *Ex. RA-51, p. 1.* PSCAA issued a draft
5 Permit Approval for public comment in July 2019 and issued the final Permit on December 10,
6 2019. *Ex. RA-132.*

7 **1. Appellants' Witnesses**

8 25.

9 The Appellants presented five witnesses who testified on the SEPA issues: Dr. Ranajit
10 Sahu, a mechanical engineer and expert in environmental and energy issues; Peter Erickson, the
11 Climate Policy Program Director at the Stockholm Environment Institute; Dr. Joseph Pratt, a
12 mechanical engineer and expert in alternative energy technologies; Dr. Thomas Spicer, a
13 professor of chemical engineering and expert in dispersion modeling; and Dr. David Layton, an
14 economics professor.

15 26.

16 Dr. Sahu has a bachelor's in mechanical engineering from the Indian Institute of
17 Technology, a master's in mechanical and combustion specialization from Caltech, as well as a
18 Ph.D. in combustion from the same. Dr. Sahu is currently an independent consultant focusing on
19 air quality requirements for private, public, and non-profit clients. *Ex. APTI-587, pp. 85-86*
20 *(Sahu Amended Pre-filed Testimony)*. Relating to the SEPA issues, Dr. Sahu provided expert
21 testimony that the SEIS underestimated TLNG's emissions of N₂O.

1 27.

2 Erickson provided opinion testimony on the methodologies and conclusions contained in
3 the SEIS and the LCA. Erickson has been commissioned as a researcher by the United Nations,
4 the World Bank, and the U.S. Environmental Protection Agency (EPA) to conduct and lead
5 research projects on GHG emissions accounting and the role of policy mechanisms in reducing
6 GHG emissions. Erickson has been published in peer-reviewed journals, including Nature,
7 Nature Energy, and Climate Policy. *Ex. ACT-108, pp. 1-2 (Erickson Pre-filed Testimony).*

8 28.

9 Dr. Pratt has a bachelor's degree in mechanical engineering from the University of
10 Washington, as well as a master's and a Ph.D. in mechanical and aerospace engineering from the
11 University of California- Irvine. From 2010 to 2018, Dr. Pratt worked for the U.S. Department
12 of Energy where he focused on transitioning to alternative energy technologies. Dr. Pratt is the
13 founder of Golden Gate Zero Emission Marine which seeks to provide hydrogen fuel cell
14 technology to the marine market. *Ex. ACT-107, pp. 1-2 (Pratt Pre-filed Testimony).* Dr. Pratt
15 provided expert testimony challenging the GHG assumptions in the TLNG SEIS No Action
16 Alternative and opined that correcting these assumptions would likely show that TLNG has a
17 higher GHG impact than what was presented in the SEIS.

18 29.

19 Dr. Spicer has a bachelor's degree, a master's, and Ph.D. in chemical engineering from
20 the University of Arkansas. Dr. Spicer's consulting clients include the American Petroleum
21 Institute, U.S. EPA, U.S. Department of Justice, U.S. National Oceanic and Atmospheric

Administration, and the U.S. Department of Homeland Security. Dr. Spicer testified as an expert on the TLNG design changes and presented his opinion about potentially significant unexamined health and safety adverse consequences due to these design changes.

30.

Dr. Layton, a professor of economics and microeconomics, provided expert testimony challenging the 1-for-1 displacement analysis in the LCA. Dr. Layton is a Professor and Associate Dean at the University of Washington Evans School of Public Policy and Governance. *Ex. APTI-561, p. 3. (Layton Pre-Filed Testimony)*. Dr. Layton's research is primarily focused on applied econometrics, microeconomics, and environmental policy. *Id.*

2. PSE Witnesses

31.

PSE presented ten witnesses who testified on the SEPA issues: Patrick Couch, Senior Vice President of Technical Services at Gladstein, Neandross, and Associates; Jan Hagen Andersen, Senior Principal Engineer at DNV, an expert in global marine shipping and alternative and low carbon fuels for marine shipping; Dr. Armando Levy, an economist and professor of economics with extensive experience in fuels markets, GHG cap and trade issues in California and other GHG projects; Jim Hogan, LNG Project Manager for PSE's project; Blake Littauer, Director of Business Development at Puget LNG, a sister company of PSE; Matthew Stobart, Project Engineering Manager with CB&I, with 37 years of experience working with LNG; William Donohue, Manager of Natural Gas Resources for PSE; Dr. Shari Libicki, a chemical engineer and principal at Ramboll US Corporation, Dr. Joseph Smith, a chemical engineer, and,

1 Dr. Filippo Gavelli, a mechanical engineer who performs safety studies for oil and gas facilities,
2 particularly LNG facilities.

3 32.

4 Couch provided expert testimony in support of the LCA methodologies for calculating
5 GHG emissions that Life Cycle Associates conducted on behalf of PSCAA. Couch is the Senior
6 Vice President of technical services at Gladstein, Neandross, and Associates, a clean
7 transportation consulting firm. *Ex. PSE-651, p. 6 (Couch Pre-filed Testimony)*. Couch has a
8 bachelor's and master's in mechanical engineering from the University of California-Irvine, with
9 specializations in combustion and propulsion technologies. His primary responsibilities include
10 assisting members of the transportation sector, including fleets and regulators, to transition from
11 traditional to alternative fuels. Couch was involved in approximately 25-50 LCAs over his
12 career, with several involving marine fuels. *Couch Testimony at 725*. In the present case,
13 Couch assisted PSE in responding to PSCAA's requests for information regarding the direct,
14 indirect and cumulative GHG lifecycle emissions outlined in the SEIS for TLNG. *Ex. PSE-651,*
15 *p. 8 (Couch Pre-filed Testimony)*.

16 33.

17 Andersen, a mechanical engineer in the maritime industry, testified as an expert in marine
18 vessel fuels, including existing and emerging fuel alternatives that effectively decrease a ship's GHG
19 emissions. Andersen advises maritime clients on alternative fuels for shipping, environmental
20 compliance, energy efficiency, and novel maritime technologies. He has over 30 years of experience
21 in the maritime industry, including expertise in the growing LNG bunkering industry. Andersen

1 provided an expert opinion as to why the assumptions and conclusions contained in the SEIS
2 regarding marine fuel displacement and methane slip from marine vessel engines are reasonable to
3 assess the foreseeable potential impacts of the TLNG Project over the Project's life. *Ex. PSE-652, p.*
4 *5 (Andersen Pre-filed Testimony).*

5 34.

6 Dr. Levy is an economist and principal at The Brattle Group, an international economic
7 consultancy that provides economic analysis on behalf of companies and governments, with a
8 particular focus on energy and climate issues. *Ex. PSE-653, p. 2 (Levy Pre-Filed Testimony).*
9 Levy offered expert testimony as to why it was reasonable to use a 1-for-1 displacement analysis
10 in the LCA. *Id.*

11 35.

12 Hogan is a project manager for PSE, has a Bachelor of Science in mechanical
13 engineering, and has obtained certifications in project management and contract management.
14 *Hogan Testimony at 363.* Hogan provided an overview of the purpose of TLNG and its design
15 history. *Id. at 364-368.*

16 36.

17 Littauer is the Director of Business Development for Puget LNG, a sister company of
18 PSE. Littauer is responsible for identifying potential customers and selling TLNG to potential
19 customers. *Littauer Testimony at 420.*

1 37.

2 Stobart is a manager for CB&I, the company PSE contracted to handle the design and
3 construction of TLNG, including identifying and selecting equipment vendors. *Stobart*
4 *Testimony at 966, 1992.* Stobart serves as Project Engineering Manager for TLNG. *Id. at 971.*
5 His primary responsibility is to serve as the technical liaison and point of contact between PSE
6 and CB&I. *Id. at 972.* As part of his duties, Stobart reviewed siting studies prepared to
7 determine whether TLNG complied with the applicable codes, regulations and laws required in
8 the particular location TLNG is sited. *Id. at 973.*

9 38.

10 Donahue is responsible for managing PSE's entire portfolio of natural gas transportation
11 contracts. As part of that responsibility, Donahue identifies and analyzes opportunities for PSE
12 to provide energy services. Prior to working for PSE, Donahue was employed by the Northwest
13 Pipeline. *Donahue Testimony at 1790-91.*

14 39.

15 Dr. Libicki has a Bachelor of Science in engineering and chemical engineering, and a
16 master's and Ph.D. in chemical engineering. Dr. Libicki is currently a principal at Ramboll US
17 Corporation, where she has been employed for 30 years as an air quality professional doing air
18 quality permitting, dispersion modeling, exposure assessments for risk assessments, and
19 emission estimates. *Ex. PSE-374, pp. 1-4 (Libicki Pre-filed Testimony).*

1 40.

2 Dr. Smith teaches courses on flare design and operation. Dr. Smith has a bachelor's and
3 master's and Ph.D. in chemical engineering from Brigham Young University. During his Ph.D.
4 studies, Dr. Smith was a researcher for the Advanced Combustion Engineering Research Center
5 funded by the National Science Foundation. *Ex. PSE-649, p. 2 (Smith Pre-filed Testimony).*

6 41.

7 Dr. Gavelli is an engineering consultant with Blue Engineering and Consulting Company.
8 His primary responsibility is to perform safety studies for oil and gas facilities, particularly LNG
9 facilities. Dr. Gavelli has a bachelor's degree and Ph.D. in mechanical engineering. Dr. Gavelli
10 works as a consultant, focusing on fires and explosion investigations, hazard analyses and risk
11 assessments of LNG facilities. *Ex. PSE-645, p. 2 (Gavelli Declaration).* He has performed
12 siting studies for numerous LNG facilities and has performed reviews of siting studies on behalf
13 of the U.S. Department of Transportation-The Pipeline and Hazardous Materials Safety
14 Administration (PHMSA). He is the principal investigator for a PHMSA-sponsored effort to
15 develop model evaluation protocols for the Proposed TLNG Project. *Id., p. 3.* Dr. Gavelli
16 testified regarding the TLNG facility design changes and addressed the safety and hazard issues
17 raised by the Appellants. *Ex. PSE-645 (Gavelli Declaration).*

18 **3. Agency Witnesses**

19 42.

20 PSCAA presented four witnesses who testified on the SEPA issues: Steven Van Slyke,
21 Agency Director of Compliance; Carole Cenci, Agency Senior Engineer and SEPA Responsible

1 Official; Ralph Munoz Agency Permitting Engineer, and Stefan Unnasch, Managing Director of
2 Life Cycle Associates.

3 43.

4 Van Slyke is a registered professional engineer in Washington State with over 38 years of
5 air quality experience. During his time with PSCAA, he has reviewed and approved over 1,500
6 NOC applications. Van Slyke has a bachelor's degree in chemical engineering from the
7 University of Idaho. *Ex. RA-1 (Van Slyke resume)*. As the Director of Compliance, Van Slyke
8 provided oversight and technical support for PSCAA's review of PSE's application. *Van Slyke*
9 *Testimony at 451*. Van Slyke testified regarding his familiarity and experience with calculating
10 air emissions, equipment and processes in PSE's application; SEPA requirements, applicable
11 regulatory thresholds, BACT determinations and NOC conditions. *Van Slyke Testimony at 1828-*
12 *30, 1844-48, 1882-86*.

13 44.

14 Cenci has a bachelor's degree in mechanical engineering from the University of
15 Minnesota and has been a licensed engineer since 1990. She serves as PSCAA's Manager of
16 Compliance. *Ex. RA-2 (Cenci resume)*. Her responsibilities included reviewing Ralph Munoz's
17 work as the permitting engineer on the TLNG Project. *Cenci Testimony at 1115*. Cenci testified
18 regarding her review of the TLNG Project and ensuring SEPA requirements were met. *Id. at*
19 *1109*.

1 45.

2 Munoz served as PSCAA's permitting engineer for TLNG. Munoz's responsibilities at
3 PSCAA include reviewing incoming NOCs and making determinations as to the adequacy of
4 proposed control technology as well as the applicability of various regulations. *Ex. RA-3 (Munoz*
5 *resume)*. Munoz testified regarding his role as PSCAA's permitting engineer for TLNG and his
6 experience and understanding with fugitive emissions, vaporizers and flares, and calculating
7 emissions related to those types of control equipment. *Munoz Testimony at 2315-17.*

8 46.

9 As the Managing Director of Life Cycle Associates, Unnasch is experienced with
10 alternative energy options and ventures to examine the potential for carbon emission reductions.
11 He specializes in the life cycle assessment and economic evaluation of alternative and renewable
12 fuel pathways. *Ex. RA-4 (Unnasch resume)*. He has performed fuel cycle analysis studies since
13 1987 and has developed analytical approaches that adhere to California's environmental
14 regulations. *Id.* He has also worked on projects involving economic analysis of alternative fuels
15 in California and Washington. *Id.* Unnasch provided testimony about the LCA he conducted,
16 the basis for the assumptions, the sensitivity analysis, and the response to public comments.

17 **V. GENERAL CONCLUSIONS OF LAW**

18 47.

19 The Board has jurisdiction over the subject matter and the parties pursuant to RCW
20 43.21B.110. As the parties appealing the SEIS and order approving the Permit application, the
21

1 Tribe and ACT have the burden of proof. WAC 371-08-485(3); *MYTAPN v. Dep't of Ecology*,
2 PCHB No. 10-162, COL 1 (July 25, 2012).

3 48.

4 The Board's standard and scope of review is *de novo*. WAC 371-08-485(1). The Board
5 makes findings of facts based on a preponderance of the evidence. WAC 371-08-485(2). The
6 Board gives great weight to PSCAA's interpretation of the laws it is charged with administering,
7 and deference to PSCAA's specialized knowledge and expertise on complex scientific or
8 technical judgments. *Port of Seattle v. Pollution Control Hr'gs Bd.*, 151 Wn.2d 568, 592-93, 90
9 P.3d 659 (2004); *Marine Vacuum Svcs. v. Puget Sound Clean Air Agency*, PCHB No. 16-130c,
10 COL 2 (Feb. 8, 2018). The Board also gives deference to PSCAA's interpretations of permit
11 conditions that involve technical or scientific judgments. *City of Snoqualmie v. Dep't of*
12 *Ecology*, PCHB No. 14-064, p. 16 (Feb. 2, 2015). The Board can decide a case based on all of
13 the evidence available at the time of the hearing, including additional information gathered after
14 issuance of the challenged order. *Port of Seattle*, 151 Wn.2d at 597-98; *BNSF Ry Co. v. Dep't of*
15 *Ecology*, PCHB No. 11-150, p. 11 (Dec. 4, 2012). Allowing the agency to analyze such
16 additional information allows the Board to fulfill its charge to give deference to a permitting
17 agency's expertise on issues that involve technical or scientific judgments. *Port of Seattle*, 151
18 Wn.2d at 592-593; *Buxton v. Dep't of Ecology*, PCHB No. 07-033, p. 10 (Dec. 21, 2007).

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1 (2002); RCW 43.21C.031(1). The purpose of an EIS is to ensure SEPA’s policies are an integral
2 part of state and local actions by providing an impartial discussion of significant environmental
3 impacts. WAC 197-11-400. “The primary function of an EIS is to identify adverse impacts to
4 enable the decision-maker to ascertain whether they require either mitigation or denial of the
5 proposal.” *Victoria Tower P’ship v. City of Seattle*, 59 Wn. App. 592, 601 (1990); WAC 197-
6 11-400(2). To achieve these goals, SEPA requires disclosure of “significant” adverse impacts that
7 arise from governmental actions. An impact is significant when there is a “reasonable likelihood of
8 more than a moderate adverse impact on environmental quality.” WAC 197-11-794. SEPA
9 empowers agencies to mitigate impacts, or deny the project altogether, when adverse impacts are
10 significant. RCW 43.21C.060; WAC 197-11-660; PSCAA Regulation I, § 2.12.

11 52.

12 The Board does not rule on the wisdom of the proposed project but rather on whether the
13 EIS gave the agency sufficient information to make a reasoned decision. *See Citizens All. to*
14 *Protect Our Wetlands v. City of Auburn*, 126 Wn.2d 356, 362, 894 P.2d 1300, 1304 (1995).

15 **B. Rule of Reason**

16 53.

17 The SEPA legal issues in this case challenge the adequacy of the SEIS’s assessment of
18 lifecycle greenhouse gas emissions on many grounds, claiming that it was arbitrary,
19 unreasonable, incorrect, or otherwise violated SEPA. The determination of whether an EIS is
20 adequate is a question of law subject to de novo review. *OPAL v. Adams County*, 128 Wn.2d
21 869, 875, 913 P.2d 793 (1996). EIS adequacy refers to the legal sufficiency of the environmental

1 data contained in the impact statement. *Klickitat County Citizens Against Imported Waste v.*
2 *Klickitat County*, 122 Wn.2d 619, 633, 860 P.2d 390 (1993), amended, 866 P.2d 1256 (1994)
3 (citing R. Settle, *The Washington State Environmental Policy Act: A Legal and Policy Analysis*
4 § 14(a) (i) (4th ed. 1993)). The adequacy of an EIS is tested under the “rule of reason.” *SEAPC*
5 *v. Cammack II Orchards*, 49 Wn. App. 609, 614, 744 P.2d 1101 (1987). The rule of reason is
6 “in large part a broad, flexible cost-effectiveness standard,” in which the adequacy of an EIS is
7 best determined “on a case-by-case basis guided by all of the policy and factual considerations
8 reasonably related to SEPA's terse directives.” *Klickitat County Citizens*, 122 Wn.2d at 633
9 (internal citations omitted). The adequacy of a particular discussion of environmental effects in
10 an EIS under the rule of reason depends on whether the environmental effects are sufficiently
11 disclosed, discussed, and substantiated by supporting data and opinion. *Id.* at 644. When
12 reviewing an EIS, the Legislature has directed that the decision of the agency regarding the
13 adequacy of an EIS be “accorded substantial weight.” RCW 43.21C.090.

14 **C. Agency Deference**

15 54.

16 Appellants argue that PSCAA is not entitled to deference because PSCAA had never
17 completed a lifecycle GHG analysis before this one, and they did little independent research on
18 key issues. *Appellants’ Closing Brief on SEPA Issues (Issue 2)*, p. 10. Appellants are correct
19 that agencies are not entitled to deference on matters outside their expertise. *Port of Seattle*, 151
20 Wn.2d at 595. However, SEPA designates the regional air pollution control agency as
21 possessing special expertise regarding air quality. WAC 197-11-920(1)(d). PSCAA’s

1 experience and expertise lies in identifying and calculating air emissions (including from the
2 types of equipment and processes in this case); applying regulatory thresholds; determining
3 BACT and establishing permit conditions. ¶¶ 43-45;⁶ Exs. RA-1, 2, 3 (PSCAA resumes).

4 55.

5 Deference is given to the agency pursuant to RCW 43.21C.090 and WAC 197-11-
6 920(1)(d). The agency also is given deference in the exercise of its technical judgment; its
7 interpretation of the CAA and its regulations; and the conditions it has written. *Port of Seattle*,
8 151 Wn.2d at 593-96. PSCAA, as the lead agency for the SEIS, hired an outside consultant to
9 conduct the LCA. Van Slyke stated the LCA uses a combination of emission estimates and
10 factors, that it is a very expansive emission estimation and comparison tool, and that PSCAA has
11 the technical expertise to understand and use the LCA in the SEIS. *Van Slyke Testimony at 493*;
12 ¶ 43. Cenci asserted she did a thorough review of several drafts of the life cycle analyses and
13 understands emissions calculations through years of experience and training as an engineer. ¶
14 44; *Cenci Testimony at 1118, 1148*.

15 56.

16 Despite this being PSCAA's first experience with an LCA, PSCAA has experience with
17 the key components of an LCA including calculating emissions, SEPA standards of review,
18 types of equipment and processes at TLNG, and applying regulatory thresholds. ¶¶43-45. Given
19 PSCAA's experience and the statutory mandate that the Board must accord PSCAA's decision
20

21 _____
⁶ Paragraph references are to internal paragraph numbers within this Order.

substantial weight, the Board concludes deference must be given to PSCAA in its review of and conclusions within the SEIS, including the LCA.

VI. FINDINGS/CONCLUSIONS BY LEGAL ISSUE

A. Supplemental Environmental Impact Statement

1. 1-for-1 Fuel Displacement (Issue 2a)

57.

Appellants claim the SEIS relies on an incorrect and unsupported claim of 1-for-1 fuel displacement, and an assumption that fuel use will not change over the 40-year life of the facility. *Appellants' Closing Brief on SEPA Issues (Issue 2)*, p. 16. Appellants further argue that PSCAA's assumption that 100 percent of the Project's LNG fuel will displace MGO is unsupported and unreasonable because the 1-for-1 displacement assumption is contrary to economic principles, courts have rejected similar assumptions, and SEIS should have used a dynamic baseline when examining displacement. *Appellants' Closing Brief on SEPA Issues (Issue 2)*, pp. 16-26.

58.

Displacement in this case refers to the anticipated amount by which LNG produced at TLNG will replace conventional diesel marine fuels, particularly MGO. *Layton Testimony at 305-307; Ex. PSE-653, p. 3 (Levy Pre-filed Testimony)*. The displacement analysis is one part of PSCAA's LCA for downstream and upstream GHG emissions from TLNG. *Layton Testimony at 305-307; Ex. PSE-653, p. 3 (Levy Pre-filed Testimony)*.

1 59.

2 The SEIS states displacing diesel and MGO will have an effect on petroleum fuel markets
3 because the increase in supply will reduce price and induce a small increase in demand. *Ex. RA-*
4 *51, p. 97.* The SEIS concluded this effect is very small since the amount of petroleum fuel
5 displaced is a small fraction of the global supply. *Id.*

6 60.

7 Unnasch used a 1-for-1 displacement assumption in the LCA assuming that no market
8 induced displacement effects would occur because the effect of the TLNG project on
9 Washington MGO prices represents a very small fraction of the total fuel market. *Ex. RA-51, p.*
10 *74, n. 3; Unnasch Testimony at 645, 670-671.* The facility's LNG production would be 0.06
11 percent of the global marine fuels market at 250,000 gpd. *Ex. PSE-652, p. 41 (Andersen Pre-*
12 *filed Testimony).* The 1-for-1 displacement has been used in other fuel LCAs in California and
13 Washington. *Unnasch Testimony at 644-645.*

14 61.

15 Dr. Layton, a professor of economics, testified on behalf of Appellants challenging the
16 100 percent displacement rate assumption in the LCA. Dr. Layton opined that even while
17 maintaining all other SEIS assumptions, if the displacement rate drops merely 3 percent (from
18 100 percent to 97 percent) the project becomes a net emitter of GHGs. *Ex. APTI-561, pp. 12-13*
19 *(Layton Pre-filed Testimony); Layton Testimony at 308.* He opined that even a small
20 displacement rate change can cause a significant increase in GHGs. Drawing from available data
21 to calculate the elasticities of the whole oil and natural gas markets, Dr. Layton opined that using

1 a displacement rate of between 54 percent and 72 percent would yield a net increase of 25
2 percent to 43 percent (175,000 to 300,000 tons per year) of GHG emissions compared to the No
3 Action Alternative. *Layton Testimony at 311-316.*

4 62.

5 Dr. Levy, also an economist, testified on behalf of PSE. Dr. Levy has particular
6 experience in petroleum markets and has worked on projects which related to economic
7 evaluations associated with life cycle analyses of GHG emissions. *Ex. PSE-653, p. 2 (Levy Pre-*
8 *filed Testimony).* Dr. Levy testified that it was reasonable for PSCAA to calculate the rate of
9 GHG emissions displacement of MGO by LNG as 1-for-1 (for every unit of LNG used, there is a
10 commensurate unit of MGO that is not used on an equal energy basis). *Id., pp. 3-4.*

11 63.

12 Dr. Levy opined that PSCAA's 1-for-1 displacement assumption was reasonable for three
13 reasons: (1) demand for petroleum fuel is relatively inelastic; (2) petroleum refineries are elastic
14 and can respond to market opportunities, such as the emergence of LNG as an alternative to
15 MGO, and (3) as ships convert to LNG, there will be a displacement effect in the LNG market
16 where LNG customers crowd out other potential LNG consumers by driving the price up. *Ex.*
17 *PSE-653, pp.4-6 (Levy Pre-filed Testimony).* Taken together, he says, the fluctuations between
18 the MGO and LNG market will essentially cancel each other out. *Id., p. 9.* In addition, the
19 effects on the global marine fuel market will be small, and whether the facility is built or not, the
20 demand for energy remains the same. *Levy Testimony at 847.*

1 64.

2 Dr. Levy and Dr. Layton disagreed on how to calculate demand and supply price
3 elasticity. Both economists agree that there are no available studies on the submarket elasticities
4 of MGO and LNG. *Ex. APTI-561, pp. 21, 26 (Layton Pre-filed Testimony); Levy Testimony at*
5 *864.*

6 65.

7 Dr. Levy asserted that there is an example of a 1-for-1 displacement which occurred in
8 2014 when TOTE converted its Puerto Rico-Florida fleet from conventional bunker fuels to
9 LNG. *Ex. PSE-653, p. 12 (Levy Pre-filed Testimony).* When TOTE converted two ships from
10 MGO to LNG on its Puerto Rico-Florida route, it stopped using MGO and only used LNG. *Id.*
11 MGO demand collapsed at TOTE after its fleet converted to LNG. *Id.*

12 66.

13 Unnasch has worked on LCAs and has also worked on projects involving economic
14 analyses of alternative fuels. *Ex. RA-4, p. 3.* He testified that Dr. Layton's displacement analysis
15 is not typical in fuel LCAs, including those conducted for the states of California and
16 Washington and the EPA. *Unnasch Testimony at 671.* He argued Dr. Layton's analysis simply
17 takes a ratio of two numbers, and the consequential effects are very small and not appropriate for
18 this type of life-cycle analysis. *Id.*

19 67.

20 The LCA explains the 1-for-1 assumption:
21

1 Displacing MGO will have a small effect on MGO consumption. The classical
2 consequential LCA approach is to assume that more MGO is available on the
3 market and that the price of MGO drops in response to increased supply. The drop
4 in price results in an increase in consumption elsewhere due to price induced
5 demand. The effect the Tacoma LNG project on Washington MGO prices will be
extremely small since it represents a very small fraction of the total fuel market.
Ultimately, this assumption implies that crude oil to make MGO is not produced
and that no additional demand for marine diesel fuel or other oil refinery products
is induced elsewhere in the world.

6 *Ex. RA-51, p. 74, n. 3.* Unnasch testified that he prepared the footnote above in the SEIS to
7 explain that Life Cycle Associates was not doing a consequential analysis because the price-
8 induced effect would be small. *Unnasch Testimony at 669-70; Ex. RA-51, p. 74.*

9 68.

10 Couch also testified that Dr. Layton's economic analysis was not specific to the location
11 of the project and the markets in which TLNG facility would participate. *Couch Testimony at*
12 *759-60.* He stated it is typical for a project of this size and scale to use 1-for-1 displacement. *Id.*
13 *at 751-52.*

14 69.

15 Dr. Layton testified he had never worked on an LCA and only looked at the displacement
16 assumption in the TLNG SEIS. *Layton Testimony at 339-340.* Dr. Layton does not have a
17 background with transportation or marine fuel supply and demand. *Id. at 340-341.* The Board
18 finds and concludes that Dr. Layton's opinion regarding supply and demand elasticities was
19 theoretical in nature, was not specific to TLNG markets, and this type of economic analysis was
20 not typically applied to fuel LCAs. Moreover, Dr. Layton did not have any expertise conducting
21

1 an LCA. Accordingly, the Board gives more weight to Dr. Levy, Unnasch and Couch's credible
2 testimony supporting the reasonableness of the 1-for-1 displacement assumption in the LCA.

3 70.

4 In reviewing the adequacy of the TLNG SEIS, the Board finds and concludes PSCAA's
5 use of a 1-for-1 displacement assumption meets the rule of reason. Appellants assert the 1-for-1
6 displacement assumption was unsupported with data or analysis. However, the LCA assumed a
7 1-for-1 displacement assumption because the effect of the Project on Washington MGO prices
8 will be extremely small since it represents a very small fraction of the total fuel market. ¶¶ 59,
9 60, 63, 67. Experts who have conducted LCAs testified this kind of economic assumption is
10 typical in fuel LCAs for projects this size. ¶¶ 60, 67, 68. Appellants assert PSCAA should have
11 used a different displacement rate such as the one presented by Dr. Layton. However, the Board
12 gives more weight to Respondents' experts' testimony on this issue than Dr. Layton's testimony.
13 ¶ 69.

14 71.

15 Appellants argue that courts have rejected displacement assumptions in EISs for other
16 fossil fuel projects, therefore the Board should also do so in this case. In support, Appellants cite
17 to several federal district court and appellate court cases where the courts have applied the rule of
18 reason to find an agency's EIS was arbitrary and capricious. *See WildEarth Guardians v. BLM*,
19 870 F.3d 1222, 1237-38 (10th Cir. 2017); *see also Center for Biological Diversity v. Bernhardt*,
20 982 F.3d 723, 736, 740 (9th Cir. 2020); *and see High Country Conserv. Advocates v. U.S. Forest*
21 *Serv.*, 52 F. Supp. 3d 1174, 1197-98 (D. Colo. 2014). The Board finds these cases to be

1 inapposite. The court in *Bernhardt* found the agency to be arbitrary and capricious in part
2 because the agency should have given a quantitative estimate of downstream GHGs and failed to
3 include emissions estimates from foreign oil consumption. *Bernhardt* 982 F.3d at 740. The
4 SEIS for TLNG provides quantitative estimates of downstream GHGs and considers the global
5 market for MGO and LNG and the entire lifecycle of GHG emissions. ¶¶ 9, 10, 11, 14, 23, 32,
6 60, 63, 68.

7 72.

8 In *High Country*, the court found the agency was arbitrary and capricious where it
9 acknowledged there might be impacts from GHGs in the form of methane emitted from mine
10 operations but stated they could not quantify the climate impacts from such emissions. The
11 record showed there was a tool available for that specific purpose, and the agency's failure to
12 utilize it was arbitrary and capricious. *High Country*, 52 F. Supp. at 1193. There is no similar
13 failure here on the part of PSCAA. The whole purpose of the SEIS was to quantify GHG
14 emissions. PSCAA conducted an LCA and gathered and addressed public comments about the
15 way in which the LCA calculated GHG emissions. ¶¶ 9, 10, 11, 12, 13, 14, 21. PSCAA then
16 evaluated and included eleven variable inputs in the LCA sensitivity analysis, providing
17 quantifiable GHG emissions data. ¶¶ 12, 13, 21.

18 73.

19 Appellants argue that similar to *WildEarth*, the SEIS here violated the rule of reason
20 because the 1-for-1 displacement relies on an economic assumption which contradicts basic
21 economic principles. *Appellants' Closing Brief on SEPA Issues (Issue 2)*, p. 19. In *WildEarth*,

1 the EIS assumed there would be no real-world difference between issuing coal leases and
2 declining to issue them because third party sources of coal would perfectly substitute for any lost
3 volume. 870 F.3d at 1234-36. Applying the National Environmental Policy Act (NEPA), the
4 court stated “[t]he evidence must be sufficient in volume and quality to ‘sharply defin[e] the
5 issues and provid[e] a clear basis for choice among options.’” *Id.* at 1235 (citing *Citizens’*
6 *Comm. To Save Our Canyons v. Krueger*, 513 F.3d 1169, 1179 (10th Cir. 2008). The court
7 concluded that there was only a blanket assertion that coal would be substituted from other
8 sources without any data. *Id.* Contrary to the facts in *WildEarth*, the SEIS explained why the
9 LCA used a 1-for-1 displacement assumption. ¶¶ 59, 66, 67. Unnasch, Couch, and Dr. Levy
10 also provided expert testimony on the reasonableness of using a 1-for-1 assumption in the LCA.
11 ¶¶ 60, 62, 63, 65-68.

12 74.

13 In addition, Appellants argue the economic assumption is a foundational piece of the
14 analysis of the environmental impact being assessed and, therefore, must be supported with data
15 and analysis in the SEIS. An EIS, however, is not required to evaluate and document all the
16 possible effects and consideration of a decision or to contain the balancing judgments that must
17 ultimately be made by the decision makers on a proposal. *See* WAC 197-11-448(1). Economic
18 competition is one type of an example of information that is not required in an EIS. WAC 197-
19 11-448(3). The Board concludes a more detailed analysis of the 1-for-1 displacement
20 assumption is not required in the SEIS.

1 75.

2 Appellants also argue the Board should disregard the testimony from non-economists
3 regarding Dr. Layton’s opinion. But as stated above, the Board gives greater weight to witnesses
4 with experience conducting LCAs. ¶ 69. Moreover, a detailed economic analysis was
5 unnecessary in the SEIS.

6 **2. Static Baseline Assumption (Issue 2a)**

7 76.

8 Appellants assert the SEIS’s assumption that the marine industry as it exists today will
9 remain unchanged over the next 40 years is misleading and unreasonable. *Appellants’ Closing*
10 *Brief on SEPA Issues (Issue 2)*, p 27 (citing *Ex. RA-51*, p. 31). They argue this static baseline
11 assumption in the “no action” scenario was flawed, and that a dynamic baseline should have
12 been used.

13 77.

14 Erickson and Dr. Pratt testified that PSCAA should have used a dynamic baseline when
15 calculating displacement that includes alternate future scenarios to reasonably evaluate the
16 potential impacts to the facility. *Erickson Testimony at 77-78; Pratt Testimony at 153-156*.
17 Dynamic baselines consider foreseen changes in technology and behavior and conditions over
18 time. *Ex. ACT-108*, p. 12 (*Erickson Pre-filed Testimony*). In the case of TLNG, Erickson stated
19 that dynamic baselines would assess plausible future changes in marine and on-road shipping
20 technologies and the market share of battery electric, hydrogen fuel cell, and other low-carbon
21 technologies. *Id.*

1 78.

2 Dr. Pratt opined that the likelihood of increased regulation combined with developed
3 alternative technologies will cause the shipping industry to invest in new fuels or technologies to
4 reduce emissions in the coming decades. *ACT-107, p. 6 (Pratt Pre-filed Testimony)*. He testified
5 that available alternative fuels include renewable diesel; bio-LNG, biodiesel, bioethanol, and
6 hydrogen fuel cells. *Id., p. 11*.

7 79.

8 Respondents countered that it was reasonable to use a static baseline assumption. Couch
9 testified that using a dynamic baseline requires a substantial number of assumptions, many of
10 which are difficult or impossible to verify or support, and it becomes a very speculative analysis.
11 *Couch Testimony at 752-753*. In his experience in the EIS context, assumptions about the future
12 generally require grounding those assumptions in specific enforceable regulations. *Id. at 752*.
13 The use of a static baseline is not an affirmative assertion that nothing will change in the future,
14 but a recognition that how things will change in the future is sufficiently unclear that the
15 magnitude and direction of change cannot be estimated. *Id. at 754*.

16 80.

17 Andersen opined that it would be speculative for PSCAA to analyze alternative fuels
18 such as hydrogen. *Ex. PSE-652, p. 34 (Andersen Pre-filed Testimony)*. LNG is the only
19 commercially viable fuel that provides GHG emissions benefits to large ocean-going vessels.
20 *Andersen Testimony at 893*. Andersen defined a large ocean-going vessel as a commercial ship,
21 a container vessel, a bulk carrier, general cargo vessel, large passenger vessels, oil and product

1 tankers, and Ro-Ro vessels that have more than 5,000 gross tonnage and use a large engine and
2 more than 400 feet in length. *Id. at 905*. Andersen testified that smaller vessels are unlikely to
3 convert to LNG because they lack sufficient space for LNG storage tanks, conversions are cost-
4 prohibitive, and other technologies such as battery hybrid are a more likely alternative than LNG.
5 *Id. at 906-07*.

6 81.

7 Dr. Pratt challenged the SEIS assumption that LNG from TLNG would be used only for
8 large ocean-going vessels. *ACT-107, p. 11 (Pratt Pre-filed Testimony)*. He asserted smaller
9 engines using LNG can have a dramatic effect on the overall Project's GHG emissions because
10 GHG savings decrease from 26 percent to approximately 10 percent in smaller engines. *Id., p.*
11 *17*. Erickson and Dr. Pratt argued that alternative fuel technologies are evolving rapidly for
12 marine use and are in use currently for small- and medium-sized vessels. *Ex. ACT-108, p. 9*
13 *(Erickson Pre-filed Testimony)*; *Ex. ACT-107, pp. 10-12 (Pratt Pre-filed Testimony)*. Specific to
14 large ocean-going vessels, however, Erickson and Dr. Pratt did not disagree with PSE witnesses
15 that MGO and LNG are the only commercially available marine fuels. *Erickson Testimony at*
16 *99-108; Pratt Testimony at 151*.

17 82.

18 Respondents contend it would be speculative to assume alternative fuel technology for
19 smaller vessels, and the SEIS did not need to consider these alternative fuels for smaller vessels.
20 *PSE Post-Hearing Brief, pp. 23-24*. TLNG is actively marketing its unsold capacity only to
21 large ocean-going vessels, comparable to TOTE vessels. *Littauer Testimony at 422- 423*. Large

1 ocean-going vessels are the most likely customers of TLNG because they are most likely to
2 convert to LNG. *Ex. PSE-652, p. 57 (Andersen Pre-filed Testimony)*. Andersen estimates that
3 80-90 percent of all new vessels on order for LNG fuel are ocean-going vessels. *Andersen*
4 *Testimony at 907*.

5 83.

6 Hogan testified that TLNG's existing infrastructure restricts its ability to provide LNG to
7 smaller vessels. The loading arm at TLNG is specifically designed to deliver LNG to the unique
8 high fueling location of TOTE large ocean-going vessels. *Hogan Testimony at 409-10*. The
9 only way the loading arm could be used to load LNG onto another vessel is if that vessel has its
10 loading flange located geometrically in a similar location to TOTE vessels. *Id. at 407-08*.

11 84.

12 The Board is not persuaded that the SEIS's static baseline assumption was unreasonable.
13 The evidence demonstrates that the future of alternative fuels for ocean-going vessels is
14 uncertain. ¶ 80. The SEIS was based on information currently available, and at the time the
15 SEIS was finalized there were only two fuels available for large ocean-going vessels: MGO and
16 LNG. *Id.* Moreover, the TLNG facility is currently designed to fuel large ocean-going vessels,
17 similar to TOTE vessels, and is being marketed to large ocean-going vessels. ¶¶ 82, 83. Based
18 on the evidence presented, the Board finds the SEIS made a reasonable assumption that the most
19 likely users of the TLNG facility will be large ocean-going vessels and concludes the SEIS
20 assumption of a static baseline is reasonable.

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87.

PSE would obtain its gas for the project from the Sumas hub on the border of British Columbia and Washington, with the gas primarily coming from British Columbia.⁸ Condition 41 of the Permit requires natural gas to come from British Columbia. *Ex. RA-132, pp. 6-7.* The SEIS relied on an upstream methane loss rate of 0.32 percent and Appellants contend this was a “crucial mistake.” *Appellants’ Closing Brief on SEPA Issues (Issue 2), p. 41.* Erickson asserted this assumption does not account for irregular operation or accidental methane releases, which are a substantial source of emissions from natural gas production. *Ex. ACT-108, p. 21 (Erickson Pre-filed Testimony).* Erickson also challenged the LCA because it did not include “top-down” studies in its sensitivity analysis, referred to as the “Alvarez” and “Johnson” studies. *Erickson Testimony at 64-67.*

88.

There are two conventional methods for estimating fugitive methane emissions: bottom-up and top-down inventories. *Ex. PSE-651, p. 12 (Couch Pre-filed Testimony).* A bottom-up inventory involves measuring or estimating fugitive methane emissions rates for various components of equipment and processes. The rates of emissions for each type of component and process are then applied to a count of all of the equipment at a facility or in a region to develop

method. *Ex. ACT-108, p. 21 (Erickson Pre-filed Testimony)* (referring to: Alvarez, R. A., D. Zavala-Araiza, D. R. Lyon, D. T. Allen, Z. R. Barkley, A. R. Brandt, K. J. Davis, S. C. Herndon, D. J. Jacob, A. Karion, E. A. Kort, B. K. Lamb, T. Lauvaux, J. D. Maasackers, A. J. Marchese, M. Omara, S. W. Pacala, J. Peischl, A. L. Robinson, P. B. Shepson, C. Sweeney, A. Townsend Small, S. C. Wofsy, S. P. Hamburg, 2018. *Assessment of methane emissions from the U.S. oil and gas supply chain*. SCIENCE, <https://doi.org/10.1126/science.aar7204>.

⁸ Over 99 percent of the gas entering Washington comes from Canada. *Ex. RA-51, p. 88.* Estimates of upstream GHG emissions, including methane leakage rates, from natural gas in British Columbia and Canada are lower than the United States. *Id., p. 170.*

1 estimates of total emissions. *Id.* A top-down inventory attempts to measure methane
2 concentrations in the atmosphere in a region of interest and then attribute a portion of those
3 emissions to a facility or activity. *Id.*

4 89.

5 Countering Erickson's argument that the SEIS failed to use top-down studies for methane
6 emission assumptions, Couch stated the Alvarez study was not directly applicable as the other
7 rates used in the SEIS because the Alvarez study is a U.S. oil and gas basin average for methane
8 leakage, and British Columbia is not part of the Alvarez study. *Couch Testimony at 736-737.*
9 The Alvarez study also provides a lump-sum estimate for all of the oil and gas sector in the U.S.,
10 not just methane leakage associated with natural gas production. *Id. at 737; Ex. PSE-651, p. 16*
11 *(Couch Pre-filed Testimony).* Couch also disagreed with Erickson regarding the Johnson study,
12 which is based on basins in Alberta, and not the British Columbia region. *Couch Testimony at*
13 *738.* Couch stated that the majority of regulatory entities use bottom-up methodologies to
14 evaluate emissions. *Id. at 730.* Couch further testified that top-down analyses can be a good
15 companion to a bottom-up analyses; however, sampling in the atmosphere for a broad region
16 makes it difficult to apportion the methane concentrations in the air back down to the identifiable
17 source of emissions on the ground. *Id. at 730.* The SEIS LCA sensitivity analysis included the
18 Alvarez study (EDF). *Id. at 735.*

19 90.

20 During the public comment period for the SEIS, PSCAA responded to comments on the
21 LCA methodology regarding methane leakage rates. *Ex. RA-51, p. 210.* PSCAA added other

methane leakage rates in the updated SEIS sensitivity analysis. *Van Slyke Testimony at 511, 532, 549-550, 554; Unnasch Testimony at 676-677, 707-708, 709-10, 720.*

91.

In addition to upstream methane leakage discussed above, methane slip is methane emissions associated with downstream emissions, the end use of LNG in an engine. *Erickson Testimony at 66.* Appellants argue that methane slip estimates in the SEIS were unreasonable and misleading for several reasons. Appellants argue that PSCAA's reliance on engine-test data provided by TOTE (*Ex. ACT-39, Appendix 1*) was unreasonable because it: (1) contained math errors; (2) erroneously estimated zero slip at 100 percent load; and (3) assumed that TOTE methane slip values would apply to vessels in the "other marine" category. *Appellants' Closing Brief on SEPA Issues (Issue 2), pp. 44-45.* Based on its own testing, TOTE showed the emission rates from their converted engines are in line with 5.3 g/kWh as specified in the draft SEIS. *Ex. ACT- 39, p. 2.* This methane slip rate of 5.3 g/kWh was based on earlier tests of similar LNG engines as well as the SINTEF report.⁹ *Ex. ACT-38, p. 22.*

92.

Erickson argued the SEIS should have assumed a higher methane slip rate of 6.9 g CH₄ per kWh based on the SINTEF report and other studies. *Ex. ACT-108, pp. 27-28 (Erickson Pre-filed Testimony).* Erickson also opined that the methane slip rate was based on an incorrect ship

⁹ As cited in *Erickson Testimony at 68.*

1 load of 100 percent, which affects the methane slip rate. *Id.*, pp. 28-30. Ship load is a measure
2 of the actual power output of an engine as a percent of its maximum power output. *Id.*, p. 28.

3 93.

4 Dr. Pratt testified that applying TOTE methane slip values to “other marine” was
5 unreasonable because other vessels could be four stroke engines which have higher GHG
6 emissions. *Ex. ACT-107*, p. 16. Dr. Pratt had assumed that TOTE vessels were two stroke
7 engines. *Id.* During the hearing, Dr. Pratt learned that his assumption was incorrect as TOTE
8 vessels are four stroke engines. *Pratt Testimony at 71.*

9 94.

10 Couch testified that the methane slip assumptions in the SEIS (5.3 g/kWh-6.9 g/kWh) are
11 actually conservative. He asserted that current literature estimates a methane slip rate of 5
12 g/kWh. *Couch Testimony at 750.* The literature Couch relied upon included a report cited by
13 Appellants, the Lindstad 2020 report. *Couch Testimony at 750; Ex. ACT-107*, p. 16.

14 95.

15 Andersen testified that assuming the non-TOTE vessels would have the same methane
16 slip values as the TOTE vessels is reasonable because most ocean-going vessels have more
17 efficient engines with lower methane slip than the TOTE vessels. *Andersen Testimony at 913,*
18 *918.* Andersen testified that the majority of ocean-going LNG fueled vessels are two stroke
19 engines which have a methane slip range of 0.2-2.5 g/kWh. *Ex. PSE-652*, p. 60. Therefore, the
20 SEIS assumption was a conservative methane slip assumption for “other marine” vessels.
21 Andersen also opined that Erickson’s direct comparison between load and engine efficiency is

misleading because the four stroke TOTE engines can run at different speeds to optimize fuel consumption and air emissions including methane slip. *Ex. PSE-652, p. 60 (Andersen Pre-filed Testimony).*

96.

The SEIS sensitivity analysis included a methane slip range of 5.3 to 6.9 g/kWh for TOTE and non-TOTE vessels. *Ex. RA-51, p. 136 (Figure 5.5).* This resulted in a range of GHG emissions from approximately negative 30 to just under positive 30 GHG emissions (k tonne CO₂e/year). *Id.*

97.

The SEIS methane leakage rate was based on the natural gas being sourced from Canada, which is Condition 41 of the Permit. ¶¶ 22, 47. The Final SEIS added additional methane leakage and methane slip rates to expand the range of emissions that could be caused if different rates were considered. *Ex. RA-51, pp. 46, 136.*

98.

The Board concludes under the rule of reason standard the SEIS provided decision makers with a reasonable range of methane emission data. Although Appellants contend the methane emissions data and assumptions were not provided, the sensitivity analysis included the Alvarez (EDF) study and the SEIS included an explanation about why PSCAA relied on the regional data and bottom-up methodology for methane leakage emissions. *Ex. RA-51, pp. 136-137, 210, 220.* The methane leakage values from the Alvarez study are identified as EDF in the sensitivity analysis of natural gas (NG) Upstream. *Id., p. 136.* The methane slip range in the

1 sensitivity analysis is 5.3 g/kWh-6.9 g/kWh. *Id.*, p. 136. Thus, the ranges Appellants are
2 suggesting should have been used are indeed contained in the sensitivity analysis.

3 99.

4 PSCAA considered detailed methane emissions data, made reasonable assumptions, and
5 considered the information in the SEIS. The Board concludes that under the rule of reason,
6 methane leakage and slip rates were sufficiently disclosed, discussed, and substantiated by
7 supportive opinions and data.

8 100.

9 Appellants also challenge PSCAA's expertise in understanding the methane emissions
10 data and assumptions. PSCAA officials testified regarding their background and experience with
11 SEPA compliance and emissions calculations, and their communications with various
12 stakeholders during the SEIS process. ¶¶ 43, 55, 90. PSCAA provided a detailed report of
13 public comments received during the process. ¶ 90. The fact that they hired an LCA consultant
14 to conduct the LCA does not mean PSCAA was ill-informed about methane emissions and
15 methodologies used to calculate them. The Board finds and concludes the methane slip and
16 leakage assumptions in the LCA were reasonable and gives substantial weight to PSCAA's
17 selection of these assumptions. See RCW 43.21C.090 and WAC 197-11-920(1)(d). The Board
18 finds and concludes that Couch and Andersen's testimony regarding conservative estimates in
19 the LCA for methane leakage and slip is credible and persuasive. They provided a reasonable
20 basis for their conclusions. ¶¶ 89, 94, 95. Moreover, the sensitivity analysis included a range of
21 methane leakage and slip values as well as the range of GHG emissions. ¶¶ 90, 96, 97.

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1 atmosphere. *Ex. RA-51, p. 215.* The AR5 includes a higher GWP for methane and a lower GWP
2 for N₂O than AR4. *Id.*

3 104.

4 The updated LCA report in the Final SEIS included an updated sensitivity analysis
5 considering AR5 GWP values. *Unnasch Testimony at 662; Exs. RA-51, p. 215, RA-52 at*
6 *“Factors” Tab.* The SEIS states:

7 The updated LCA report included an updated sensitivity analysis that considered
8 AR5 GWP values. Refer to Section 1.5.2 (and Appendix A.4) of the LCA report.
9 The results of that sensitivity analysis are shown in Section 5 (see Figure 5.5) of
the LCA report. That analysis indicates that the use of the AR5 GWP values, by
itself, would not change the conclusions identified in the DSEIS.

10 *Ex. RA-51, p. 215.* In the sensitivity analysis, the AR5 GWP factor increased the net GHG
11 emissions rate to positive 20 (k tonne CO₂e/year), compared with negative 30 (k tonne
12 CO₂e/year) for the AR4 GWP factor. *Id., p. 136.*

13 105.

14 The LCA used a 100-year time horizon to assess the GWP of the Project. *Ex. RA-51, p.*
15 *161.* PSCAA received public comments challenging the use of a 100-year time horizon,
16 suggesting that a 20-year time horizon should have been used to account for methane emissions.
17 *Id., p. 215.* The Final SEIS addressed these comments:

18 Evaluation of the GHG emissions using the 100-year GWP protocol is consistent
19 with IPCC AR4 (IPCC 2007) and other policy directions and initiatives in
Washington State as prescribed in WAC 173-441-040. It is also consistent with the
20 long-term goals of the Paris Agreement. The comments regarding a 100-year
analysis methodology as contrasted to the 20-year analysis relates to the differences
21 in GWP for methane on a longer versus a shorter lifetime. The analysis has not
been revised to adjust the results of the life-cycle analysis on a 20-year basis

1 because most of the GHG emissions and warming effects from the emissions
2 considered in this analysis are CO₂, not CH₄. A 20-year GWP based analysis would
3 omit the warming effect of CO₂ after 20 years and the CO₂ has much longer
cumulative effects. CO₂ has a persistent effect in the atmosphere for over 100
years.

4 *Id.*

5 106.

6 PSCAA explained its decision to use the 100-year time horizon for the emissions lifespan
7 over the 20-year time horizon in the LCA report:

8 The methodology selected by PSCAA and the project team to follow a protocol
9 based on AR4 values for a 100-year life remains a valid, reasonable approach. The
10 GHG emission reporting requirements for the federal government (40 Code of
11 Federal Regulations 98 - Mandatory Greenhouse Gas Reporting) and Washington
12 State (see WAC 173-441 - Reporting of Emissions of Greenhouse Gases) follow
these protocols. It is both appropriate and reasonable to evaluate the GHG
emissions from this proposal in a life-cycle analysis on the same basis as those
inventory values to support comparisons and understanding of the emissions as was
done in the SEIS.

13 *Ex. RA-51, pp. 215-16.*

14 107.

15 Erickson argued that using AR5 values and the GWP 20-year time horizon would more
16 accurately count methane emissions, which has a GWP of 36 over a 100-year time horizon but a
17 value of 87 over a 20-year time horizon. *Ex. ACT-108, pp. 31-32 (Erickson Pre-filed*
18 *Testimony)*. Under AR4, methane has a 100-year GWP of 25; whereas under AR5 methane has a
19 100-year GWP of 36. *Id., pp. 31-32.* Erickson testified that understanding shorter time scales is
20 important to show short-terms effects of methane and the SEIS should have included both time
21 horizons. *Erickson Testimony at 74-75.*

108.

Unnasch testified that the GWP calculation is used for the impact assessment of an LCA. *Unnasch Testimony at 645*. Each of the GHG emissions are multiplied by their GWP to assess their impact. *Id. at 646*. In drafting the LCA, Unnasch determined that a 20-year time horizon for GWP would not present a reasonable or reliable calculation of GHGs and did not include it in the LCA. *Id. at 675; Ex. RA-51, App. B, pp. 92-93*. A 20-year GWP is primarily used when focusing on short-term climate impacts. *Unnasch Testimony at 675, 745; Ex. PSE-651, p. 33 (Couch Pre-filed Testimony)*. The 20-year GWP time horizon effectively cuts off the warming effect of CO₂ and N₂O after 20 years while capturing the entire warming effect of methane, which has a lifetime of about 20 years or less. *Ex. RA-51, p. 76*. Unnasch testified that for this LCA the 100-year AR4 GWP was the standard GWP to use. *Unnasch Testimony at 672-73*.

109.

Couch testified it was reasonable for PSCAA to analyze the project's impacts under 100-year GWP time horizon given the composition of GHGs in the Project. *Couch Testimony at 746*. AR4 is most predominantly used by agencies such as the U.S. EPA, and Washington and California statewide inventories. *Id. at 747*. In addition, Couch noted that the 100-year GWP framework is consistent with the State of Washington's GHG inventory which is necessary to make comparisons to other emissions. *Id. at 746*.

110.

Couch also testified that the majority of GHG emissions from the project are attributable to carbon dioxide (CO₂). *Ex. PSE-651, p. 33 (Couch Pre-filed testimony)*. Carbon dioxide is a

1 long-term climate pollutant. *Couch Testimony at 674-755, 746.* A 20-year GWP based analysis
2 would omit the warming effect of carbon dioxide after 20 years and carbon dioxide has a much
3 longer cumulative effect. *Ex. RA-51, p. 215.*

4 111.

5 The Board finds and concludes Unnasch and Couch's testimony regarding the use of the
6 100-year GWP time horizon was credible. Both Unnasch and Couch have conducted numerous
7 LCAs and provided a reasonable basis for using the 100-year time horizon. Unnasch and Couch
8 also provided a credible and reasonable explanation for relying on the AR4 GHG factors for this
9 LCA. ¶¶ 105, 106, 108, 109. The Board also finds Erickson's testimony credible regarding use
10 of a 20-year time horizon to calculate methane emissions and gives his testimony the same
11 weight as Unnasch and Couch.

12 112.

13 Ultimately, the Board concludes that PSCAA's selection of the 100-year time horizon to
14 assess the GWP was reasonable. The SEIS included an explanation of why the 100-year AR4
15 GWP should be used. ¶¶ 105, 106, 108. After receiving comments, Unnasch added AR5 in the
16 sensitivity analysis in the final LCA. ¶¶ 103, 104. The SEIS addressed the comments on the use
17 of a 100-year GWP and concluded use of the 100-year GWP best captured the effects of CO₂, the
18 most prevalent GHG for this project. ¶¶ 105, 106, 108.

19 113.

20 PSCAA relied on AR4 values for a 100-year emissions lifespan to be consistent with
21 GHG emission reporting requirements for the federal government (40 C.F.R 98 – Mandatory

Greenhouse Gas Reporting) and Washington State (WAC 173-441 – Reporting of Emissions of Greenhouse Gases). ¶¶ 105, 106. PSCAA determined it was reasonable to evaluate the GHG emissions on the same basis as those inventory values to support comparisons and understanding of the emissions. ¶¶ 105, 106.

114.

The SEIS disclosed, discussed, and substantiated the use of AR4 and the 100-year GWP time horizon for methane emissions. PSCAA included AR5 in the sensitivity analysis but did not include the 20-year time horizon methane emissions data. ¶¶ 104, 105, 108. Although Erickson’s testimony was credible regarding the updated methane emissions data in AR5 and he explained why he thought a 20-year time horizon should have been included in the SEIS, the Board defers to PSCAA as the agency with expertise to resolve technical differences on how to quantify methane emissions for the Project. *Port of Seattle*, 151 Wn.2d at 593.

5. Nitrous Oxide Emissions (Issue 2e)

115.

Appellants argue the SEIS fails to properly address the facility’s emissions of N₂O, a potent GHG. Appellants argue that the N₂O emissions are underestimated in the SEIS because the SEIS fails to account for nitrogen gas used to purge the lines. Appellants’ expert, Dr. Sahu, opined that TLNG flared waste gases will contain more nitrogen than typical gaseous waste because nitrogen will be used to clear lines after fueling of ships and trucks. *Ex. APTI-587, p. 78 (Sahu Pre-filed Testimony)*. As a result, the nitrous oxide emissions from purging gas lines were

1 underestimated. *Sahu Testimony at 1730; Ex. APTI-587, p. 78 (Sahu Pre-filed Testimony)*. Dr.
2 Sahu performed no quantitative analysis of the nitrous oxide emissions. *Sahu Testimony at 1730*.
3 116.

4 In preparing the LCA, Unnasch used standard nitrous oxide factors based on EPA's AP-
5 42¹¹ combustion emission factors, which are also organized in the GHGenius and GREET
6 models used in other LCAs in Washington State.¹² *Unnasch Testimony at 646-650, 676; Van*
7 *Slyke Testimony at 5376*. The LCA used standard N₂O emissions factors that are available for
8 many equipment types, such as diesel engines, gas turbines, and flares. *Unnasch Testimony at*
9 *666*.

10 117.

11 Dr. Libicki testified that the nitrogen used as purge gas "would not discernibly change
12 N₂O emissions from the flare." *Ex. PSE-374, p. 162 (Libicki Pre-filed Testimony)*. Dr. Libicki
13 calculated that the purge gas would operate roughly 692 hours per year or less than eight percent
14 of the year and would impact the nitrogen percentage minimally. *Ex. PSE-374, p. 163 (Libicki*
15 *Pre-filed Testimony)*. Dr. Smith opined that if any additional nitrous oxide is formed due to
16 excess nitrogen it would be very small and quickly destroyed in the combustion zone of the flare.
17 *Ex. PSE-649, pp. 67-68 (Smith Pre-filed Testimony)*.

18
19 ¹¹ AP-42 contains EPA's compilation of emission factors for carbon monoxide, nitrogen oxides, and VOCs that are
20 used by industry based on emissions test data from various industrial facilities and sources. They are continually
21 updated and undergo public review and comment. *Exs. PSE-374, pp. 28-29, RA-71; Van Slyke Testimony at 1909*.

¹² The GHGenius LCA model is based on the UC Davis Life Cycle Emission Model (LEM) that was developed for
Natural Resources Canada. *Ex. RA-51, p. 64*. Both models are used for assessment of GHG emissions for low
carbon fuel regulations in the U.S. and Canada. The SEIS used the GHGenius and GREET models to calculate
upstream emissions on a life cycle basis. *Ex. RA-51, p. 67*.

118.

Van Slyke testified that burning of gaseous fuels does not have the fuel-bound nitrogen components that are associated with normal N₂O emissions. *Van Slyke Testimony at 537-38.* The N₂O emissions that were used in the LCA rely on emission factors that are published as part of established and reviewed emission factor documents. *Id. at 537.*

119.

Unnasch also disagreed with Dr. Sahu's conclusion regarding N₂O emissions, which necessarily implies that atmospheric nitrogen would increase N₂O emissions. *Unnasch Testimony at 666.* Unnasch explained that according to relevant scientific literature, only very small amounts of N₂O are produced from combustion processes and atmospheric nitrogen is not a precursor for producing additional N₂O. *Id.*

120.

Couch testified that the LCA used standard N₂O emission factors organized in the GHGenius and GREET models, which is standard for fuel life cycle analysis considered by state agencies such as Ecology. *Couch Testimony at 646-650, 676.*

121.

The Board finds and concludes that testimony from Unnasch, Dr. Libicki, Dr. Smith, Van Slyke, and Couch was credible and persuasive regarding N₂O emissions. The Board finds Dr. Sahu's testimony less credible as he performed no quantitative analysis of the nitrous oxide emissions. ¶ 115.

122.

Respondents' experts provided calculations demonstrating that N₂O emissions in the purge gas were minimal. ¶¶ 116, 117. Respondents' experts also used standard N₂O emission factors used in GHGenius and GREET models which have been used in other LCAs in Washington State. ¶¶ 116, 118, 120.

123.

The SEIS disclosed, discussed, and substantiated by data TLNG's N₂O emissions. Respondents' experts additionally substantiated that the forecasts were reasonable, and those calculations were not able to be refuted by Appellants' expert. Under the rule of reason, the Board concludes the SEIS properly addressed the N₂O emissions from the facility.

6. No Significant Adverse Impact (Issue 2c)

124.

Appellants assert under Issue 2c that the SEIS fails to acknowledge that maintenance of high-GHG emissions status quo for the lifetime of the project is a "significant" impact under SEPA. Appellants argue PSCAA's determination of insignificance for a fossil fuel project that maintains status quo GHG emissions is contrary to science and conflicts with applicable law and policy, and that PSCAA failed to consider the cumulative harm that will result from TLNG's contribution to existing adverse climate conditions. *Appellants' Closing Brief on SEPA Issues (Issue 2)*, pp. 11-14.

125.

Appellants argue PSCAA failed to integrate local, state and federal policies on GHG emissions in determining there were no significant adverse impacts. As one example, Appellants cite to Washington’s goal to reduce GHG emissions to 95 percent below 1990 levels and achieve net zero emissions by 2050, RCW 70A.45.020. *Appellants’ Closing Brief on SEPA Issues (Issue 2)*, p. 13. As another example, Appellants assert PSCAA has failed to abide by its own targets, calling for an 80 percent reduction in GHGs by 2050. *Id.*, p. 14 (citing *Ex. ACT-57*).

126.

In making a significance determination, agencies must consider whether a proposed action “conflict[s] with local, state or federal laws” for the protection of the environment. WAC 197-11-330(3)(e)(iii). Pursuant to WAC 197-11-030(2)(a) the agency must “[i]nterpret and administer the policies, regulations, and laws of the state of Washington in accordance with the policies set forth in SEPA and these rules.”

127.

The SEIS identified local, state and federal laws with jurisdiction over GHG emissions. Section 4 of the SEIS addresses the regulatory framework for GHG emissions, and the specific regulations that apply to the TLNG project. *Ex. RA-51*, pp. 36-39. This section includes discussion of Chapter 70.235 RCW (recodified as Chapter 70A.45.010), which establishes GHG emissions reduction limits for state agencies and GHG reduction targets, and PSCAA SEPA checklist which requires identification and consideration of GHGs. *Ex. RA-51*, p. 37. Three agencies have jurisdiction over GHG emissions within the geographic areas of the Port of

1 Tacoma, City of Tacoma, and Pierce County: the U.S. EPA, Ecology, and PSCAA. PSCAA is
2 the primary regulatory agency responsible for air quality permitting and compliance within King,
3 Kitsap, Pierce, and Snohomish counties. *Id.*, p. 36.

4 128.

5 Section 4.2 of the SEIS discloses and discusses the environment affected by climate
6 change. *Ex. RA-51*, p. 40. The State of Washington established goals to minimize climate
7 change impacts and reduce GHG emissions. *Id.* The SEIS states that the potential effects of
8 climate change and GHG emissions are global and cumulative impacts. *Id.*

9 129.

10 Appellants argue that the cumulative harm must be considered under SEPA and that the
11 context and intensity of TLNG’s GHG emissions support a finding of significance. *Appellants’*
12 *Closing Brief on SEPA Issues (Issue 2)*, p. 15. The SEIS puts the TLNG projected emissions of
13 54,522 and 107,922 metric tons CO₂ per year in the context of global impacts, concluding the
14 SEIS analysis predicts TLNG would result in a net GHG reduction contingent on the source of
15 the natural gas. *Ex. RA-51*, p. 48. Section 4.6 discloses and discusses cumulative impacts and
16 states “while individual sources of GHG emissions are not large enough to have an appreciable
17 effect on climate change, the global accumulation of GHG emissions is resulting in global and
18 local impacts on the climate.” *Id.*, p. 47.

19 130.

20 The public comment section of the SEIS addressed concerns about cumulative effects
21 from the proposed facility with other existing industry at the Port of Tacoma. PSCAA responded

1 that the identified scope for the SEIS was for a life-cycle analysis of the GHG emissions
2 associated with the proposed TLNG facility only. *Ex. RA-51, p. 214.* Considering emissions
3 from other facilities are not consistent with the life-cycle analysis methodologies. *Id.*

4 131.

5 As stated, the Board reviews the adequacy of the SEIS under the rule of reason. Under
6 the rule of reason standard, “the EIS must present decision-makers with a ‘reasonably thorough
7 discussion of the significant aspects of the probable environmental consequences’ of the
8 agency’s decision.” *Klickitat County Citizens*, 122 Wn.2d at 633. The rule of reason standard is
9 met here as the SEIS considered the contribution of TLNG’s emissions to existing adverse
10 climate conditions. ¶¶ 127, 128, 129.

11 132.

12 Appellants cite to several cases to support their argument that an agency must consider
13 the cumulative effects of a project. *See Appellants’ Closing Brief on SEPA Issues (Issue 2), pp.*
14 *15-16.* However, all of the cases cited by Appellants involve an agency’s threshold
15 determination of whether to prepare an EIS, which is not at issue here. *See Ctr. for Biological*
16 *Diversity v. Nat’l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1220 (9th Cir. 2008) (holding
17 an environmental assessment’s finding of insignificance under NEPA for federal fuel economy
18 standards was deficient and contrary to the record in its attempt to justify the refusal to prepare
19 an EIS); *City of Fed. Way v. Town & Country Real Estate, LLC*, 161 Wn. App. 17, 54, 252 P.3d
20 382, 401 (2011) (Under the “clearly erroneous” standard for a threshold determination of non-
21 significance, the court found the cumulative impacts on traffic constitutes a significant adverse

1 impact under SEPA, and mitigation payments were lawful). Both of these cases were examining
2 whether an agency's initial threshold finding of insignificance was clearly erroneous, which
3 triggers whether or not an EIS must be prepared. See RCW 43.21C.031. Such cases are not
4 applicable to the TLNG SEIS where the SEPA process is well beyond the initial threshold
5 determination.

6 133.

7 Appellants also cite *Columbia Riverkeeper, et al. v. Port of Kalama et al.*, SHB 17-010c
8 (Sept. 15, 2017),¹³ for the proposition that an inaccurate significance finding in an EIS robs an
9 agency of its authority to mitigate or deny a project. This case is distinguishable. In *Port of*
10 *Kalama*, Riverkeeper challenged the adequacy of the Final EIS, asserting that it erroneously
11 concluded that the Project's GHG emissions were not significant. Riverkeeper, in part, claimed
12 that the Final EIS merely relied on Ecology's internal document, "Guidance for Ecology:
13 Including Greenhouse Gas Emissions in SEPA Reviews" (Guidance) to conclude the Project
14 would not have significant adverse impacts without any analysis of environmental impacts. *Id.*,
15 p. 19. The Shorelines Hearings Board found the Final EIS failed to provide adequate analysis
16 because the conclusion was based "almost entirely on Ecology's Guidance." *Id.*, p. 23. Unlike
17 in *Port of Kalama*, PSCAA has done an analysis of environmental impacts in the LCA for
18 TLNG.

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21 ¹³ Appellants also cite a 2018 case they call *Port of Kalama v. Shorelines Hearings Board* with a different citation. The Board assumes the Appellants were referring to this case. See *Appellants Closing Brief on SEPA Issues (Issue 2)*, pp. 5, 12.

134.

By letter, after the hearing and closing briefs were submitted, Appellants submitted *Washington State Dairy Federation v. Dept' of Ecology*, 18 Wn. App. 2d 259, 490 P.3d 290 (June 29, 2021), for the Board's consideration. In *Dairy Federation*, environmental groups sought judicial review of the PCHB's decision to largely approve Ecology's issuance of waste discharge permits for concentrated animal feeding operations, claiming in part that SEPA required Ecology to consider the effects of climate change before issuing the permits. The PCHB had dismissed appellants' argument regarding climate change on summary judgment. The Court of Appeals reversed, holding that SEPA required Ecology to consider climate change "to some extent" when issuing permits. *Dairy Federation.*, 18 Wn. App. at 309. The *Dairy Federation* case is distinguished from the case at hand. Rather than an industry-wide permit, the TLNG Permit is for a single, specific facility. Also, an EIS was never issued or reviewed in *Dairy Federation*. The issue here is the adequacy of the SEIS conducted to assess the lifecycle GHG emissions for TLNG.

135.

The Board is mindful of climate change as well as the policy basis for SEPA. In reviewing the adequacy of an EIS, the Board is limited to reviewing whether the EIS presented decision-makers with a "reasonably thorough discussion of the significant aspects of the probable environmental consequences" of the agency's decision. SEPA only requires the agency consider whether the project is in conflict with applicable laws, regulations, and policies, and PSCAA found it was not. ¶ 130. The decision before PSCAA was not to adopt a policy or a

1 regulation addressing GHGs in relation to an entire industry. In fact, PSCAA’s jurisdiction is
2 geographically limited. ¶ 127.

3 136.

4 Appellants also argue the baseline for the No Action Alternative should follow the
5 guidance in Washington Department of Ecology’s proposed Greenhouse Gas Assessment Rule.¹⁴
6 *Ex. ACT-22, WSDOE Draft GAP Rule Conceptual Framework for Informal Review, Wash. State*
7 *Dep’t of Ecology (March 2021)*. The proposal calls for defining the no action scenario as
8 assessing future conditions under “state and federal GHG reduction limits and international goals
9 approved by the U.S. Government.” *Ex. ACT-22, p. 18*.

10 137.

11 The Board concludes that PSCAA could not have followed the guidance in Ecology’s
12 draft GHG Assessment rule issued in March 2021 because it did not exist in 2018 and 2019
13 when the SEIS was in process. The SEIS was prompted by Ecology withdrawing its previous
14 GHG guidance. ¶ 9. The Board concludes the SEIS adequately addresses applicable laws,
15 regulations, and policies, in compliance with SEPA.

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20 ¹⁴ In March of 2021, one month prior to the hearing in this case and long after the SEIS and issuance of the Permit,
21 Ecology released a proposed Greenhouse Gas Assessment Rule (Draft GAP Rule). *Ex. ACT-22 (WSDOE Draft*
GAP Rule Conceptual Framework for Informal Review, Wash. State Dep’t of Ecology (March 2021). The purpose
of the GAP Rule is to “enable consistent, predictable, and transparent consideration of GHG emissions related to
industrial and fossil fuel projects. *Ex. ACT-22, p. 7*. The final rule is planned to be adopted later in 2021. *Id., p. 6*.

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141.

TLNG will process and store 250,000 gpd of LNG. *Ex. RA-21, p. 15.* The gas is processed to remove heavy hydrocarbons (“heavies”). These heavy hydrocarbons include: (1) mixed refrigerant liquids including propane and isopentane, and (2) natural gas liquids removed from the raw gas stream which contain a mixture of different heavy hydrocarbons (including propane, i-butane, n-butane, i-pentane, n-pentane, n-hexane, n-heptane, n-octane). *Ex. ACT-109, pp. 4-5.* Removed heavies would be stored as natural gas liquids in the heavies storage vessel (V-802). *Hogan Testimony at 392-93.* Stored natural gas liquids would be trucked offsite. *Stobart Testimony at 1018-19.*

142.

TLNG will process natural gas through a pretreatment and liquification process, after which the LNG will be stored until used either for transportation fuel or for peak shaving purposes. *Van Slyke Testimony at 451-52; Ex. RA-15.* Upon obtaining custody of TLNG’s feed gas, the gas will be odorized and passed through a metering station. After which the pressure of the gas will be boosted to a level optimum for plant operations. Once at adequate pressure, the gas runs through an amine wet pre-treatment system where certain compounds are removed, next the gas goes through the liquefaction process. The LNG is then stored in a tank for later use as transportation fuel or for re-gasification to serve peak shaving needs. *Stobart Testimony at 1002-1012.* An enclosed ground flare will be used for the destruction of generated waste gases, and a vaporizer will be used to re-gasify the LNG. *Id. at 1014-15.*

1 143.

2 PSE has identified potential consumers of its transportation fuel. Primarily, the fuel is
3 intended for TOTE vessels. *Ex. RA-38, p. 30.* TOTE vessels may be characterized as short sea
4 vessels and fall within the classification of ocean-going vessels. *Couch Testimony at 798-99.*
5 PSE hopes to serve other marine vessels in addition to TOTE as LNG engine technology
6 becomes more prevalent in marine vessels. Other non-marine LNG customers may include those
7 in the long-haul trucking industry. *Ex. RA-38, p. 8.*

8 144.

9 The natural gas processed by TLNG originates from North Montney Region of the
10 Western Canadian Sedimentary Basin. From this region, natural gas is piped into the West Coast
11 Energy pipeline where it travels south until it reaches Sumas, Washington, at which point the gas
12 is transferred to the Williams Northwest Pipeline (“Northwest Pipeline”). *Donahue Testimony at*
13 *1791; Ex. PSE-24.* Flow in the pipeline is typically north to south but the pipeline is
14 bidirectional. *Id. at 1797, 1811.* The gas can only flow in one direction at a time. *Id. at 1797.*

15 145.

16 Upon arrival at the Frederickson Gate Station, the Northwest pipeline gas is metered and
17 measured for transfer to PSE where it is then pressurized and odorized. *Ex. RA-38, p. 126.* Gate
18 stations, or custody transfer points, are locations where custody of gas within the Northwest
19 Pipeline changes to a utility provider such as PSE. *Donahue Testimony at 1799.*

1 146.

2 The composition of the pipeline gas is dependent on factors present during extraction and
3 transmittal and can change gradually over time. *Donahue Testimony at 1815-6*. From
4 approximately 2013 through 2016 the British thermal units (BTU) content of the feed gas
5 received at Sumas increased primarily due to increased ethane. *Id.* at 1821. Due to the increase
6 in heavy hydrocarbons in feed gas composition, in 2017, CB&I made some design changes to
7 TLNG. *Stobart Testimony at 994; Ex. PSE-369*.

8 147.

9 The City of Tacoma completed SEPA review of the proposal in the FEIS that evaluated
10 the preliminary design and concluded there would be no significant adverse safety or risk
11 impacts. *Ex. APTI-472, pp. 225-226*. The City anticipated eventual subsequent design changes.
12 *Id.* Other regulatory agencies, such as the UTC, apply federal, state and local regulations to
13 address safety and risk through the subsequent design, construction, and operation of the facility.
14 *Id.*, p. 225. The UTC, as a Pipeline Hazardous Materials Safety Administration (PHMSA)
15 delegate, is the responsible agency for reviewing compliance when siting an LNG facility.
16 *Gavelli Testimony at 1054*. In Section 3.5 of the FEIS, the Washington UTC Pipeline Safety
17 Office provides oversight of property design and construction of the proposed project as well as
18 ongoing oversight of project operations. *Van Slyke Testimony at 479-480*.

19 148.

20 The FEIS concluded that the preliminary design of TLNG was compliant with all safety
21 regulations, but that the design should be reviewed when complete to ensure continued

1 compliance. *Ex. RA-38, p. 31.* The PHMSA is the agency responsible for regulating the siting,
2 design, construction, operation, and maintenance of TLNG. *Van Slyke Testimony at 480; Ex.*
3 *RA-38, p. 116.* Additionally, the Washington UTC Pipeline Safety Office has been granted
4 authority by PHMSA to provide oversight of the facility's design, construction, and operation.
5 *Ex. RA-38, p. 130.*

6 149.

7 The siting requirements of 49 C.F.R 193, to which TLNG is subject, cover the methods
8 and means of managing risks from spills, or design spills, at the facility. *Ex. ACT-81, p. 4.* The
9 purpose of the Siting Study is to determine if accidents within the LNG facility can have an
10 impact on the public or public property outside the boundaries. *Gavelli Testimony at 1050.* The
11 associated Siting Study is where the safety and hazard risks from design spills are first
12 considered. In 2015, CB&I performed a Siting Study of TLNG as part of the FEIS process.
13 *Stobart Testimony at 976.*

14 150.

15 Stobart, who serves as Project Engineering Manager for TLNG, has worked as an
16 engineer, including design, construction, and commissioning, on approximately 25 LNG projects
17 over his career. *Stobart Testimony at 968.* His testimony is based on his direct knowledge with
18 the Siting Studies and design changes to the TLNG facility.

151.

In 2018, CB&I prepared two supplemental Siting Studies to evaluate safety concerns raised by the Tribe. *Stobart Testimony at 978-979; Exs. ACT-86, ACT-87*. CB&I completed the risk assessment of all the changes Appellants identified. *Stobart Testimony at 980*.

152.

Appellants assert that the heavy liquid hydrocarbons in the raw natural gas feedstock increased from the original design in 2015 to the July 2017 revised design. *Ex. ACT-109, p.5 (Spicer Pre-filed Testimony)*. Dr. Spicer opined that refrigerant liquids and natural gas liquids contain highly flammable chemicals, and a leak of these hazardous chemicals could pose a fire or vapor cloud explosion hazard.¹⁵ Also, processing feed gas with a higher content of heavy hydrocarbons would require more frequent removal of natural gas liquids by truck. Second, Dr. Spicer opined the relocation of equipment in the liquefaction area near Vessel V-204 occurred in a manner that could affect areas of congestion and confinement where a leak of mixed refrigerants from the vessel could create the risk of an explosion.¹⁶ *Id.*, p. 7.

153.

Dr. Spicer further opined that the vapor dispersion calculations in the 2015 Siting Study were no longer applicable. *Ex. ACT-109, p. 12 (Spicer Pre-filed Testimony)*. Specifically, the

¹⁵ Dr. Spicer cited The National Fire Protection Association (NFPA) 59A for evaluating the consequences of a fire or vapor cloud explosion, which requires modeling radiant heat flux, vapor dispersion, and overpressure. Overpressure is the pressure caused by a flame front over and above normal atmospheric pressure caused by a deflagration or detonation. *ACT-109, p. 5 (Spicer Pre-filed Testimony)*.

¹⁶ An area of congestion (obstacles or blockage in a moving gas that can generate turbulence and enhance mixing) and confinement (solid surfaces that prohibit gas movement in one or more directions) creates the circumstances found to be important in characterizing the overpressure damage due to an explosion.

1 flow rates and capacity of lines carrying hazardous materials changed, if not increased, creating
2 fire or explosion hazards. Dr. Spicer noted Line 8008, which carries LNG from the liquefaction
3 area to the heavies storage area where it is then trucked offsite, was identified in 2015 as
4 exceeding the probability of failure threshold. With the 2017 design changes, Line 8008 may
5 have an increased flow rate, and thus a larger vapor dispersion extent. Furthermore, the addition
6 of the “New Heavies Line” and the increased storage capacity of V-801 present unexamined
7 hazards. *Id.*, p. 13. Specifically, Dr. Spicer opined that the “New Heavies Line” carries medium
8 reactivity flammable liquid and thus poses new fire or explosion hazards. Moreover, because the
9 line is above ground and runs the length of the facility, it has a higher probability of failure.
10 *Spicer Testimony at 200.* Additionally, Dr. Spicer testified that the increase to the storage
11 capacity of V-801, which carries heavy hydrocarbons, should have been evaluated for
12 unexamined hazards. *Ex. ACT-109, p. 13 (Spicer Pre-filed Testimony).*

13 154.

14 Appellants also assert PSE made a substantial design change after publication of the FEIS
15 by relocating equipment in the liquefaction area near vessel V-204,¹⁷ which contains highly
16 flammable hydrocarbons, and if spilled could explode in a confined environment. *ACT-109, pp.*
17 *7-8 (Spicer Pre-filed Testimony).* In the original site design, the liquefaction heat exchanger, a
18 piece of equipment measuring 15 by 25 feet, was located (plant) south of both V-204 and the
19 MRL Condenser. But in the final design, this orientation was flipped such that the liquefaction
20

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¹⁷ V-204 – MRL Condensate Vessel. *Stobart Testimony at 983.*

1 heat exchanger is (plant) north of V-204 and the MRL condenser. Additionally, redesigning the
2 facility to accommodate the heavier feed gas would increase flow into and out of vessel V-204.
3 With these changes to V-204's location and incoming/outgoing flow rates, Dr. Spicer testified
4 that the areas of congestion in confinement identified in 2015 may have changed. *Id.*, p. 10.
5 Furthermore, Dr. Spicer testified that the catastrophic failure of V-204 could result in a boiling
6 liquid expanding vapor explosion (BLEVE), and that this consequence was never evaluated in
7 the Final EIS. *Spicer Testimony at 218-19; Ex. ACT-109, p. 10 (Spicer Pre-filed Testimony).*

8 155.

9 The original site design required truck trips for removal of heavy hydrocarbons
10 approximately every 14 days, whereas the design changes require truck trips approximately
11 every five days. *Stobart Testimony at 1013.* Stobart testified that based on the analysis of the
12 feed gas composition in 2020, one truck trip would be required every 30 days. *Id.* Appellants
13 assert that the safety hazards associated with increases in both on-site and off-site truck traffic
14 were not sufficiently examined. *Ex. ACT-109, p. 14 (Spicer Pre-filed Testimony); Spicer*
15 *Testimony at 204, 214-15.*

16 156.

17 Respondents argue that the design changes identified by the Appellants do not require
18 further SEPA review because those changes constitute development that is within the scope of
19 the proposed action evaluated by the FEIS, and the City properly relied on regulatory review by
20 other agencies with jurisdiction over facility risk issues. Respondents further argue that none of
21

1 the design changes are substantial or will create unexamined significant adverse impacts. *Puget*
2 *Sound Energy, Inc.’s Post-Hearing Brief*, pp. 9-16.

3 157.

4 Dr. Gavelli, PSE’s expert witness, testified that adjustments made to accommodate the
5 changing feed gas composition did not create new unexamined hazards. *Ex. PSE-645, pp. 10-11*
6 *(Gavelli Declaration)*. He asserted the 2015 Siting Study evaluated the risks associated with
7 lines carrying medium reactivity flammable liquid and the 2017 design changes, including the
8 addition of the “New Heavies Line.” The changes did not introduce any high reactivity
9 flammable liquid; thus, the hazards fall into the same medium reactivity category as hazards
10 previously evaluated. *Id.*, p. 5.

11 158.

12 Dr. Gavelli also testified the increased storage capacity of V-801 does not present new
13 hazards because the 2015 Siting Study already evaluated more serious risk scenarios than
14 releases from V-801. *Ex. PSE -645, p. 8 (Gavelli Declaration)*. Specifically, Line 8008, which
15 connects to V-801 and carries Natural Gas Liquids (NGL) to the NGL storage vessel, was
16 evaluated for a full-bore failure. *Id.* Additionally, by applying the PHMSA failure rate table to
17 the lines added or modified in 2017, Dr. Gavelli testified that a full-bore rupture of the new, 2”
18 amine line would be credible, however the stream flowing along the line is reported to include
19 approximately 40 percent hydrocarbons and 60 percent water and therefore is not considered
20 flammable. *Id.*, p. 9.

159.

Dr. Gavelli noted that Line 8008 appears to be the only line affected by the 2017 feed gas composition changes. *Ex. PSE-645, p. 9 (Gavelli Declaration)*. Line 8008 line carries a liquid stream of heavy hydrocarbons from V-801 to the NGL storage vessel and could be subject to a higher flow rate following the facility design changes. Dr. Gavelli stated that a rough estimate of the outflow from this line indicates that the available liquid inventory could be depleted in approximately 20 seconds, as opposed to the 10-minute duration that appears to have been used in the 2015 Siting Study. Therefore, it was reasonable to conclude that the 2015 analysis of the vapor dispersion consequences of a full-bore rupture of Line 8008 is still valid. *Id., p. 9*. Dr. Gavelli testified that based on his conservative analysis, the explosion consequence of Line 8008 would not exceed regulatory requirements. *Id., p. 9*.

160.

Dr. Gavelli also testified that the equipment adjustments in the liquefaction area do not render the 2015 analysis inapplicable. *Ex. PSE-645, p. 7 (Gavelli Declaration)*. He asserted the 2015 analysis evaluated the overpressure consequences from the ignition of a flammable vapor cloud due to a 0.4-in leak in V-204, which is the only credible release scenario for V-204. *Id.* The worst-case scenario conservatively assumed a stoichiometric cloud that filled the entire footprint of the liquefaction area. *Id.* Thus, any change in the position of V-204 relative to the congestion areas would not result in an increase in the overpressure hazard distances. *Id.*

161.

Dr. Gavelli testified that the probability of a catastrophic failure of V-204 is not a credible scenario according to PHMSA Failure Rate Table. *Ex. PSE-645, p. 6 (Gavelli Declaration)*. He stated that a BLEVE can only occur as a consequence of a catastrophic failure of a pressure vessel. Dr. Gavelli opined that because the probability of catastrophic failure of V-204 is not a credible scenario, the vessel does not present the risk of a BLEVE. *Id., pp. 6-7*.

162.

Finally, Dr. Gavelli noted that offsite transportation of hazardous materials is outside the scope of TLNG's siting. Additionally, the 2018 Supplemental Siting Study evaluated the consequences of spills of heavy hydrocarbons and LNG at the truck loading station and found them to satisfy siting requirements. *Ex. PSE-645, p. 10 (Gavelli Declaration)*.

163.

Dr. Gavelli has conducted over 50 site hazard evaluations for LNG facilities, including on behalf of PHMSA. *Gavelli Testimony at 968*. Dr. Gavelli has 17 years of experience with hazard analyses and risk assessments for LNG facilities, and expertise in the regulatory and technical standards for siting these facilities. *Id. at 1049, 1052-53*.

164.

The Board finds and concludes that the testimony from Stobart and Dr. Gavelli was credible and persuasive. The Board gives greater weight to Stobart and Dr. Gavelli's testimony based on their expertise with LNG facilities, experience with state and federal regulations for

1 these facilities, and direct knowledge and evaluations of the TLNG facility design changes. ¶¶
2 150, 151, 163.

3 165.

4 Dr. Spicer conducted one site assessment, which did not involve an LNG facility. *Spicer*
5 *Testimony at 278-79*. The City’s FEIS was the sole basis for Dr. Spicer’s understanding of the
6 siting study regulations. *Id. at 282-83*. Dr. Spicer testified that a leak of hazardous chemical
7 “could” pose a fire or vapor explosion hazard. ¶ 152. He also asserted relocation of equipment
8 in the liquefaction area “could” affect areas of congestion and confinement. ¶ 154. Dr. Spicer
9 did not run any calculations to support his testimony. *Spicer Testimony at 282*. Dr. Spicer had
10 not undertaken an independent analysis of whether the catastrophic failure of vessel V-204 is a
11 credible scenario and was not familiar with the PHMSA Failure Rate Table. *Id. at 283-85*. Dr.
12 Spicer’s opinions were speculative, and he did not perform any analysis of his own to determine
13 whether the new changes might affect compliance with PHMSA’s siting requirements.

14 Therefore, the Board gives less weight to Dr. Spicer’s testimony.

15 166.

16 The City completed SEPA review of the proposal in an EIS and evaluated the preliminary
17 design, concluding there would be no significant adverse safety or risk impacts. ¶ 147. In
18 general, SEPA review occurs at the conceptual stages of design, and further design changes are
19 expected to occur. *See WAC 197-11-055(4)*. Other regulatory agencies, including the UTC,
20 have jurisdiction to review safety and risk throughout the design, construction, and operation of
21

1 the Project. ¶ 147. The UTC continues to have this regulatory authority and Appellants can
2 address safety concerns through the UTC.

3 167.

4 SEPA regulations state that an agency may use environmental documents that have
5 previously been prepared in order to evaluate proposed actions, alternative, or environmental
6 impacts. WAC 197-600(2). An agency acting on the same proposal shall use an environmental
7 document unchanged, except in the following cases:

8 (b) For DNSs and EISs, preparation of a new threshold determination or
supplemental EIS is required if there are:

9 (i) Substantial changes to a proposal so that the proposal is likely to have significant
10 adverse environmental impacts (or lack of significant adverse impacts, if a DS is
being withdrawn); or

11 (ii) New information indicating a proposal's probable significant adverse
12 environmental impacts. (This includes discovery of misrepresentation or lack of
material disclosure.) A new threshold determination or SEIS is not required if
probable significant adverse environmental impacts are covered by the range of
alternatives and impacts analyzed in the existing environmental documents.

13 WAC 197-11-600(3). Decisions regarding whether a supplemental EIS is required involve the
14 application of law to facts and are reviewed under the “clearly erroneous” standard set forth in
15 RCW 34.05.570(3)(d); *Glasser v. City of Seattle, Office of Hearing Exam'r*, 139 Wn. App. 728,
16 740, 162 P.3d 1134, 1139 (2007).

17 168.

18 Appellants argue a supplemental EIS is required due to changes in facility design.

19 *Appellants' Closing Brief on SEPA Issues (Issue 2)*, p. 46. Appellants bear the burden of proving
20

1 a supplemental EIS is required due to “substantial changes” to the proposal such that the
2 proposal is likely to have significant adverse environmental impacts. “Significant” is defined as:

3 (1) "Significant" as used in SEPA means a reasonable likelihood of more than a
4 moderate adverse impact on environmental quality.

5 (2) Significance involves context and intensity (WAC 197-11-330) and does not
6 lend itself to a formula or quantifiable test. The context may vary with the physical
7 setting. Intensity depends on the magnitude and duration of an impact.

8 The severity of an impact should be weighed along with the likelihood of its
9 occurrence. An impact may be significant if its chance of occurrence is not great,
10 but the resulting environmental impact would be severe if it occurred.

11 (3) WAC 197-11-330 specifies a process, including criteria and procedures, for
12 determining whether a proposal is likely to have a significant adverse
13 environmental impact.

14 WAC 197-11-794.

15 169.

16 Respondents argue the design changes do not require a new SEIS because other
17 regulatory agencies, including the UTC, will apply federal, state and local regulations to address
18 safety and risk throughout subsequent design, construction and operation of the facility. *Puget
19 Sound Energy, Inc.’s Post-Hearing Brief, p. 11.* Respondents also argue that the safety issues
20 related to facility redesign were raised too late. The Board addressed this argument when it
21 denied Summary Judgment on Issue 2d, concluding that genuine issues of material fact remained
as to the current configuration of the Project and whether Project impacts were adequately
assessed in the SEIS. *Order on PSE’s Second Dispositive Motion, p. 20.*

170.

The Board finds and concludes Appellants have not met their burden to show the facility
design changes are significant as defined in WAC 197-11-794. Appellants have not shown that

1 the Siting Studies did not address the safety hazards they raise. They have not shown either the
2 severity of an impact or the likelihood of its occurrence. Furthermore, the facility design
3 changes constitute development that is within the scope of the proposed action evaluated by the
4 FEIS. *See* WAC 197-11-055(4).

5 171.

6 Further, the UTC is the agency with jurisdiction to identify ongoing processes relating to
7 safety impacts from subsequent changes in design. ¶¶ 148, 167. Appellants have been
8 participating in the UTC process and submitted Dr. Spicer’s testimony regarding safety issues.
9 *Ex. RA-142.*

10 172.

11 The Board finds and concludes PSCAA’s reliance on the FEIS was not clearly erroneous.

12 **C. Agency’s Substantive SEPA Authority (Issue 9)**

13 173.

14 Respondents’ Legal Issue 9 asks whether legally adequate environmental review under
15 SEPA requires either denial or further mitigation of the Project or is a reviewable cause of action
16 under SEPA. In Legal Issue 4k, resolution of which is addressed in the Board’s decision on the
17 Permit issues, Appellants challenge whether Condition 41 is sufficient mitigation and whether
18 PSE will comply with the Condition. *Appellants’ Closing Brief on SEPA Issues (Issue 2)*, pp.
19 42-43. Condition 41 requires that PSE ensure the sole source of natural gas comes from British
20 Columbia or Alberta (by way of British Columbia) and prohibits TLNG from accepting natural
21 gas if the flow on the supply pipeline past the Frederickson Gate Station is not north to south.

1 *Ex. RA-132, pp. 6-7.* Appellants are apparently arguing that PSCAA should have exercised
2 substantive SEPA authority to further condition or deny the Permit. Appellants further argue
3 that PSCAA's assumptions regarding 1-for-1 displacement, methane leakage and slip rates, and
4 GWP are erroneous and do not allow decisionmakers to properly mitigate for the Project. *See*
5 *Appellants' Closing Brief on SEPA Issues (Issue 2), pp. 14, 18, 21, 42.*

6 174.

7 Respondents counter that these claims (especially as to Condition 41) do not relate to the
8 adequacy of the SEIS but rather are challenging PSCAA's failure to exercise its substantive
9 SEPA authority. PSCAA has the authority to enforce the Permit through permit record-keeping
10 and reporting requirements. An agency's exercise of its substantive SEPA authority is
11 discretionary, not mandatory. *See* RCW 43.21C.060; *Glasser*, 139 Wn. App. at 740. The Board
12 concludes that PSCAA has the discretion to exercise its substantive SEPA authority to enforce
13 Condition 41.

14 175.

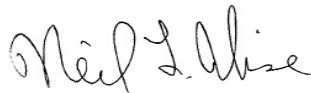
15 Any Finding of Fact deemed to be a Conclusion of Law is hereby adopted as such. Any
16 Conclusion of Law deemed to be a Finding of Fact is hereby adopted as such. Based upon the
17 foregoing Findings of Fact and Conclusions of Law, the Board enters the following:

1 **VII. ORDER**

2 The Order of Approval No. 11386 and the associated Supplemental Environmental
3 Impact Statement is AFFIRMED. The Order of Approval No. 11386 is remanded for further
4 action consistent with the Board's decision in Findings of Fact, Conclusions of Law, and Order
5 on NOC Issues 4, 4a, 4b, 4c, 4d, 4e, 4f, 4g, 4h, 4i, 4j, 4k, 4o, 4p, 4u, 6, and 8.

6 SO ORDERED this 19th day of November, 2021.

7 **POLLUTION CONTROL HEARINGS BOARD**

8 

9 NEIL L. WISE, Board Chair

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11 CAROLINA SUN-WIDROW, Member

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13 MICHELLE GONZALEZ, Member

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15 HEATHER C. FRANCKS, Presiding
16 Administrative Appeals Judge