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June 15, 2022

British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, BC
V6Z 2N3

Attention: Mr. Patrick Wruck, Commission Secretary

Dear Mr. Wruck:

Re: FortisBC Energy Inc. (FEI) and British Columbia Hydro and Power Authority (BC Hydro) – Energy Scenarios
FEI Stage One Submission – Modelling Results

In December 2021, the British Columbia Utilities Commission (BCUC) initiated a process to explore energy scenarios to achieve BC's greenhouse gas (GHG) targets and the resulting interdependent long-term implications on British Columbia's primary Electric and Gas Utilities, stating:

BC Hydro and FEI [...] have a significant and correlated role in achieving these GHG reduction objectives as the electric and gas energy systems in BC display many interdependencies, such as in the emerging industries of hydrogen and syngas production, carbon capture and storage and liquefied natural gas, to name a few.

In its letter dated January 21, 2022, the BCUC requested that BC Hydro and FEI (the Utilities) share the data required to file load forecast results based on each other's scenarios contained in their respective resource plans. As part of the filings, each Utility would include appropriate supporting commentary regarding the supply resource impacts, rate impacts, and associated GHG emission impacts that may be associated with each energy scenario.

In its letter dated March 9, 2022, the BCUC accepted the Utilities' request to stage the filings as follows:

- **Stage One** to be filed by June 15, 2022 will provide the load forecast results for the energy scenarios; and
- **Stage Two** to be filed by August 12, 2022 will provide supporting commentary regarding the supply resource impacts, rate impacts and associated GHG emission impacts for the energy scenarios.

This report represents FEI's Stage One filing, and focuses on annual demand only.

In addition, FEI considers that the submission of the Stage One report fulfills and concludes the monthly update submissions for the Utilities.

If further information is required, please contact Ken Ross, Manager, Integrated Resource Planning and DSM Reporting at (604) 576-7343 or ken.ross@fortisbc.com.

Sincerely,

FORTISBC ENERGY INC.

Original signed:

Diane Roy

Attachments

cc (email only): bhydroregulatorygroup@bhydro.com



**British Columbia Hydro and Power
Authority (BC Hydro), and
FortisBC Energy Inc. (FEI)
Energy Scenarios**

**FEI Modelling Results
Stage One**

June 15, 2022

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1. INTRODUCTION AND BACKGROUND

In this report, FEI presents the results of its modelling of annual gas demand for select scenarios from FEI's and BC Hydro's respective long-term resource plans.

In December 2021, the British Columbia Utilities Commission (BCUC) initiated a process to explore energy scenarios to achieve BC's greenhouse gas (GHG) targets and the resulting interdependent long-term implications on British Columbia's primary Electric and Gas Utilities, stating:

"BC Hydro and FEI [...] have a significant and correlated role in achieving these GHG reduction objectives as the electric and gas energy systems in BC display many interdependencies, such as in the emerging industries of hydrogen and syngas production, carbon capture and storage and liquefied natural gas, to name a few."

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In its letter dated March 9, 2022, the BCUC accepted the Utilities' request to stage the filings as follows:

- Stage one to be filed by June 15, 2022 will provide the load forecast results for the energy scenarios; and
- Stage two to be filed by August 12, 2022 will provide supporting commentary regarding the supply resource impacts, rate impacts and associated GHG emission impacts for the energy scenarios.

This report represents FEI's Stage One filing and focuses on annual demand only. FEI engaged consultants Posterity Group (Posterity) to support FEI in preparing the load forecast results.

The respective scenarios selected by the Utilities for analysis are set out below.

BC Hydro Scenarios:

- BC Hydro Reference Case
Reflects 'current policies' that are legislated or have firm announcements. These include the BC carbon tax, rising to \$50 per tCO₂e¹ by 2022 and other policies that generally date from the first BC Climate Action Plan, released in 2008. This scenario also includes the announced light-duty (passenger) vehicle zero-emission vehicle (ZEV) standard that requires a minimum fraction of sales be ZEVs and is trending towards a phase-out of

¹ tCO₂e = tonnes (t) of carbon dioxide (CO₂) equivalent (e).

1 conventional vehicles by 2040. (This represents the 'Current Policy' scenario outlined by
2 the BC Hydro 2021 IRP, Appendix C: December 2020 Load Forecast – Appendix F:
3 Navius Report).

4 • Accelerated Electrification

5 A range of stronger policies and incentives, plus an emissions cap that achieves BC's
6 2025, 2030 and 2040 GHG reduction targets. These represent a 16 percent reduction
7 from 2007 emissions by 2025, a 40 percent reduction by 2030 and 60 percent reduction
8 by 2040. The incentives and regulatory policies include:

- 9 ▪ A strengthening of the Renewable and Low-Carbon Fuel Requirement;
- 10 ▪ A ZEV standard with some additional requirements for medium and heavy-duty
11 vehicles;
- 12 ▪ A renewable natural gas (RNG) standard requiring a minimum blend of renewable
13 fuel in the natural gas stream;
- 14 ▪ Incentives for the efficient electrification of buildings (e.g. with heat pumps);
- 15 ▪ Requirement for building envelope energy retrofits from after 2030; and
- 16 ▪ A zero-emissions building requirement, which affects new heating system
17 installations after 2035.

18 (This corresponds with the 'Stronger Policies' scenario outlined in the BC Hydro 2021 IRP,
19 Appendix F: Navius Report).

20 • Low Load Forecast

21 This scenario maintains all sectors and annual demand at the base year level. This
22 scenario was determined by FEI to closely approximate FEI's Economic Stagnation
23 Scenario as further discussed below.

24 **FEI Scenarios:**

25 • Diversified Energy (Planning) Scenario

26 The key planning assumptions build upon a diversified approach to energy delivery and
27 emissions reductions to British Columbians. Under this scenario, customer growth occurs
28 for electric and gas utilities and the existing gas infrastructure is used to deliver low-carbon
29 energy solutions to customers. FEI uses the Diversified Energy Scenario as its planning
30 scenario in the 2022 Long-Term Gas Resource Plan (LTGRP). In the Diversified Energy
31 scenario FEI meets the 2030 GHG emissions cap for buildings and industry set out in the
32 BC government's proposed GHG Reduction Standard for gas utilities as well as the
33 Province's 2040 GHG emission reductions target.

34 • Deep Electrification

1 The BC government does not dramatically increase carbon taxes above currently
2 announced levels to avoid electoral backlash but uses all other policy levers to electrify
3 the economy in order to achieve domestic carbon abatement. Government also promotes
4 Carbon Capture Utilization and Storage (CCUS) for non-electrified sectors. Such policies
5 create constraints for the BC economy and reduce the uptake of FEI's low-carbon gas
6 transportation (LCT) solutions and also renewable gases. To support economic growth,
7 the BC government supports liquified natural gas (LNG) exports to other jurisdictions.
8 Despite these exports, the domestic shift towards electricity causes a regional
9 conventional natural gas supply glut, leading to low regional gas prices.

10 • Economic Stagnation

11 In this scenario the BC economy tightens, influenced by other North American and global
12 trends, leaving fewer dollars available to the government and utility customers in BC to
13 aggressively pursue decarbonization initiatives. Regional growth in natural gas demand
14 slows, keeping BC's gas demand/supply balance abundant. Global economic
15 performance reinforces trends towards the right of the political spectrum and causes
16 governments to focus on areas other than climate policy. The economic environment has
17 some negative impact on LNG exports and significant negative impact on natural gas as
18 a transportation fuel. This scenario is not intended to model a 20-year recession, but rather
19 a general trend over the planning horizon in which spending is reined in.

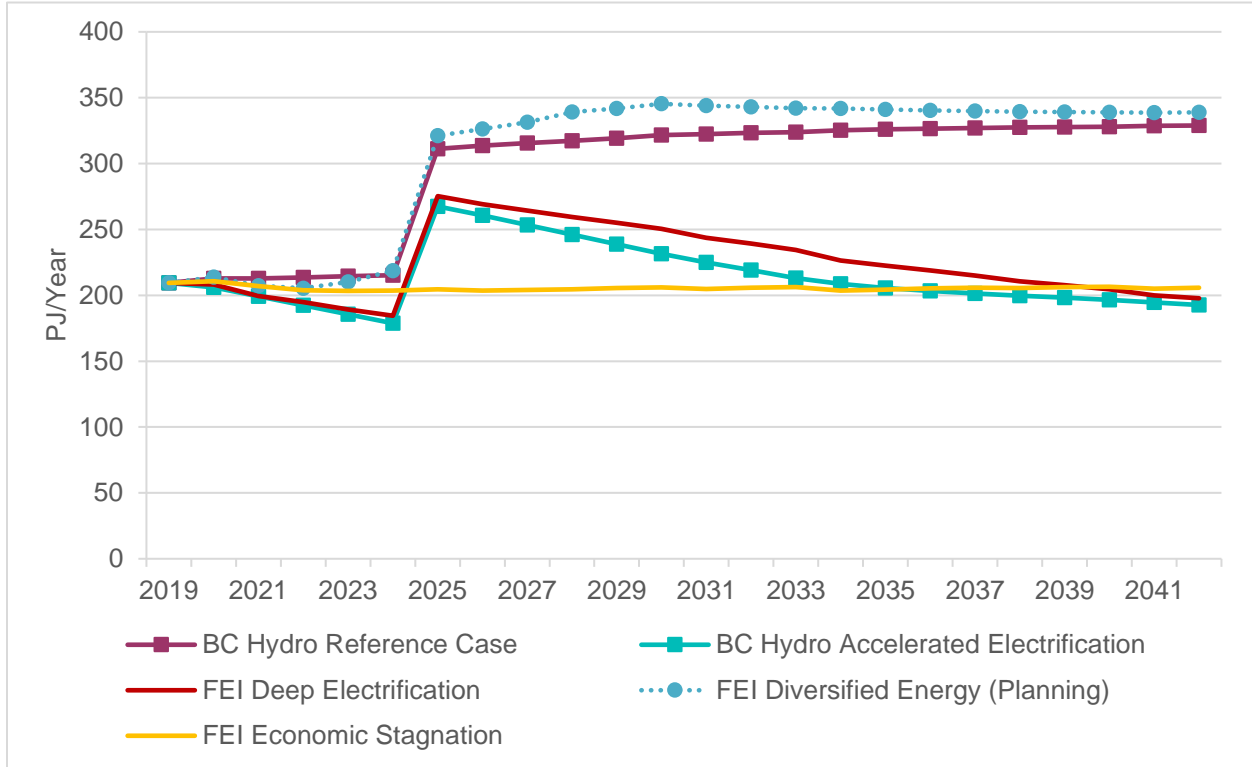
20 As described above, BC Hydro's Low Load Forecast represents a scenario where electricity
21 demand over the long term remains constant with little to no growth or decline. The implication
22 for a gas demand scenario of this nature is that demand would also stay relatively constant. With
23 respect to annual gas demand, FEI's Economic Stagnation scenario results in a fairly constant
24 level of future demand over the planning horizon, such that modelling and presenting this
25 additional gas demand scenario would not provide value. Thus, the results of this report present
26 only five scenarios – the two other BC Hydro Scenarios and the three FEI scenarios.

27 **2. Results**

28 The results of modelling the total annual gas demand for each of the five scenarios are shown in
29 Figure 1 and Table 1 below.

1

Figure 1: Forecast of Total Annual Gas Demand by Scenario - All Sectors²



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3

Table 1: Forecast of Total Annual Gas Demand (PJ/Year) by Scenario – All Sectors

	2025	2030	2035	2040	2042
FEI Deep Electrification	275	251	223	205	198
BC Hydro Accelerated Electrification	267	231	206	196	193
FEI Diversified Energy (Planning)	321	345	341	339	339
BC Hydro Reference Case	311	322	326	328	329
FEI Economic Stagnation	205	206	204	206	206

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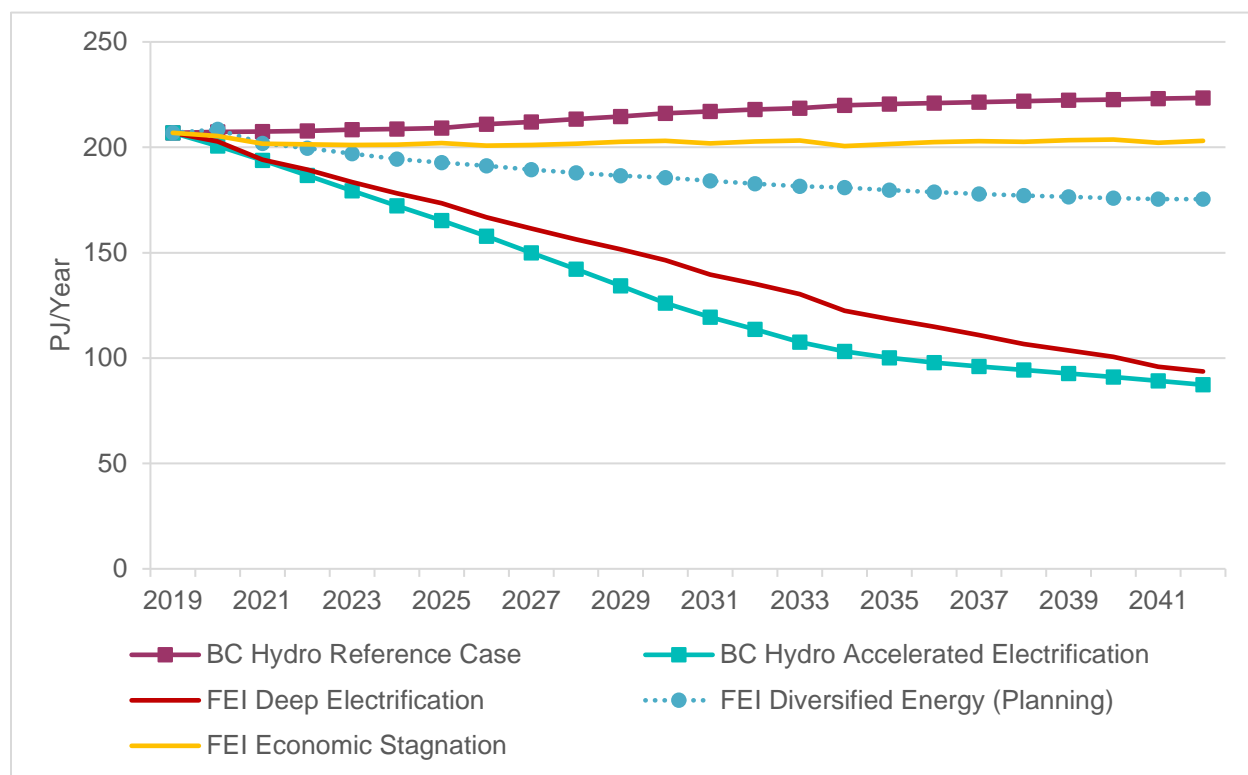
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10

Notable in this scenario modelling exercise is the outcome of annual energy demand forecasts for FEI’s residential, commercial and industrial customer demand categories because this is the demand category where a more significant shifting of load between the gas and electric systems is modelled in the Deep and Accelerated Electrification Scenarios, impacting the majority of FEI’s customers. The forecast of combined annual gas demand for these customers under each of the scenarios is presented in Figure 2 and Table 2 below.

² To be consistent with the 2022 LTGRP, demand from the Woodfibre LNG project was not included in the Economic Stagnation Scenario. Further, though a later expected in service date for the facility has recently been announced by Woodfibre LNG, the date modelled in the 2022 LTGRP has been used for the BC Hydro scenarios for consistency.

1 **Figure 2: Forecast of Total Annual Gas Demand by Scenario – Residential, Commercial and**
2 **Industrial Customers³**



3
4
5 **Table 2: Forecast of Total Annual Gas Demand (PJ/Year) by Scenario – Residential, Commercial**
6 **and Industrial Customers**

	2025	2030	2035	2040	2042
FEI Deep Electrification	173	146	119	101	94
BC Hydro Accelerated Electrification	165	126	100	91	87
FEI Diversified Energy (Planning)	193	186	180	176	175
BC Hydro Reference Case	209	216	220	223	223
FEI Economic Stagnation	202	203	202	204	203

7 The other two FEI categories of demand that are included in the total annual gas demand shown
8 in Figure 1 and Table 1, but not included in Figure 2 and Table 2, are FEI’s Low-Carbon
9 Transportation (LCT) and Global LNG demand category and the Large New Industrial Load
10 Category. FEI does not expect BC Hydro to model these categories as part of BC Hydro’s future
11 demand. However, for completeness, Posterity modelled for FEI these demand categories for
12 each of the BC Hydro scenarios as follows:

³ Results exclude FEI rate classes TPT-1, TPT-2 and Company Use (consistent with the 2022 LTGRP).

- 1 • The reference case setting for LCT and Global LNG was used to complete the total annual
2 gas demand for the BC Hydro Reference Case and Accelerated Electrification scenarios.
3 This setting was used to avoid FEI bias in interpreting the BC Hydro scenario narratives
4 for this demand category and for consistency in the absence of data with which to use or
5 develop other settings.
- 6 • FEI's planning setting for Large New Industrial demand was used, which is made up of
7 the expected load from the Woodfibre LNG project. Since the project has announced its
8 intention to proceed to construction, FEI has used this setting for both of the BC Hydro
9 scenarios modelled. FEI notes that although the in-service date for the Woodfibre facility
10 has recently been revised, for consistency with its LTGRP, FEI used the same timing
11 (2025) for the facility's in-service date as was used for the FEI scenarios which were
12 modelled before the in-service date was extended.

13 Since the resulting demand forecasts for these scenarios are a product of FEI's 2022 LTGRP
14 modelling and not a result of separate modelling for these categories as part of the BCUC
15 Scenarios request, they are not presented separately or discussed in further detail in this report.

16 3. KEY OBSERVATIONS

17 FEI makes the following key observations on the results of the modelling for the residential,
18 commercial and industrial demand categories.

- 19 1. The BC Hydro Reference Case Scenario has the greatest gas demand (natural gas, RNG
20 and hydrogen) throughout the forecast period. Specifically, the BC Hydro Reference Case
21 Scenario has a greater demand than that of FEI's Diversified Energy (Planning) Scenario
22 and FEI's Economic Stagnation scenario. To match the gas demand in the BC Hydro
23 Reference Case, it was necessary to model substantial electricity-to-gas fuel switching for
24 the major end uses in all three sectors. FEI's 2022 LTGRP did not contemplate any
25 scenarios where fuel switching away from electricity and towards natural gas would occur
26 on this scale.
- 27 2. Gas demand in FEI's Diversified Energy (Planning) Scenario falls in the mid-range of the
28 various scenarios. BC Hydro's Reference Case and FEI's Economic Stagnation scenarios
29 are at the higher end and the two Electrification scenarios are at the lower end.
- 30 3. Gas demand for BC Hydro's Accelerated Electrification Scenario tracks relatively closely
31 to FEI's Deep Electrification Scenario. In 2030 there is a difference of about 20 PJ, and
32 the gap is less than 10 PJ by 2040. This means that both scenarios forecast a similar
33 decline in gas demand, although BC Hydro's scenario results in a gas demand forecast
34 that is slightly lower.
- 35 4. Although supply resource implications are not part of the Stage One submission, FEI has
36 observed that the BC Hydro Accelerated Electrification Scenario includes more renewable

1 and low-carbon gas supply than the FEI Deep Electrification Scenario. One of BC Hydro's
2 scenario assumptions is that there will be an RNG standard requiring a minimum blend of
3 renewable fuel in the natural gas stream even in a scenario where the province is focused
4 on electrification. In contrast, FEI's Deep Electrification Scenario assumes the Province
5 primarily focuses on electrification rather than decarbonizing the gas system, since
6 investing in renewable and low-carbon gas resources would cause inordinate pressure on
7 rates that would already be strained by maintaining a gas system for a dwindling demand.
8 This observation will be explored further in FEI's Stage Two submission.

9 **4. DATA EXCHANGED AND MODELLING CHALLENGES**

10 In addition to the scenario descriptions presented in Section 1, BC Hydro and Navius provided
11 FEI with the following data for all of the BC Hydro service territory and for multiple energy sources
12 (see below) for the milestone years 2020, 2025, 2030, 2035, and 2040:

- 13 • 'Drivers of growth': GDP growth, population growth, natural gas price, and oil price;
- 14 • Scenario indicators: natural gas production, commercial and institutional floor area,
15 residential floor area, housing starts, and retail spending;
- 16 • Economic sectors used in the modelling (i.e., segments);
- 17 • Residential and Commercial building area and thermal energy demand intensity by
18 building type and end use (including energy consumption for load served by electricity and
19 energy resources other than electricity like natural gas including RNG, oil, wood and
20 other);
- 21 • Natural gas, including RNG, and electricity consumption by industrial sub-sector;
- 22 • Carbon prices and gas supply costs; and
- 23 • Forecasts for hydrogen, renewable natural gas (RNG) and carbon capture, storage, and
24 utilization (CCUS) by sector.

25 In addition to scenario descriptions, FEI and Posterity provided BC Hydro with the following data
26 for FEI's service territory and for gas demand only (natural gas and renewable gas) for each year
27 over the planning horizon:

- 28 • Gas consumption by sector, fuel and segment;
- 29 • CNG/LNG consumption by fuel and segment;
- 30 • Tertiary load by sector, end use and segment;
- 31 • Industrial production forecast;
- 32 • FEI customer accounts by sector and segment;
- 33 • Units by segment for the Residential (dwellings) and Commercial (m²) sectors;

- 1 • Fuel share by sector, end use, segment and fuel;
- 2 • Marginal avoided cost of renewable gases (RNG and hydrogen); and
- 3 • Electricity price (retail rate and avoided cost).

4 At a high level, BC Hydro's method is a top-down approach, based on economic simulations
5 initially calibrated to federal GHG emissions and annual demand data, that develops all further
6 parameters from this headline level. In contrast, FEI's method is a bottom-up approach based on
7 customer end use demand and customer-specific data sources.⁴ This difference resulted in some
8 challenges for FEI and Posterity in converting the BC Hydro scenarios and data into inputs to
9 FEI's forecasting model. The following adjustments were employed to meet these challenges:

- 10 • FEI / Posterity adopted 2020 as the common base year for this exercise;
- 11 • In some cases, FEI data was used if and when BC Hydro did not have explicit data on an
12 input required for the FEI models;
- 13 • Where necessary, an iterative, targeting approach was employed to match the overall
14 level of the residential, commercial and industrial sectors end use changes in the Posterity
15 end use model to the overall percent changes in fuel use in the Navius modeling inputs;
16 and
- 17 • In some cases, FEI / Posterity made adjustments to fuel switching assumptions when the
18 practical limitations of the end use forecasting model were exceeded, creating logic errors.
19 For example, once all end uses in the end use model were converted, further fuel switching
20 could not continue.

21 The method employed to complete this conversion is not presented in detail in this report;
22 however, where this necessary step in the modelling process may have implications for
23 considering impacts on supply resources, GHG emissions and/or customer rates, additional
24 discussion will be included in FEI's Stage Two submission.

25 **5. NEXT STEPS**

26 This Stage One report presents the results of FEI's modelling of total annual gas demand for
27 select scenarios from FEI's and BC Hydro's respective resource plans. The Stage Two report,

⁴ Additional data sources used to develop FEI's Reference Case and Alternate Future Scenarios include:

- 2021 Conservation Potential Review (2021 CPR);
- FEI's 2017 Residential End Use Survey (REUS) which represents FEI's most recent REUS at the time the forecast modelling was undertaken;
- FEI's 2019 Commercial End Use Survey (CEUS) which represents FEI's most recent study of its commercial customers; and
- Research and data analysis from the 2017 LTGRP which FEI included to utilize and build upon.

1 due August 12, will provide further supporting commentary for this scenarios modelling project
2 regarding implications for:

- 3 • supply resources;
4 • rates; and
5 • associated GHG emissions.

6 Since a discussion of supply resources and rate impacts necessitates the consideration of the
7 peak load and long-term system capacity requirements associated with each of the scenarios,
8 FEI will also be including this information in its August 12 submission.

9 FEI appreciates the opportunity to participate in the BCUC Energy Scenario modelling project in
10 which the Utilities are collaborating in developing a long-term supply resource outlook for BC's
11 energy system as a whole. This project recognizes the roles for both the electric and gas energy
12 systems in BC as being a complementary part of a resilient energy future and is an important step
13 in planning for British Columbia's decarbonization transition with the objective of supplying safe,
14 reliable, and affordable energy for all British Columbians.