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Via E-File

March 6, 2020

B.C. Utilities Commission
Suite 410, 900 Howe Street
Vancouver, BC V6Z 2N3

File No.: 4.2.7(2020)

Attention: Patrick Wruck
Commission Secretary and Manager, Regulatory Services

Dear Mr. Wruck:

**Re: Pacific Northern Gas Ltd. and Pacific Northern Gas (N.E.) Ltd.
Application for Acceptance of 2019 Consolidated Resource Plan and for Acceptance of
Energy Conservation and Innovation (ECI) Portfolio Funding for 2020 and 2022
Response to BCUC Information Request No. 1**

Accompanying, please find the response of Pacific Northern Gas Ltd. and Pacific Northern Gas (N.E.) Ltd. (collectively, PNG) to British Columbia Utilities Commission (BCUC) Information Request No. 1 in the referenced proceeding.

Printed copies of the response will be delivered by courier on Monday, March 9, 2020, including 10 copies to the BCUC's office and one copy to each of the parties who registered as interveners in this proceeding.

Please direct any questions regarding this letter to my attention.

Yours truly,

A handwritten signature in black ink, appearing to read 'Verlon G. Otto', is written over a light grey circular stamp.

Verlon G. Otto

cc. Bill Andrews – BCSEA
Tom Hackney – BCSEA
Leigha Worth (BCPIAC) – BCOAPO

**Pacific Northern Gas Ltd. and Pacific Northern Gas (N.E.) Ltd.
Application for Acceptance of 2019 Consolidated Resource Plan and for Acceptance of
Energy Conservation and Innovation (ECI) Portfolio Funding for 2020 to 2022**

**INFORMATION REQUEST NO. 1 TO
PACIFIC NORTHERN GAS LTD. AND PACIFIC NORTHERN GAS (N.E.) LTD.**

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A. INTRODUCTION

**1.0 Reference: INTRODUCTION
 Exhibit B-1 (Application), Section 1.4, p. 10–11; Appendix A
 Resource Planning Objectives**

Page 10 of Pacific Northern Gas Ltd. and Pacific Northern Gas (N.E.) Ltd.’s (collectively, PNG) 2019 Consolidated Resource Plan and expenditure schedule for the Energy Conservation and Innovation (ECI) Portfolio for 2020 to 2022 (2020-2022 ECI Expenditure Schedule) (together, the Application) states:

In accordance with the directive of BCUC Order G-155-15, PNG will consistently apply the weightings identified in its resource planning objectives when evaluating alternatives to resource portfolios, projects or other initiatives. In addition, PNG has reviewed the weightings assigned to each of the planning objectives and amended them to reflect a greater consideration of Objective 6 - the B.C. Government’s “Energy Objectives”. PNG submits that this greater weighting is appropriate in light of an increased focus on energy conservation and renewable natural gas as highlighted in the Government’s CleanBC Plan.

On Page 11 of Exhibit B-1, Table 1 shows the Resource Planning Objectives and the weightings of each objective from PNG (N.E.) Resource Plan compared to the PNG Consolidated 2019 Resource Plan.

Table 1 is reproduced below.

Table 1: Changes to weightings applied to resource planning objectives

RESOURCE PLANNING OBJECTIVES		
Objective	Weights	
	PNG(N.E.) 2015 Resource Plan	PNG Consolidated 2019 Resource Plan
1 Safe, reliable service	30%	30%
2 Least cost service	30%	25%
3 Economic viability of the utility	10%	10%
4 Stable Rates	10%	10%
5 Environmental and socio-economic impacts	10%	10%
6 Alignment with the B.C. Government’s Energy Objectives	10%	15%
	100%	100%

Appendix A of Exhibit B-1 shows the Summary of Resource Plan Objectives and describes the Weighting, Attributes, Measurement Criteria and Benchmarks/Targets for each Resource Plan Objective.

- 1.1 Please discuss PNG's rationale for reducing the weighting of Objective 2: Provision of Least Cost Service while not reducing the weighting of any other planning objectives.

Response:

As stated on page 10 of the Application, PNG has amended the weightings assigned to PNG's Resource Planning Objectives to reflect a greater consideration of Objective 6 - the B.C. Government's "Energy Objectives". These objectives have been specifically identified on pages 14 through 16 of the Application. Both the Province's CleanBC Plan and the Methane Regulation did not exist when PNG(N.E.) filed its 2015 Resource Plan. The CleanBC Plan sets out a number of policy actions touching all sectors of the B.C. economy that are expected to be enacted by additional regulations. The salient features of the CleanBC Plan have been laid out in Section 2.1.2.1 of the Application. Increasingly stringent requirements on the energy efficiency of new and existing homes, the promotion of electricity for space heating as well as in the upstream oil and gas sector, and increases in the minimum efficiency standards of natural gas appliances are all expected to result in declining deliveries to PNG's customers. While PNG remains diligent in controlling the costs of operating and maintaining its pipeline system, declining throughput is expected to put additional upward pressure on delivery rates.

The CleanBC target of 15 percent renewable content in natural gas (RNG) delivered to residential and industrial customers by 2030, is expected to have the most direct impact on PNG. Securing sufficient supplies of RNG to meet the 15 percent target, at up to the \$30 per gigajoule (GJ) limit currently set out in the Greenhouse Gas Reduction Regulation (GGRR) is expected to have a notable impact on costs borne by all of PNG's customers. PNG views the cost of acquiring RNG as unavoidable in light of the CleanBC target and, absent any relief offered by the Province, PNG expects further upward pressure on the costs its customers pay.

PNG does not believe that the costs of complying with the CleanBC 15 percent renewable target, with the Methane Regulations currently in effect, or any future regulations enacted to support the B.C. Governments "Energy Objectives" should be borne by its shareholder, or that PNG should attempt to reduce its cost of maintaining and operating its pipeline systems. Consequently, PNG determined that, while the Province's increased focus on reducing GHG emissions warranted an increased focus by PNG (in terms of an increased weighting on its Resource Planning Objective), PNG was not prepared to reduce its focus on providing safe and reliable service (Objective 1), nor on the environmental and socio-economic impacts of its operations (Objective 5). In addition, maintaining predictable rates for its customers (Objective 4), and ensuring the economic viability of PNG through a fair and adequate return for its shareholder (Objective 3) are in the best interests of its customers, and in the prosperity of the northern communities where PNG's employees live and work.

In summary, PNG submits that CleanBC Plan, and regulations leading to the reduction of GHG emissions warrant an increased focus by PNG. However, PNG expects that additional costs will be associated with attaining these emissions reductions. While PNG remains frugal and diligent about the impact of even small cost increases on its customers, PNG expects that the current and future regulatory environment provides ample signals that the objective of reducing GHG emissions must take an increased priority in relation to the objective of reducing costs to its customers.

In light of these considerations, PNG submits that an increase of 5 percent to Objective 6 is sufficient to increase its priority relative to the other objectives, while not diminishing, significantly, PNG's focus on the provision of least cost service (Objective 2).

PNG will continue to monitor and respond to evolving climate change related policies, regulations and standards. Compliance with these may require PNG to further amend these weighting.

Finally, PNG has been asked to address the "level of confidence" it has applied to the assumptions it made leading to an adjustment of the weightings of Objectives 2 and 6. PNG is unclear on what is meant. Applying a "level of confidence" assumes that PNG has collected data relevant in some fashion to the determination of the Objective weightings, and that PNG has generated statistics that predict, in some fashion, the range of weightings that should be applied. PNG is unaware of an algorithmic process that it could use to set weightings, nor is it aware of such a process used by other utilities. Therefore, PNG respectfully submits that the notion of a "level of confidence" is not appropriate in this context.

- 1.2 Please explain how PNG established the 5 percent adjustments to the weighting of Objective 2 and Objective 6. In your response please address the following:
- i. The key actions in the CleanBC Plan that PNG anticipates will impact PNG's resource planning objectives and why;
 - ii. Any actions, policies or initiatives expected to impact PNG's resource planning objectives and why;
 - iii. The assumptions made with respect to the actions, policies or initiatives and their impacts on PNG's resource planning and how the assumptions were established;
 - iv. What level of confidence PNG has applied to the assumptions; and
 - v. How PNG applied these assumptions to the weighting of the resource planning objectives.

Response:

Please see the response to Question 1.1.

- 1.3 Please explain why PNG considers the 5 percent adjustments to Objectives 2 and 6 to be appropriate.

Response:

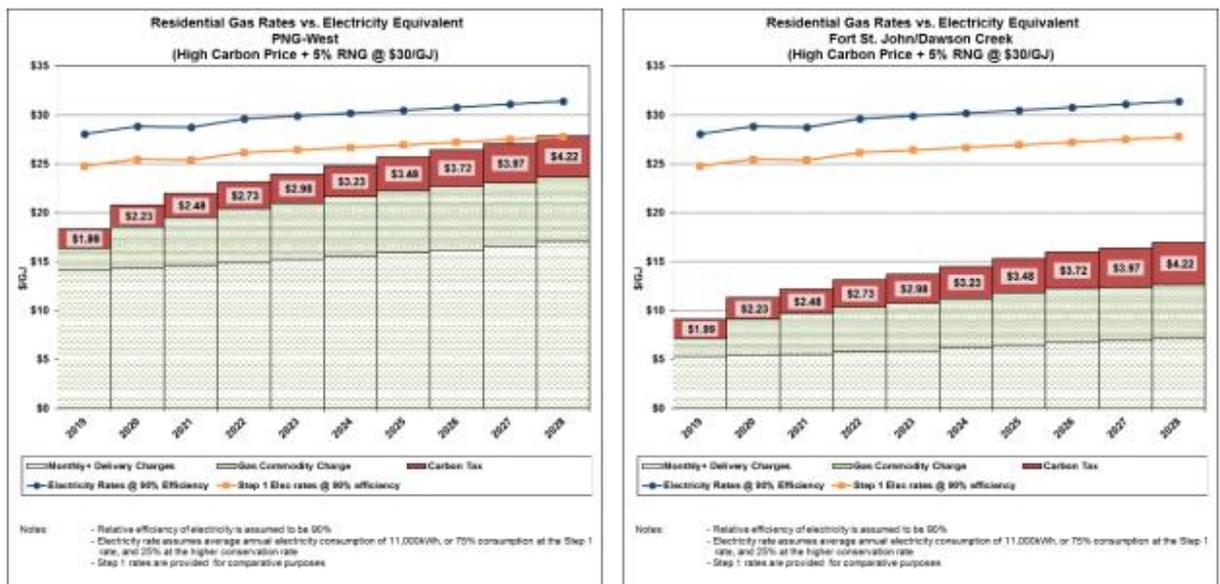
Please see the response to Question 1.1.

B. ENERGY MARKET OUTLOOK

**2.0 Reference: ENERGY MARKET OUTLOOK
 Exhibit B-1, Section 2.4, pp. 57,59; Section 4.4.1, p. 69
 A Comparison of Energy Costs: Burner Tip Rates Natural Gas Rates to
 Electricity**

On Page 57 of Exhibit B-1, Figure 10 shows PNG burner tip vs. electricity costs (high carbon price scenario) for PNG-West and Fort St. John/Dawson Creek. The title of each graph says, "High Carbon Price + 5% RNG @ \$30/GJ." Figure 10 is reproduced below.

Figure 10: PNG burner tip vs. electricity costs (high carbon price scenario)



On page 59 of Exhibit B-1, PNG states:

PNG has developed a high gas cost scenario by adding a blend of RNG priced at \$30 per GJ. For comparative purposes, PNG has estimated gas commodity costs that reflect a 5 percent blend of RNG by 2022, and a 10 percent blend by 2027, consistent with the CleanBC target of achieving a 15 percent blend of RNG by 2030.

On page 69 of Exhibit B-1, Table 18 shows PNG's RNG supply forecast. Table 18 is reproduced below.

Table 18: RNG supply forecast

		2018	2019	2020	2021	2022	2023	2024
Total Deliveries (Sales and Transport)	TJ	10,586	11,146	11,546	11,861	11,870	11,831	11,709
Deliveries (Sales)	TJ	6,416	6,567	7,221	7,517	7,585	7,546	7,482
RNG Supply	TJ	-	-	-	30	130	200	300
As a portion of total deliveries	%	0.0%	0.0%	0.0%	0.3%	1.1%	1.7%	2.6%
As a portion of sales	%	0.0%	0.0%	0.0%	0.4%	1.7%	2.7%	4.0%
GHG reduction (tonnes CO ₂ e)	(tCO ₂ e)	-	-	-	(1,493)	(6,468)	(9,950)	(14,925)

		2025	2026	2027	2028	2029	2030
Total Deliveries (Sales and Transport)	TJ	10,926	10,800	10,745	10,668	10,587	10,471
Deliveries (Sales)	TJ	6,699	6,631	6,576	6,499	6,418	6,302
RNG Supply	TJ	400	510	620	730	840	950
As a portion of total deliveries	%	3.7%	4.7%	5.8%	6.8%	7.9%	9.1%
As a portion of sales	%	6.0%	7.7%	9.4%	11.2%	13.1%	15.1%
GHG reduction (tonnes CO ₂ e)	(tCO ₂ e)	(19,900)	(25,373)	(30,845)	(36,318)	(41,790)	(47,263)

2.1 Please confirm, or otherwise explain, that the RNG supply forecast included in Figure 10 is the same as shown in Table 18.

Response:

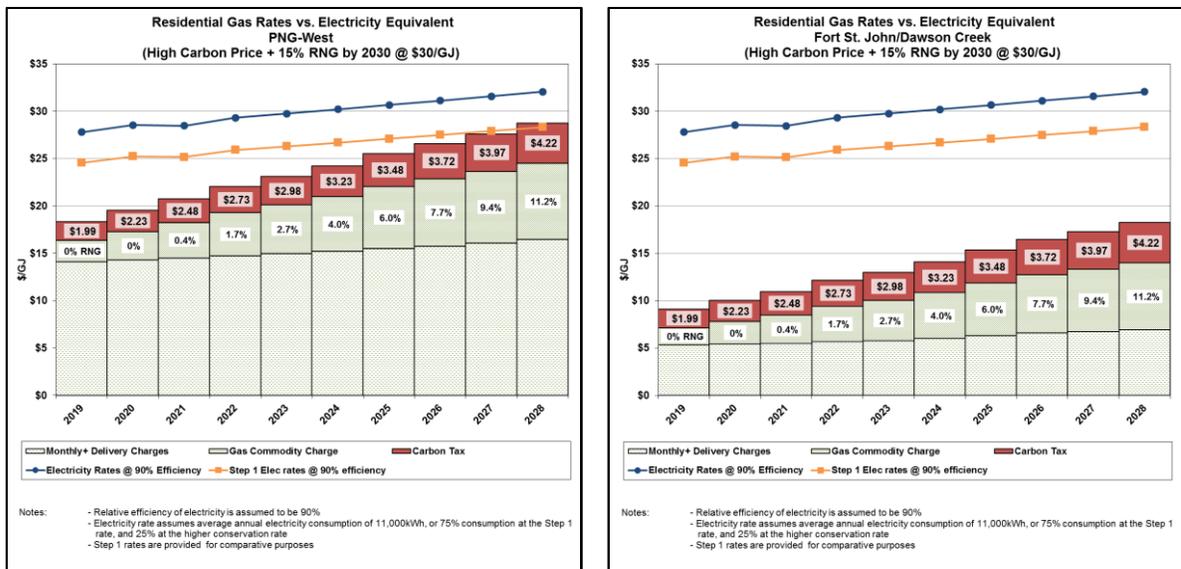
The RNG supply forecast included in Table 18 is not reflected in the burner tip costs presented in Figure 10.

2.1.1 If not confirmed, please provide an updated graph and/or table.

Response:

A revised Figure 10 showing the PNG burner tip vs. electricity costs under a high carbon price scenario that reflects the blend of RNG supply presented in Table 18 is provided below.

Figure 10 (REVISED): PNG burner tip vs. electricity costs (high carbon price)



**3.0 Reference: POLICY ENVIRONMENT AND OUTLOOK
Exhibit B-1, Section 2.1.1, pp. 23–26
Federal Policies**

On page 23 of Exhibit B-1, PNG states:

Actions the federal government is currently undertaking that directly influence PNG's planning environment include the developing federal Clean Fuel Standard (CFS), changes to energy efficiency standards for appliances and equipment, and changes to the national model building code.

3.1 With respect to the Clean Fuel Standard, Appliances and Equipment Standards and the National Model Building Code, please explain how these codes and standards have informed PNG's Demand Forecasts. In your response please address:

- i. What assumptions PNG has made with respect to the code and standards and how the assumptions were established;
- ii. What level of confidence PNG has applied to the assumptions, providing any relevant analysis; and
- iii. How these assumptions have been applied to the Demand Forecast.

Response:

The expected impact of changes to the B.C. building code, as driven by the CleanBC Plan and its goal of achieving net-zero ready efficiencies in new construction by 2032, has been reflected directly in the residential and small commercial forecast use per account (UPA) associated with new construction (Application, pp. 88, 94) that is forecast to decline by 20 percent by 2025, by 40 percent by 2027, and by 80 percent by 2032. PNG expects the B.C. building code to be more stringent than the National Model Building Code in its impact on the energy efficiency of new construction.

PNG forecasts the residential UPA using an end-use model that was developed for the PNG-West 2013 Resource Plan and subsequently refined for the PNG(N.E.) 2015 Resource Plan and again for this Application. The end-use model incorporates the impact of space and water heating appliance efficiencies. PNG has forecast the replacements of standard and mid-efficiency furnaces based on a service life of 30 years and the age profile of furnaces determined through the 2013 Residential End-Use Survey (REUS). The replacement of the existing mix of standard and mid-efficiency furnaces with high efficiency furnaces meeting the federal appliance efficiency standards reduces the natural gas consumed for space heating by nearly 20 percent.

PNG has similarly forecast the replacements of water heaters based on a service life of 12 years, and the age profile of water heaters determined through the 2013 REUS. The replacement of the existing stock of hot water heaters with high efficiency models meeting the federal appliance efficiency standards reduces the natural gas consumed for water heating by approximately 10 percent per household. (Application, p.87)

PNG has not directly reflected the impact of the federal Clean Fuel Standard (CFS) in the demand forecast. The introduction of a blend of RNG in the gas supply delivered to customers does not affect forecasts of UPA, however, the increased cost associated with RNG may reduce capture rates of new customers. PNG has reflected a trend of declining capture rates for new customers in its demand forecast intended to reflect the impact of the CleanBC Plan, namely a focus on electrification, along with the eroded competitiveness of natural gas compared to electricity (Application, p. 83).

PNG has not assigned any probabilities to its assumptions. Therefore the application of a level of confidence to these assumptions is not relevant.

**4.0 Reference: POLICY ENVIRONMENT AND OUTLOOK
Exhibit B-1, Section 2.1.1, pp. 26–30
B.C. Policies and Initiatives**

On pages 26 to 30 of Exhibit B-1, PNG provides an outline of British Columbia’s provincial policies and initiatives, including:

- Clean Growth Strategy;
- Industry Clean Growth Strategy;
- BC Hydrogen Roadmap;
- B.C. Acts and Regulations;
- Carbon Tax Act;
- Greenhouse Gas Reduction (Emissions Standards) Statutes Amendment Act;
- Demand Side Measures Regulation;
- Clean Energy Act and Greenhouse Gas Reduction Regulation;
- BC Methane Regulation;
- BC Building Code; and
- BC Energy Step Code.

4.1 Please discuss how PNG’s Demand Forecasts have been informed by the policies and initiatives outlined above. In your response please address:

- i. What assumptions PNG has made with respect to the policies and initiatives and how the assumptions were established;
- ii. What level of confidence PNG has applied to the assumptions, providing any relevant analysis; and
- iii. How these assumptions have been applied to the Demand Forecast.

Response:

PNG has explained how specific regulations, standards and policies have been reflected in the development of load forecasts in Section 7 of the Application. Please see also the response to Question 3.1. Those policies not directly reflected in the forecasting model influence PNG’s strategy regarding new opportunities and innovation (Application, Section 4), the development of its GHG reduction plans (Application, Section 5) and the development of its Energy Conservation and Innovation (ECI) programs (Application, Section 8).

**5.0 Reference: POLICY ENVIRONMENT AND OUTLOOK
Exhibit B-1, Section 2.1.1, pp. 31–32
Municipal Policies**

On pages 31 to 32 of Exhibit B-1, PNG provides an overview of the planned or implemented policies in the municipalities and local governments within PNG's service areas, including: Prince Rupert, Terrace, Smithers, the Peace River Regional District, Fort St. John, Taylor, Dawson Creek, Pouce Coupe and Tumbler Ridge.

- 5.1 Please explain how the municipal policies outlined have informed PNG's Demand Forecasts. In your response please address:
- i. What assumptions PNG has made with respect to the municipal policies and how the assumptions were established;
 - ii. What level of confidence PNG has applied to the assumptions, providing any relevant analysis; and
 - iii. How these assumptions have been applied to the Demand Forecast.

Response:

Please see the response to Question 4.1.

**6.0 Reference: POLICY ENVIRONMENT AND OUTLOOK
Exhibit B-1, Section 2.2.2, pp. 36–47
Regional Economic Outlook – PNG-West Commercial and Industrial
Developments**

On page 36 of the Application, PNG states:

Economic growth in the region is highly dependent on both the likelihood and timing of major resource development investments. The plans and timing of such investments are in turn dependent on global supply, demand and price projections for commodities and resources, as well as prevailing regulatory and socio-economic conditions.

On pages 37 to 47 PNG summarizes noteworthy projects in the PNG-West service area based on the following categories (Tables 7 to 12):

- North Coast and Nechako Commercial Projects;
- North Coast Proposed Clean Energy Projects;
- Forestry;
- North Coast and Nechako Mining Projects;
- World Scale LNG Export Projects and Related Infrastructure;
- Crude Oil & Liquids Related Projects Major Projects; and
- North Coast and Nechako Clean Tech Projects.

6.1 For each project listed in Tables 7 to 12, please provide the probability of the project advancing to completion.

Response:

PNG does not have the detailed insight of the projects' proponents that is required to determine the probabilities of each project advancing to completion. Some of these projects are in the early stages of development. Progression of these projects depends on a number of factors that are subject to changes in market conditions, commodity prices, changes in government policies and regulations, support from First Nations, and global market outlooks. PNG's customers have recently benefited from increased throughput resulting from the successful completion of the RIPET project, as well as from demand from LNG Canada and wood pellet manufacturers.

6.1.1 If PNG has not calculated probabilities, please explain why not.

Response:

Please see the response to Question 6.1.

- 6.2 Please explain how the probabilities have been used to establish the Reference scenario. In your response, please include an explanation of how the probabilities have been used to inform the capture rates and the use per account for the Residential and Small Commercial customers, and the forecast for the Large Customer Demand.

Response:

The identification of large projects in the regions in which both PNG-West and PNG(N.E.) operate is intended to provide an overview of the economic activity either occurring or potentially occurring. PNG does not expect that many of these projects will become customers of PNG. If they come to fruition, PNG anticipates some positive impact to its demand resulting from increased housing starts and customer additions, all of which are based on B.C. Stats forecasts of regional population growth and household formations (Application, p. 77-78).

PNG has included demand from large commercial and industrial loads that can be reasonably expected to materialize in all three of its planning scenarios. PNG has identified all of these demands in Sections 7.3.3.1, 7.3.3.2, and 7.4 of the Application.

- 6.3 Please confirm, or explain otherwise, that the Reference scenario does not include forecast demand associated with any of the projects identified above.

Response:

Please see the response to Question 6.2.

- 6.3.1 If confirmed, did PNG include the demand forecast associated with any of the identified projects in any other scenario? Please discuss.

Response:

Please see the response to Question 6.2.

- 6.4 For each category identified above, please provide an updated demand forecast scenario that includes the estimated loads associated with (i) the project(s) that is closest to completion, (ii) the project(s) that PNG believes most likely to proceed and (iii) the project(s) PNG believes will have the largest demand. Please provide an explanation of any assumptions used in the demand estimates.

Response:

The identification of large projects in the regions in which both PNG-West and PNG(N.E.) operate is intended to provide an overview of the economic activity either occurring or potentially occurring. PNG does not expect that many of these projects will become customers of PNG.

PNG has included demand from large commercial and industrial loads that can be reasonably expected to materialize in all three of its planning scenarios. PNG has identified all of these demands in Sections 7.3.3.1, 7.3.3.2, and 7.4 of the Application.

Please see also the response to Question 6.2.

**7.0 Reference: POLICY ENVIRONMENT AND OUTLOOK
Exhibit B-1, Section 2.2.2, pp. 47–54
Regional Economic Outlook – PNG(N.E.) Commercial and Industrial
Developments**

On pages 47 to 54 of Exhibit B-1, PNG summarizes noteworthy projects in the PNG(N.E.) service area based on the following categories (Tables 13 to 17):

- Peace River North and South Commercial Projects;
- Peace River North and South Power Projects;
- Peace River North and South Oil and Gas Sector Projects;
- Northeast B.C. Coal Projects; and
- Peace River North and South Clean Tech Projects.

7.1 For each project listed in Tables 13 to 17, please provide the probability of the project advancing to completion.

Response:

PNG does not have the detailed insight of the projects' proponents that is required to determine the probabilities of each project advancing to completion. Some of these projects are in the early stages of development. Progression of these projects depends on a number of factors that are subject to changes in market conditions, commodity prices, changes in government policies and regulations, support from First Nations, and global market outlooks.

7.2 Please explain how the probabilities have been used to establish the Reference scenario. In your response, please explain how the probabilities have been used to inform the capture rates and the use per account for the Residential and Small Commercial customers, and the forecast for the Large Customer Demand.

Response:

The identification of large projects in the regions in which both PNG-West and PNG(N.E.) operate is intended to provide an overview of the economic activity either occurring or potentially occurring. PNG does not expect that many of these projects will become customers of PNG. If they come to fruition, PNG anticipates some positive impact to its demand resulting from increased housing starts and customer additions, all of which are based on B.C. Stats forecasts of regional population growth and household formations (Application, p. 77-78).

PNG has included demand from large commercial and industrial loads that can be reasonably expected to materialize in all three of its planning scenarios. PNG has identified all of these demands in Sections 7.3.3.1, 7.3.3.2, and 7.4 of the Application.

- 7.3 Please confirm, or explain otherwise, that the Reference scenario does not include forecast demand associated with any of the projects identified above.

Response:

Please see the response to Question 7.2.

- 7.3.1 If confirmed, did PNG include the demand forecast associated with any of the identified projects in any other scenario? Please discuss.

Response:

Please see the response to Question 7.2.

- 7.4 For each category identified above, please provide an updated demand forecast scenario that includes the estimated loads associated with (i) the project(s) that is closest to completion, (ii) the project(s) that PNG believes most likely to proceed and (iii) the project(s) PNG believes will have the largest demand. Please provide an explanation of any assumptions used in the demand estimates.

Response:

The identification of large projects in the regions in which both PNG-West and PNG(N.E.) operate is intended to provide an overview of the economic activity either occurring or potentially occurring. PNG does not expect that many of these projects will become customers of PNG.

PNG has included demand from large commercial and industrial loads that can be reasonably expected to materialize in all three of its planning scenarios. PNG has identified all of these demands in Sections 7.3.3.1, 7.3.3.2, and 7.4 of the Application.

Please see also the response to Question 7.2.

C. CUSTOMER ATTITUDES

**8.0 Reference: CUSTOMER ATTITUDES
Exhibit B-1, Section 3, p. 61
Willingness to Purchase Bio-Methane**

On Page 61 of Exhibit B-1, PNG states:

Residential and commercial survey respondents gave modest support for pursuing renewable energy sources like bio-methane. Approximately one quarter (28 percent) of residential customers would opt for a bio-methane program if it was priced at \$2 per month. Potential uptake declines to 16 percent if a bio-methane program resulted in costs of \$4 per month, and to 13 percent when priced at \$8 per month. For commercial customers, 14 percent would opt for bio-methane if the cost impact was limited to a three percent increase in their bill. Potential uptake in a bio-methane program amongst commercial customers decrease to nine percent if the cost impact was five percent; a cost impact of 10 percent lowers the potential uptake to six percent.

- 8.1 Please discuss the types of bio-methane programs, such as an “opt-in” program, that PNG is considering, and to which customers these programs may be offered.

Response:

PNG is currently refining its RNG strategy and anticipates making an application to the BCUC related to an RNG program later in 2020. In that application, PNG expects to present its proposed mechanism for recovering the costs associated with a biomethane program.

- 8.2 Please discuss the benefits and risks of each type of program for PNG customers and BC.

Response:

Please see the response to Question 8.1.

D. NEW OPPORTUNITIES AND INNOVATION

- 9.0 Reference: NEW OPPORTUNITIES AND INNOVATION
Exhibit B-1, Section 1.4, pp. 11, 13, 15; Section 4.1, p.63; Exhibit B-1,
Appendix A, Resource Planning Objectives; PNG(N.E.) 2015 Resource Plan
for the Fort St. John, Dawson Creek and Tumbler Ridge Distribution
Systems Decision and Order G-155-15 dated September 30, 2015, p. 21
Remote Communities**

On page 63 of Exhibit B-1, PNG states:

PNG has identified a number of northern communities that are currently relying on propane for their primary space and water heating requirements, and who are requesting natural gas service from PNG. These communities are small, often consisting of a few hundred potential residential and commercial customers each having propane tanks on their property. All are remote from PNG's existing gas distribution systems and extensions of PNG's distribution mains are therefore, typically not economic.

- 9.1 Please provide map(s) showing the name, location and population of the identified communities that are requesting natural gas service from PNG. On the same map(s), please show PNG's existing gas transmission and distribution system and any areas of overlap between the identified communities and the existing system.

Response:

PNG is in preliminary discussions with a few small communities surrounding Fort St. John and Dawson Creek, and in the rural regions of PNG-West, regarding the provision of natural gas distribution service, either through a pipeline connection or through LNG deliveries. In order not to set expectations of these communities regarding the feasibility of any of these projects, PNG respectfully declines to identify specific communities at this time.

Should PNG identify an opportunity that is feasible, PNG expects to submit an application to the BCUC related to any significant infrastructure associated with the opportunity.

On page 15 of Exhibit B-1, PNG states:

PNG is exploring the opportunity to leverage its existing pipeline transmission and distribution systems to provide service to micro-scale producers of compressed natural gas (CNG) and LNG near demand loads and to develop new CNG and LNG distribution services to its customers. Promoting CNG and LNG as an alternative to diesel, gasoline and propane for transportation, off-grid power generation and for isolated communities and large customers unattached to the utility's natural gas distribution or transmission system improves the economics of these end-uses while at the same time reduces greenhouse gas emissions through the displacement of higher carbon-content fuels.

On page 63 of Exhibit B-1, PNG states:

PNG first identified, in general terms, opportunities related to providing CNG and LNG distribution services to customers in remote communities in its 2015 Resource Plan for PNG(N.E.). In the four years since filing its 2015 Resource Plan, PNG has not proceeded beyond screening level assessments of potential opportunities for providing LNG/CNG to remote communities.

On page 21 of the PNG (N.E.) 2015 Resource Plan for the Fort St. John, Dawson Creek and Tumbler Ridge Distribution Systems Decision, the BCUC was "of the view that the 2015 Resource Plan is not as thorough as it should be regarding the regional LNG and CNG strategy."

9.2 Please provide details of any potential CNG or LNG development that could impact PNG's demand forecast over the 20-year planning period (2019-2038). Please include in the discussion the likelihood of such developments and the potential impact on the demand forecast for the 20-year planning period.

Response:

PNG has evaluated the cost of building, installing and operating LNG storage and gasification facilities to serve customers in remote communities. As indicated in section 4.1 of the Application, PNG has found that the cost to these customers, of providing LNG service is currently generally less competitive than the existing propane supply used in these communities. This is due in large part to the high cost of transportation of the LNG from one of only two LNG liquefaction plants located in B.C. or from one LNG facility located in northern Alberta. Recent interest in the PNG RECAP program by micro project developers may result in the development and construction of one or more of these micro LNG production facilities within PNG's service territory. If so, the costs of LNG transportation may be significantly reduced thereby making LNG a more viable alternative to propane.

PNG will continue to evaluate a variety of supply models to serve remote communities, as well as to increase the reliability of the gas supply to its customers. These models may include procuring LNG supply, or developing LNG production and storage facilities.

9.3 Please describe in detail the extent of PNG’s efforts to develop new and existing markets for CNG & LNG in its service area.

Response:

Please see the response to Question 9.2.

On page 11 of Exhibit B-1, Table 1 shows the changes to weightings applied to resource planning objectives from PNG’s 2015 Resource Plan to PNG’s 2019 Consolidated Resource Plan. Table 1 is reproduced below.

Table 1: Changes to weightings applied to resource planning objectives

RESOURCE PLANNING OBJECTIVES		
Objective	Weights	
	PNG(N.E.) 2015 Resource Plan	PNG Consolidated 2019 Resource Plan
1 Safe, reliable service	30%	30%
2 Least cost service	30%	25%
3 Economic viability of the utility	10%	10%
4 Stable Rates	10%	10%
5 Environmental and socio-economic impacts	10%	10%
6 Alignment with the B.C. Government’s Energy Objectives	10%	15%
	100%	100%

On page 13 of Exhibit B-1, PNG states:

To ensure that the Company remains viable, additional supply or demand-side resources should only be considered if there is sufficient customer demand growth to support the added cost of service impacts associated with those resources, and that the addition of those resources does not materially increase rates beyond the price of energy from alternative sources. If this were to occur, it would be unlikely that the new customer demand that

drove the expansion would sign up for natural gas service due to unfavourable pricing, leaving existing customers to recover the cost impacts of a resource addition. In turn, existing customers may either leave the system in favour of alternatives, or materially alter their consumption patterns, both which could adversely impact the sustainability of the utility. To ensure that resources are added only when appropriate, the Company employs financial feasibility tests, such as a mains extension test. [Emphasis added]

On page 63 of Exhibit B-1, PNG states:

In each case, the size of the community, along with the lack of significant commercial or industrial load, and the distance from supplies, either of CNG/LNG or fuel gas pipelines, challenges the cost competitiveness of natural gas service as compared to existing propane supply. PNG continues to work with communities desiring natural gas service to ascertain current and projected loads. In making its determination on the costs and benefits of providing natural gas service, PNG is committed to assessing the opportunity within the framework of its six Resource Planning Objectives set out in Appendix A: Resource Planning Objectives. [Emphasis added]

Appendix A of Exhibit B-1 shows the Summary of Resource Plan Objectives and describes the Weighting, Attributes, Measurement Criteria and Benchmarks/Targets for each Resource Plan Objective.

- 9.4 Please identify any community in BC currently relying on LNG/CNG for their primary space and water heating requirements. For those identified, please discuss the community's current natural gas demand and its method of LNG/CNG delivery.

Response:

PNG is not aware of any community in B.C. currently relying on LNG/CNG for their primary space and water heating requirements.

- 9.5 When considering opportunities related to providing CNG and LNG distribution services to customers in remote communities, please discuss how PNG uses the Resource Planning Objectives in Appendix A in its determination and the relationship to PNG's mains extension test.

Response:

PNG applies the Resource Planning Objectives when completing an alternatives analysis for a project or for a supply option. The evaluation of alternatives to supply a remote community, whether to extend a pipeline to a remote community, whether to supply LNG/CNG to that community, or whether in fact to serve that community at all, will be assessed in the following context:

- 1. Safe Reliable Service:** Whether the alternative increases the reliability and security of energy supply to that community.
- 2. Least Cost Service:** The alternative having the lowest cost impact on new and existing customers is ranked highest. Providing service to remote communities may require a capital contribution from customers. Customers receiving LNG/CNG service may have to pay higher commodity costs than customers connected to PNG's existing gas distribution systems. PNG will consider both capital contributions and the cost at the burner tip, of each alternative.
- 3. Economic Viability of the Utility:** PNG will ensure that contractual arrangements underpinning the provision of service to remote communities are such that the risk of stranded assets is minimized.
- 4. Stable Rates:** The volatility of customer's current energy costs are compared against the stability and predictability of costs under the alternative supply options proposed by PNG.
- 5. Environmental and socio-economic impacts:** Project alternatives are compared based on their impact to air and water quality, hydrology, fish, wildlife and vegetation, terrain integrity, land use, archeological and heritage resources, health and the economy.
- 6. Alignment with the B.C. Government's Energy Objectives:** The magnitude of GHG reductions associated with a project and its alternatives are compared to the status quo. PNG will also consider the impact that its Energy Conservation and Innovation (ECI) programs could have in reducing energy consumption, and hence GHG emissions, in the remote communities.

9.5.1 Please provide a copy of PNG's current mains extension test.

Response:

Please see CONFIDENTIAL Exhibit BCUC 9.5.1 attached to these responses. PNG requests that its Mains Extension Test be kept confidential.

9.6 Please discuss whether PNG expects its proposed changes to the Resource Planning Objective Weightings to impact opportunities for providing LNG/CNG to remote communities.

Response:

In its 2019 Consolidated Resource Plan, PNG has increased slightly, the weighting assigned to Objective 6 - the B.C. Government's "Energy Objectives" at the expense of a slight reduction in weighting assigned to Objective 2 – Least Cost Service.

In the context of considering opportunities related to providing LNG and CNG distribution services to customers in remote communities, the effect of the change is to give slightly more weight to the emissions reductions associated with a switch from propane to natural gas as a heating fuel. PNG does not expect this to significantly alter its decisions regarding alternatives evaluated in the course of developing any of these opportunities in remote communities.

**10.0 Reference: NEW OPPORTUNITIES AND INNOVATION
Exhibit B-1, Section 4.2, pp. 63–64
Natural Gas for Transportation**

On pages 63–64 of Exhibit B-1, PNG states:

Target markets include high fuel volume end-use equipment in the oil and gas, mining, marine and rail sectors. Additional opportunity exists for the on-road trucking sector, however this is expected to have the longest time to conversion due to small per-unit fuel use and time required for the build-out of a retail supply network.

PNG continues its efforts to develop the market for CNG/LNG for the transportation and mobile equipment sector in its service areas as part of its general business development efforts. At this time, PNG has not identified any action-able opportunities.

- 10.1 Please discuss the challenges holding back adoption of CNG/LNG as a transportation fuel in the oil and gas, mining, marine and rail sectors.

Response:

With the down turn of the oil and gas and mining sectors in B.C., heavy haul truck fleets have focussed on rationalizing their capital and operating budgets and have not been focussed on pursuing alternate fuel options. With the implementation of the federal Clean Fuel Standard for liquid fossil fuels expected on January 1, 2022, PNG expects to see renewed interest in lower GHG emissions alternatives as these regulations bring more clarity to the marketplace.

- 10.1.1 Please explain how PNG plans to address those challenges identified.

Response:

PNG is monitoring the development of the federal Clean Fuel Standard, with the regulations expected to be gazetted in the summer of 2020 and finalized in 2021. As the regulations become more defined PNG will begin to discuss alternate fuel opportunities with fleet managers within our service territory.

10.2 Please discuss in detail PNG's efforts to develop the market for CNG/LNG in the transportation sector.

Response:

Please see the response to Question 10.1.

10.2.1 Please provide a summary of benefits and any risks associated with the development of the CNG/LNG transportation sector.

Response:

If CNG/LNG is taken up by the transportation sector, PNG will see demand growth in localized market areas where the CNG compression and/or LNG liquefaction facilities are located. These facilities may also offer an added benefit of providing natural gas storage and peaking services at strategic locations within the PNG system.

As the conversion of established transportation fleets from one fuel type to another is generally dependant on the timing of the turnover of the fleet, additional natural gas demand may be slow and sporadic in developing. In addition, the CleanBC Plan is pushing for electrification which may result in competition by electric vehicles and/or hydrogen fueled alternatives.

**11.0 Reference: NEW OPPORTUNITIES AND INNOVATION
Exhibit B-1, Section 4.3, p. 64
Innovation**

On page 64 of Exhibit B-1, PNG states:

PNG is active in the evaluation of a broad range of pre-commercial technologies that enable many different ways to reduce emissions. PNG is a participant in the Natural Gas Innovation Fund (NGIF) created by the Canadian Gas Association (CGA) to support the funding of cleantech innovation in the natural gas value chain. This includes actively working with the NGIF to identify technology that is nearing commercialization for installation at demonstration sites in PNG's service territory.

Also, on page 64 of Exhibit B-1, PNG states:

Examples of technological innovation being supported by these two organizations include gas fired cold-temperature heat pumps and adsorption chillers, microscale combined heat and power units for residential and commercial installations, biomethane upgrading, carbon capture, and natural gas vehicle engines.

- 11.1 Please discuss the likelihood that these various technologies will be implemented in PNG's service area, the expected timeframe(s) and any anticipated challenges.

Response:

The technologies PNG has identified on page 64 of the Application - gas fired cold-temperature heat pumps and adsorption chillers, microscale combined heat and power units for residential and commercial installations, biomethane upgrading, carbon capture, and natural gas vehicle engines – are considered to be viable in PNG's service areas. The degree and timing of market penetration they can achieve over the next 10 to 20 years depends on a number of factors including the cost of natural gas and carbon taxes, the impact of public policy, most notably the federal Clean Fuel Standard, the CleanBC 15 percent RNG target, the adoption by municipalities of the B.C. Energy Step Code, and public perceptions on natural gas as a fossil fuel.

- 11.2 Please discuss how wide-spread adoption of these technologies in PNG's service area could impact PNG's demand forecast over the planning period (2019-2038).

Response:

Widespread adoption of technologies that displace other, less efficient natural gas appliances, such as gas fired cold temperature heat pumps replacing natural gas furnaces and boilers, would reduce the demand for natural gas from those customers. For example, gas fired cold temperature heat pumps achieving efficiencies of 120 percent could reduce a customer's space heating load by over 20 percent, as compared to a conventional high efficiency furnace. Whether such technologies have a perceptible impact on the space heating load served by PNG will depend on the degree to which these are adopted. As stated in the response to the Question 11.1, the degree of market adoption depends on a number of economic, societal and policy driven factors.

**12.0 Reference: NEW OPPORTUNITIES AND INNOVATION
Exhibit B-1, Section 4.4, pp. 64–68
Renewable Natural Gas (RNG)**

On page 64 of Exhibit B-1, PNG states:

Biogas can be produced from a number of sources and biogas from all of these sources can be processed (upgraded) to RNG. The most common sources of biogas are described below. All of these sources are available in PNG's service areas, albeit perhaps not in quantities sufficient to support a project that delivers RNG into PNG's distribution systems.

12.1 Please identify any biogas production currently available in PNG's service area.

Response:

PNG is not aware of any biogas production facilities that produce pipeline quality methane in PNG's service areas.

12.1.1 For those identified, please describe the biogas facility, including biogas generation source, and the associated annual production volumes of raw biogas and equivalent RNG available.

Response:

Not applicable. Please see the response to Question 12.1.

- 12.2 What does PNG consider to be a sufficient quantity to support a project that delivers RNG into PNG's distribution system? Please elaborate.

Response:

Currently, the minimum efficient scale for a biomethane production facility in PNG's service territory is the smallest facility that can supply RNG at a cost to PNG of \$30 per GJ or less, consistent with section 2 (3.8(a)) of the Greenhouse Gas Reduction Regulation. The minimum efficient scale depends on a number of factors such as:

(i) The cost of generating the raw biogas: Biogas can be generated from landfills, wastewater treatment plants, anaerobic digestion of organic materials such as commercial and residential food waste, and farm waste. The cost to develop systems to generate (in the case of anaerobic digestion), capture and collect biogas will be reflected, ultimately, in the cost of the processed biomethane. The cost of these facilities does scale with capacity, however there is a certain minimum cost associated with them, regardless of their capacity.

(ii) The gas composition of the raw biogas: Impurities in the raw biogas must be removed prior to injection in a distribution pipeline. The complexity of the processing facilities, along with their cost, depends on the nature and concentrations of impurities in the raw biogas. The cost of these facilities does scale with capacity, however there is a certain minimum cost associated with them, regardless of their capacity.

(iii) The pipeline interconnection facilities: Facilities to monitor the chemical composition of the processed biomethane, and to control the flow onto a natural gas distribution system are required. The cost of these facilities does scale with capacity, however there is a certain minimum cost associated with them, regardless of their capacity. In addition, a supply pipeline must be constructed to inject the biomethane into the distribution system. The proximity of the biomethane production to the distribution system will determine the cost of the supply pipeline.

(iv) System reinforcement: Biogas resources are located in PNG's rural service areas in many cases. These portions of the system may have low capacity and require additional expansions in order to accept the RNG supply.

(v) Technological improvements: Increased interest in RNG is promoting more development of pre-commercial and commercial processing technologies, and increased competition in the RNG processing sector; both of which is expected to lead to decreasing costs for equipment.

PNG considers all of these factors when completing a screening level assessment for potential supply. Based on these, PNG would normally not consider a supply resource of less than 10,000 GJ per year.

On page 65 of Exhibit B-1, PNG states:

Accessing sufficient supplies of RNG to meet a five percent blend, let alone a 15 percent blend, has proved challenging for FEI. As the efforts of FEI over the past 10 years has shown, acquiring even a fraction of this quantity of supply is challenging at this stage of the development of the industry in B.C.

On pages 65–66 of Exhibit B-1, PNG states:

PNG expects that its own efforts will be equally challenging, if not more so. Based on total deliveries to its non-bypass customers, PNG requires approximately 500 TJ of RNG to reach the five percent voluntary limit. Meeting the CleanBC target will require significantly more RNG supply, as much as 1,000 TJ, based on deliveries to sales (non-transport) customers. Sources of supply that could be connected to PNG's system are from smaller projects that are challenging to develop at RNG prices under \$30 per GJ. In addition, regions where RNG may be generated from anaerobic digestion of manure and farm waste often lie at the ends of PNG's gas distribution system. PNG's systems therefore may have limited ability to accept RNG without system reinforcements, further increasing the cost of RNG supply. *[Emphasis added]*

- 12.3 Please discuss why PNG considers, as compared to FEI, it will be equally challenging, if not more so, for PNG to access sufficient supplies of RNG.

Response:

Landfills, waste water treatment plants, farms and organics handling facilities in PNG service territory support local municipalities and regional districts having much smaller populations than in southern B.C., particularly in the Lower Mainland/Metro Vancouver region. Consequently, these facilities are smaller and their potential as a biogas resource is much lower. As discussed in the response to Question 12.2, the facilities to generate, capture, process and inject biomethane into PNG's gas distribution system have a certain minimum efficient scale that may not be attainable by all potential sources of supply. Consequently, PNG anticipates requiring a number of smaller projects to yield a supply of perhaps 100 to 150 TJ per year of biomethane; while such quantities may be supplied by a single landfill project in Metro Vancouver. PNG expects that additional effort will be required to identify and promote the development of numerous smaller biomethane supply sources, as compared to a few larger ones.

Over the longer term (5 – 10+ years), assuming significant advancements in woody biomass RNG technology, PNG may be well positioned to acquire RNG from larger sources, although this will heavily depend upon the availability of forestry feedstock.

Hydrogen produced either from renewable sources, or from natural gas with the associated sequestration of the dis-associated CO₂ offer the potential for significant sources of renewable and clean energy. PNG is monitoring developments in hydrogen production and pipeline injection to identify opportunities for either procuring quantities of hydrogen or for developing hydrogen production facilities.

- 12.4 Please explain, with examples where relevant, what is meant by ‘system reinforcements.’

Response:

System reinforcements refer to increasing the capacity of a local gas distribution system in order that it can transport the quantities of biomethane to loads on the system. In cases where there are low numbers of customers connected to the portion of the distribution system where biomethane supply is injected, there may not be sufficient demand, particularly in the summer when the heating load is near or at zero, to absorb the additional supply. In those cases, additional work may be required to extend mains and trunk lines to connect to customer loads on nearby portions of the distribution system and increase the capacity of the local system to absorb the supply. In these cases, the cost of the system reinforcements would be included in the price of the biomethane supply.

To be clear, PNG notes that the delivery of the physical molecules of biomethane in this case is always to customers in proximity to the source of supply. PNG submits that this fact should not preclude PNG’s ability to offer a notional supply of biomethane to any of its customers, similar to the offering of FortisBC Energy Inc.

- 12.5 Please explain the types of system reinforcements that may be required for PNG to accept RNG and the estimated associated cost.

Response:

Please see the response to Question 12.4. The cost of a system reinforcement project is entirely dependent on the characteristics of the gas transmission or distribution system at and near the biomethane injection site, and on the quantity of biomethane injected. It is therefore not possible to provide an estimate for a general situation.

On page 66 of Exhibit B-1, PNG states:

PNG adopts a broad interpretation of “Renewable Gas” that includes landfill gas, biogas generated from digesters fed from manure, agricultural waste and household organics, or from woody biomass. In addition, synthetic methane and hydrogen, generated either through electrolysis of water, using electricity from low carbon sources, or hydrogen generated from natural gas through steam reformation in concert with carbon sequestration of the associated GHG emissions, are all considered under the definition of Renewable Gas.

- 12.6 Please discuss PNG’s broad interpretation of Renewable Gas to that used in the 2018 CleanBC Plan.

Response:

PNG submits that its interpretation of “Renewable Gas” is entirely aligned with the definition implied by the policy directions stated in the CleanBC Plan. The CleanBC Plan discusses utilizing methane “escaping into the atmosphere from our landfills, agricultural operations and sewage treatment plants” (CleanBC Plan, p. 36), the “injection of sustainable hydrogen into the natural gas grid” (p. 46), biogas from the Surrey biofuel facility, (p. 35), and “the conversion of forestry waste into pipeline grade renewable natural gas” (p. 62).

On page 66 of Exhibit B-1, PNG states:

In order for PNG to secure sufficient quantities of RNG, PNG expects that it will need to acquire a portion of that supply from sources not directly connected to its transportation and distribution systems. PNG therefore anticipates entering into agreements for the notional transportation of RNG to its service areas, from RNG sources located elsewhere in B.C. or in other provinces and territories in Canada, or in the U.S. Such transactions would involve the creation and transfer of environmental attributes associated with RNG, from the producer to PNG.

- 12.7 Please explain how acquiring RNG in other provinces and territories in Canada, or in the U.S., is consistent with relevant BC legislation and policy, including, the *Clean Energy Act* (CEA), the *Greenhouse Gas Reduction Regulation* (GGRR) and the 2018 CleanBC Plan.

Response:

PNG submits that its plan to acquire RNG, not only from supply connected to its pipeline systems, but from across the rest of B.C., as well as from sources in other provinces and territories in Canada, or in the U.S., is consistent with the Clean Energy Act (CEA), the Greenhouse Gas Reduction Regulation (GGRR), and the CleanBC Plan.

The CEA sets out B.C.'s Energy Objectives of which the following are relevant to the acquisition of RNG supply:

- 2(g) to reduce BC greenhouse gas emissions;*
- 2(h) to encourage the switching from one kind of energy source or use to another that decreases greenhouse gas emissions in British Columbia;*

In the case of RNG supply sourced from outside of B.C., and in the absence of a national GHG reduction credit trading program, PNG believes that appropriate accounting for quantities of RNG purchased, along with a clear contractual path between the point of supply and the end-use customer, and the retirement of the emission reduction attributes associated with the RNG once consumed by the end-user, will ensure that B.C. realizes the emissions reductions associated with the out-of-province RNG supply.

PNG's position is consistent with FEI's position as presented in the Section 71 Filing of Biomethane Purchase Agreements (BPA's) between FEI and Tidal Energy Marketing proceeding. FEI in its response to BCUC IR 2.1 states that "FEI confirms that acquiring biomethane in Ontario will reduce GHG emissions in BC. Greenhouse gas emissions are accounted for at the end-use which requires a clear contractual path, real displacement of conventional gas, and the retirement of environmental attributes upon use." (FEI-Tidal BPA Proceeding, Exhibit B-2, BCUC IR 2.1)

In that proceeding, the Commercial Energy Consumers Association of B.C. (CEC) agreed with FEI's position and stated that "the CEC does not find evidence to suggest that there are significant limitations on the benefits of biomethane purchases in BC if the RNG is acquired out of province. The CEC does not take issue with the out-of-province aspects of this application" (CEC Argument, p.12)

PNG notes that the BCUC approved the FEI-Tidal BPA's on February 27, 2020 by way of Order G-40-20.

Section 2 (3.7) and (3.8) of the GGRR states:

(3.7) A public utility's undertaking that in the class defined in subsection (3.8) is a prescribed undertaking for the purposes of section 18 of the [CEA] Act.

(3.8) The public utility acquires renewable natural gas
(a) for which the public utility pays no more than \$30 per GJ, and
(b) that, subject to subsection (3.9), in a calendar year, does not exceed 5% of the total volume of natural gas provided by the public utility to its non-bypass customers in 2015.

In its Decision attached to Order G-122-19 on FEI's Application for a BioGas Purchase Agreement with the City of Vancouver, the BCUC described a three-part test to determine whether the acquisition of RNG, either through a supply purchase agreement, or through a utility-owned facility, meets the criteria for consideration as a prescribed undertaking under section 2(3.8) of the GGRR:

- *The public utility must be acquiring renewable natural gas (as opposed to some other form of commodity);*
- *The utility must pay no more than \$30 per GJ for that renewable natural gas; and*
- *Subject to certain exceptions, the annual volume of renewable natural gas acquired must not exceed 5% of the total volume of natural gas the utility provided to its non-bypass customers in 2015. (G-122-19, p. 8)*

PNG submits that the three-part test does not contain any criteria specifying the source, nor the location, of the RNG supply.

Finally, the CleanBC plan sets as a policy objective, a provincial target to achieve a 15 percent renewable gas blend in deliveries of natural gas to residential and industrial customers by 2030. PNG has not found any further guidance in the CleanBC Plan regarding the location of the RNG supply.

12.7.1 Please explain the benefits and risks of this strategy for PNG customers.

Response:

In the short term, accessing RNG supply from supply outside of B.C. enables PNG to access a potentially greater quantity of supply, within a shorter timeframe, and at potentially lower cost, than were PNG restricted to acquiring supply from sources located within B.C. PNG submits that restricting its acquisition of supply to within B.C. in practice means restricting itself to supply located within its service territory or, at least, to sources outside of FEI's service territory. As noted on Page 65 of the Application, PNG appreciates the challenges FEI faces in acquiring sufficient supply of RNG to meet the GGRR voluntary 5 percent target, let alone the 15 percent CleanBC target, and PNG would not anticipate being able to acquire RNG from sources connected to FEI's system. As stated in its response to Question 12.3, sources of RNG supply in PNG service territory tend to be small and challenging to develop under a price cap of \$30 per GJ.

PNG does not anticipate any risk associated with a strategy of procuring RNG from sources located outside of B.C., that would not also exist with the procurement of supply located in B.C. In any case, PNG believes that contractual arrangements can be put in place that address the risk of supply curtailment, non-delivery, and supplier insolvency.

12.8 Please discuss whether, as an alternative to procuring physical RNG, PNG believes that purchasing the environmental attributes of RNG produced in other jurisdictions would be consistent with relevant BC Legislation and policy.

Response:

Confirmed. In order for the emission reduction benefits associated with RNG supply to be captured by PNG and its customers, three requirements must be satisfied: (i) an appropriate accounting for quantities of RNG purchased; (ii) a clear contractual path between the point of supply and the end-use customer; (iii) and the retirement of the emission reduction attributes associated with the RNG once consumed by the end-user. PNG submits that contractual arrangements can be made with out-of-province suppliers of RNG that meet these requirements. As stated in its response to the Question 12.7.1, PNG further submits that such arrangements are consistent with the CEA, the GGRR, and the CleanBC Plan.

Please see also the response to Question 12.7.

13.0 Reference: NEW OPPORTUNITIES AND INNOVATION
Exhibit B-1, Section 4.4.1, pp. 68–69
PNG’s RNG Strategy

On page 68 of Exhibit B-1, PNG states:

In light of the GGRR voluntary five percent RNG target and the CleanBC 15 percent RNG goal by 2030, PNG intends to develop a portfolio of RNG supply. PNG expects that such supply will initially be in the form of biomethane, but that other forms of RNG identified in the previous section, will also be pursued. PNG expects to acquire RNG, either through entering into supply agreements with third parties, or by developing its own supply projects. PNG anticipates adopting and filing for approval with the BCUC, a similar set of principles governing its ability to develop RNG supply infrastructure, as the BCUC has approved for FEI. PNG expects to begin acquiring RNG supply by late 2020 or 2021.

On page 69 of Exhibit B-1, Table 18 shows PNG’s RNG supply forecast. Table 18 is reproduced below.

Table 18: RNG supply forecast

		2018	2019	2020	2021	2022	2023	2024
Total Deliveries (Sales and Transport)	TJ	10,586	11,146	11,546	11,861	11,870	11,831	11,709
Deliveries (Sales)	TJ	6,416	6,567	7,221	7,517	7,585	7,546	7,482
RNG Supply	TJ	-	-	-	30	130	200	300
As a portion of total deliveries	%	0.0%	0.0%	0.0%	0.3%	1.1%	1.7%	2.6%
As a portion of sales	%	0.0%	0.0%	0.0%	0.4%	1.7%	2.7%	4.0%
GHG reduction (tonnes CO₂e)	(tCO₂e)	-	-	-	(1,493)	(6,468)	(9,950)	(14,925)

		2025	2026	2027	2028	2029	2030
Total Deliveries (Sales and Transport)	TJ	10,926	10,800	10,745	10,668	10,587	10,471
Deliveries (Sales)	TJ	6,699	6,631	6,576	6,499	6,418	6,302
RNG Supply	TJ	400	510	620	730	840	950
As a portion of total deliveries	%	3.7%	4.7%	5.8%	6.8%	7.9%	9.1%
As a portion of sales	%	6.0%	7.7%	9.4%	11.2%	13.1%	15.1%
GHG reduction (tonnes CO₂e)	(tCO₂e)	(19,900)	(25,373)	(30,845)	(36,318)	(41,790)	(47,263)

- 13.1 Please describe the circumstance(s) that would lead PNG to develop its own supply project(s) versus entering into supply agreements with third parties.

Response:

PNG is currently identifying opportunities for acquiring RNG supply through either supply agreements with third parties, or by owning and operating facilities that process feedstock renewable gas supply into pipeline quality biomethane. For each opportunity, PNG will evaluate the specific costs, benefits and risks. PNG expects to provide a full cost and risk analysis with all applications requesting approval of either RNG supply agreements, or facilities.

- 13.1.1 Please provide a discussion of the benefits and risks associated with each scenario.

Response:

PNG expects that the benefits and risks associated with supply agreements and utility-owned RNG processing facilities will be different for each specific opportunity. PNG will present an analysis of the costs, benefits and risks associated with each application requesting BCUC approval of RNG supply agreements or for the construction of RNG processing facilities.

- 13.2 Please discuss what would be included in a filing of the above noted “set of principles governing PNG’s ability to develop RNG supply infrastructure.”

Response:

PNG is referring to a set of guidelines outlining the ownership of three elements of the RNG supply infrastructure that FEI presented in its 2010 Biomethane Application (Application for Approval of a Biomethane Service Offering and Supporting Business Model..., filed on June 8, 2010) and subsequently approved by way of Order G-194-10. In its 2010 Biomethane Application, FEI proposed that it would own the interconnection facilities, consisting of gas metering, regulation, control and odourization equipment, as well as the interconnecting pipeline, in all cases where FEI acquires a supply of RNG that is physically delivered onto its gas distribution system. FEI did not expect to own facilities related to the generation and collection of biogas. Examples of such facilities include, anaerobic digesters that convert organic material into raw biogas, and landfill gas capture and collection systems. FEI also proposed retaining the flexibility to own and operate the facilities that process, or upgrade, raw biogas into pipeline quality biomethane. In Decision and Order G-194-10, the BCUC declined to make a determination on the ownership of biogas processing assets by FEI and directed FEI to keep the upgrading business “sufficiently distinct so as to be severable, should the Commission determine that this business ought to be conducted through a separate entity in the future” (Decision and Order G-194-10, p. 39).

FEI affirmed its ownership model for RNG supply infrastructure in its 2012 Biomethane Application (FortisBC Energy Inc. Biomethane Service Offering: Post Implementation Report and Application for Approval of the Continuation and Modification of the Biomethane Program on a Permanent Basis). This time, the BCUC approved FEI’s ability to own biogas processing facilities when “dealing with regional or municipal governments.” (Decision and Order G-210-13, p.100).

PNG anticipates making an application to the BCUC, for approval of a similar set of principles governing PNG’s ability to construct, own and operate biogas production facilities under certain circumstances, and PNG’s ability to construct, own and operate the interconnection facilities including the interconnecting pipeline. Included in its application, PNG will propose a set of principles governing how the cost associated with these facilities will be recovered from PNG customers.

PNG anticipates submitting its application in either Q2 or Q3 of 2020.

- 13.2.1 Please identify the filing PNG is referring to in which the BCUC approved a set of principles governing FEI’s ability to develop RNG supply infrastructure.

Response:

Please see the response to Question 13.2.

13.2.2 In what timeframe does PNG anticipate filing such an application to the BCUC.

Response:

Please see the response to Question 13.2.

13.3 Please discuss any RNG supply sources PNG has identified, either committed or potential, to satisfy the RNG Supply forecast included in Table 18 for:

Response:

The supply forecast presented in Table 18 of the Application is a representative trend in supply required to meet the 2019 CleanBC target of including a blend of 15 percent RNG in deliveries to residential and industrial customers by 2030. Table 18 illustrates the quantity of the supply that is required to be brought online over the next 10 years. The table does not reflect any specific sources of supply at this time.

13.3.1 2020 to 2024; and

Response:

Please see the response to Question 13.3.

13.3.2 2025 to 2030.

Response:

Please see the response to Question 13.3.

- 13.4 Please confirm, or otherwise explain, that PNG considers the volume of required RNG supply as a percent of deliveries (sales) is consistent with the 2018 CleanBC Plan.

Response:

In developing Table 18 to illustrate the quantity of RNG supply required by 2030, PNG applied its own interpretation of the two sole references in the CleanBC Plan, to a blend of 15 percent RNG in deliveries by natural gas utilities (the “15 percent RNG Target”). These references are: (i) “Make residential natural gas consumption cleaner by putting in place a minimum requirement of 15% to come from renewable gas” (p. 8); and (ii) “Make industrial natural gas consumption cleaner with a minimum 15% to come from renewable gas” (p. 9).

Over half of PNG’s deliveries are to customers who purchase their gas directly from suppliers and marketers. PNG provides transportation-only service to these customers to deliver their own gas supply. In these cases, PNG has no ability to ensure that the gas transported on its customers’ behalf meets the minimum RNG content requirements that will, PNG presumes, be enforced through regulation aligned with the CleanBC Plan.

At this time PNG lacks clarity on how the 15 percent RNG Target will be enacted in regulation. PNG has therefore made what it submits is a forecast that reflects a reasonable outcome of future regulation. PNG readily concedes that, in actuality, the 15 percent RNG Target may be applied very differently and in fact be applicable to both sales and transportation volumes.

- 13.4.1 Please discuss why total deliveries (sales and transportation volumes), was not considered.

Response:

Please see the response to Question 13.4.

13.4.2 Please explain why PNG has no forecast RNG supply to 2038.

Response:

PNG has not prepared a forecast of RNG supply because it has not identified specific opportunities for acquiring RNG over the next 20 years. Table 18 illustrates the quantity of the supply that is required to be brought online over the next 10 years. The table does not reflect any specific sources of supply at this time.

PNG continues to develop its understanding of the potential for RNG supply, including hydrogen, in its service territory. In doing so, PNG expects to identify specific opportunities for acquiring RNG, along with their expected quantities and timing.

13.4.3 Please provide an updated version of Table 18 to include the full planning period (2019-2038).

Response:

Please see the response to Question 13.4.2. PNG has not prepared a forecast of RNG supply, based on actual identifiable sources or RNG. PNG submits that extending the illustrative forecast provided in Table 18, out to the end of the 20 year planning period spanned by this Resource Plan would be merely a speculative exercise.

13.5 Please confirm, or otherwise explain, if PNG intends to include RNG supply in its 2020/2021 its Annual Gas Contracting Plan (ACP).

Response:

PNG is in the initial stages of identifying sources of supply. If PNG identifies a source of RNG supply that it reasonably expects can be acquired during the period spanned by the 2020/21 ACP, then PNG would include such supply in its 2020/21 ACP, subject to receiving the necessary approvals from the BCUC.

- 13.6 Please confirm, or otherwise explain, if any capital costs associated with PNG's RNG supply forecast have been included in PNG (N.E.) 2020/2021 Revenue Requirements Application or PNG (West) 2020/2021 Revenue Requirements Application.

Response:

As stated in its response to Question 13.1, PNG is currently identifying opportunities for acquiring RNG supply through either supply agreements with third parties, or by developing facilities that process feedstock renewable gas supply into pipeline quality biomethane. At this time, PNG has not identified clear opportunities for RNG supply and none of these opportunities have been reflected in its illustrative forecast provided by Table 18. Consequently, PNG has not reflected any capital costs associated with RNG supply in its PNG 2020/2021 Revenue Requirements Application, or in its PNG(N.E.) 2020/2021 Revenue Requirements Application.

In the event that PNG develops a project related to RNG supply over the 2020 – 2021 timeframe, PNG anticipates filing an Application related to the facilities required to receive RNG supply onto its pipeline systems.

E. GHG REDUCTION PLANS

**14.0 Reference: GHG REDUCTION PLANS
 Exhibit B-1, Section 5.3, pp. 71–72
 PNG GHG Reduction Plan**

On page 71 of Exhibit B-1, PNG states:

PNG has developed a GHG reduction plan that identifies the sources of PNG’s GHG emissions, evaluates opportunities to reduce those emissions, and sets out a multi-year plan for reducing emissions from those sources.

14.1 Please provide GHG reductions in tonnes CO₂e in the following tabular format for the planning period (2019-2038) as it relates to the noted multi-year plan.

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
PNG's GHG Reduction (tCO ₂ e)										
	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
PNG's GHG Reduction (tCO ₂ e)										

Response:

PNG has not created a detailed schedule of planned emissions reductions projects over the next 20 years. However, PNG has made plans for 2020 and 2021 that will reduce emissions from several sources. A project to replace the natural gas actuated starter for the sole operating compressor at Station R1 is scheduled for this summer. This is expected to reduce PNG’s facility emissions by 100 tonnes annually. In addition, PNG is continuing its program of replacing its line heaters at regulating and compressor stations with more efficient models. The reduction in emissions resulting from this replacement program is small, however.

PNG has also identified additional opportunities for reducing emissions from its facilities, as presented in the table that follows. PNG will identify the timing of these projects in more detail in subsequent revenue requirement applications and, if necessary, CPCN applications.

Opportunity	Estimated Emissions Reduction (tonnes CO ₂ e per year)
Use of a portable flare or pump down compressor system when venting on the transmission and distribution systems	2,000 – 3,000 (varies by year)
Replacement of the natural gas powered turbine at the R1 compressor station, with an electric driver.	2,500
Update amine technology to reduce venting from the Tumbler Ridge gas plant.	Not evaluated at this time.
More block valves with blowdowns to the flare system to minimize the amount of vented gas for maintenance activities at the Tumbler Ridge gas plant.	Not evaluated at this time.
Efficient burners – Tumbler Ridge gas plant.	Not evaluated at this time.
Update glycol dehydrator technology to reduce venting at the Tumbler Ridge gas plant.	200

14.2 Please discuss the relationship between PNG’s GHG Reduction Plan and its forecasted annual demand for the planning period (2019-2038).

Response:

The scope of PNG’s GHG reduction plan is currently limited to emissions from PNG’s processing, transmission, compression and distribution facilities. PNG’s ECI program presented in Section 8, and PNG’s RNG strategy, presented in Section 4.4.1 of the Application, address PNG’s plans for reducing downstream emissions associated with natural gas use by PNG’s customers.

On page 71 of Exhibit B-1, PNG states:

The BC OGC Methane Regulations come into force January 1, 2020 with provisions affecting the operation of PNG facilities coming into effect January 1st, 2022. PNG has identified two near-term opportunities that meet the requirements to reduce venting and fugitive emissions, namely the replacement of the natural gas powered starter and natural gas powered actuators at compressor station R1.

On page 72 of Exhibit B-1, PNG states:

An opportunity to reduce emissions from combustion by replacing the natural gas powered turbine at R1 with an electric drive will be evaluated, taking into account capital costs, savings in carbon taxes, and the reliability of electric power at that location.

- 14.3 Does PNG anticipate filing a CPCN with the BCUC within the next 5 years for any capital upgrade work at compressor station R1? If yes, please provide the anticipated timing of such an application.

Response:

PNG believes that an application related to upgrades at R1 is likely to be filed in the next five years. While timing is not certain, PNG believes that an application could potentially be submitted in late 2020 or early 2021.

- 14.4 Please discuss the impacts of replacing the natural gas-powered turbine at R1 with an electric drive on PNG's forecasted annual demand for the planning period (2019-2038).

Response:

Replacing the natural gas powered turbine at Station R1, with an electric drive will not alter PNG's forecast of the annual demand of its customers. An electric compressor at R1 would reduce PNG's fuel gas demand by approximately 45,000 GJ per year and reduce associated emissions by approximately 2,000 tonnes CO_{2e}. At the same time, PNG would incur additional costs related to electricity demand, and related to the capital expenditures associated with the replacement project.

F. DEMAND FORECASTING

**15.0 Reference: Sensitivity Analysis
Exhibit B-1, Section 7.4, p. 112
Energy Conservation and Innovation Programs**

On page 112 of Exhibit B-1, PNG states:

Finally, PNG has reflected the impact of its current and proposed ECI programs in these, gross demand forecasts. The impact on demand, of the ECI program is presented in Section 8.3.

- 15.1 Please reproduce the gross demand forecasts excluding the impact of the Energy Conservation and Innovation (ECI) Program.

Response:

PNG concedes that the phrasing of the last sentence in Section 7.4, presented in the preamble to this question, is confusing. PNG intended to state that PNG has completed an assessment of the impact of its current and proposed ECI programs, and that this impact is presented in Section 8.3.

PNG affirms that the demand forecasts presented in its Application are gross demand forecasts (excluding the impact of its ECI programs). The impact of PNG's ECI programs on forecast demand, is presented in Section 8.3. No amendment to the Application, nor to any IR responses, is required.

- 15.1.1 Where necessary, please update all IR responses relating to the gross demand forecasts to reflect the exclusion of ECI Programs.

Response:

Not applicable, please see the response to Question 15.1.

16.0 Reference: Annual Demand Forecast
 Exhibit B-1, Section 7.3.2, pp. 91-92; PNG(N.E.) 2015 Resource Plan for the
 Fort St. John/Dawson Creek and Tumbler Ridge Distribution Systems
 proceeding, Exhibit B-1, pp. 77-78, 79
 Small Commercial Customers – Capture Rates

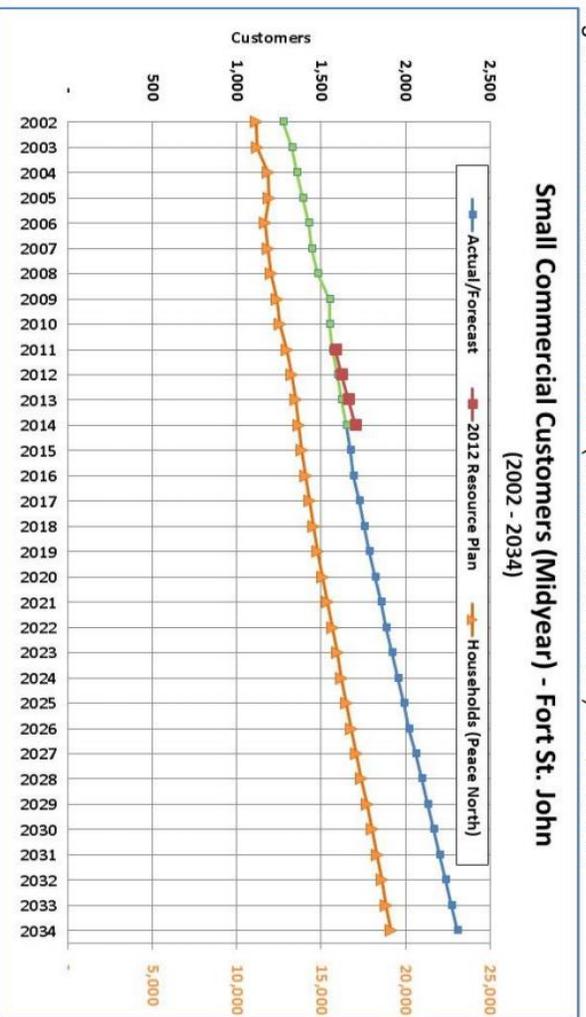
On page 91 of the Exhibit PNG states:

Consistent with the approach taken in earlier resource plans, PNG assumes that the trend in household formations in the regions served by PNG is a proxy for growth in small commercial customer additions. Capture rates adopted for the demand forecasts for 2020 in all regions are the same as those used in the 2014 and 2015 Resource Plans.

On pages 77–78 of Exhibit B-1 in PNG(N.E.)’s 2015 Resource Plan for the Fort St. John/Dawson Creek and Tumbler Ridge Distribution Systems proceeding (PNG(N.E.) 2015 Resource Plan), PNG(N.E.) stated:

The correlation between household additions and small commercial customer additions is very high: 0.95 for Fort St. John and Dawson Creek, and 0.9 for Tumbler Ridge (Figure 42, Figure 43, and Figure 44).

Figure 42: Small Commercial Customers (Historical and Forecast) – Fort St. John



- 16.1 Please provide the most recent correlation analysis between the growth in small commercial customer additions and the trend in household formations for each of PNG's service areas.

Response:

The requested information is provided in the table that follows.

	Correlation between Commercial Customer Additions and Change in Households in Local Health Area			Correlations presented in 2015 PNG(N.E.) Resource Plan	Customer Additions (Actual less Predicted)
	2016 - 2018	2014 - 2018	2009 - 2018		2014 - 2018
PNG-West	(0.79)	(0.79)	(0.74)	na	(119)
Fort St. John	0.83	(0.74)	0.66	0.95	127
Dawson Creek	0.83	(0.91)	0.25	0.95	91
Tumbler Ridge	(0.44)	0.41	0.67	0.90	4

- 16.1.1 Please provide an explanation for any changes between the most recent correlations and those in the 2015 PNG(N.E.) Resource Plan.

Response:

Correlations between commercial customer additions and the change in households in the corresponding Local Health Area (LHA) remain high in the Fort St. John and Dawson Creek delivery areas. Owing to the small amount of activity in Tumbler Ridge, the correlation between commercial customer additions and the change in households can vary significantly, depending on the time period chosen. While four additional commercial customers were expected over the past five years, based on actual household additions in the Peace River South LHA, Tumbler Ridge experienced no net gain over this same period.

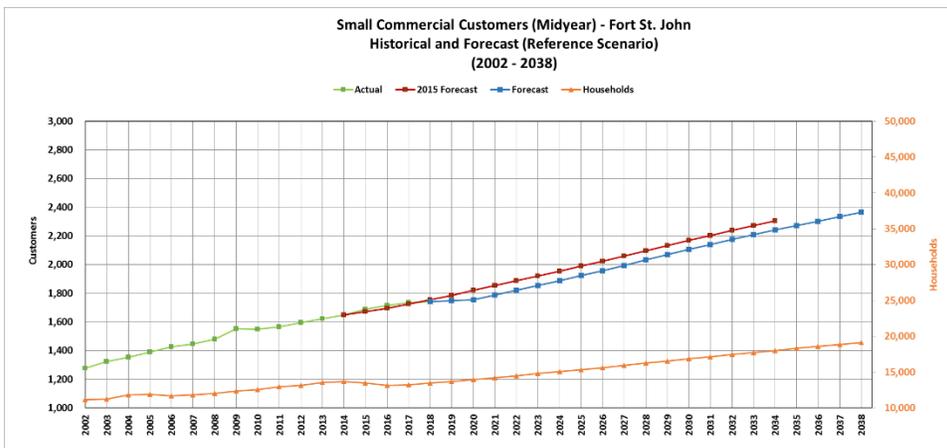
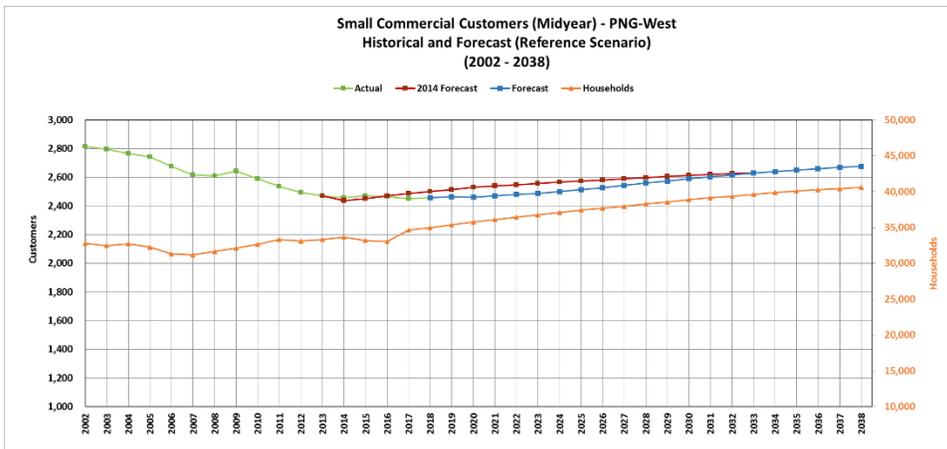
In the PNG-West region, PNG exhibited a net loss of 15 customers, rather than a gain of 30 as forecast in the 2014 Resource Plan that was based on a forecast of household additions in the associated LHA's, and as compared to a gain of 104 customers predicted by the actual household additions over the same period.

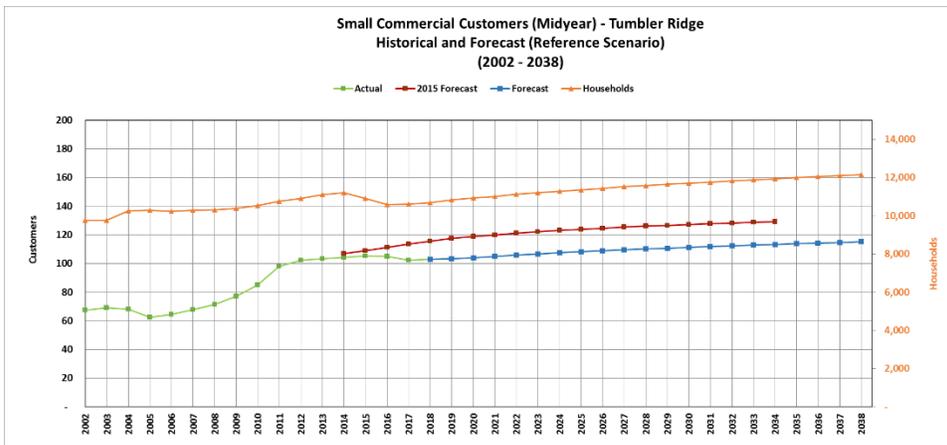
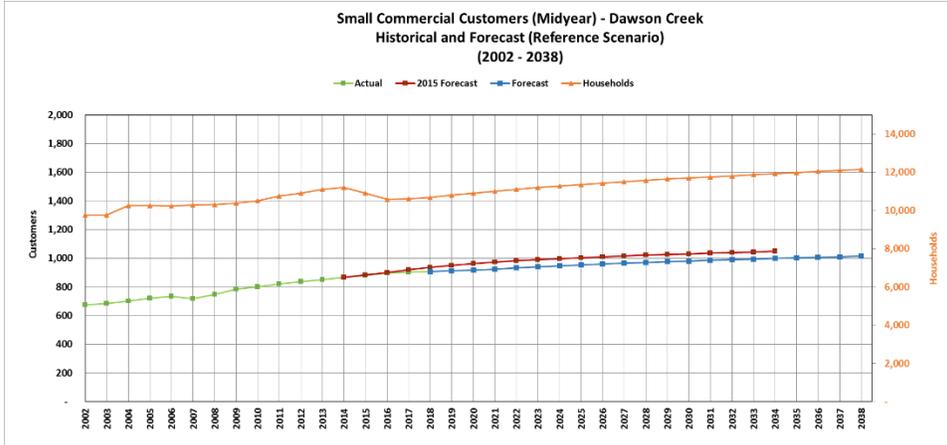
Despite this discrepancy, PNG maintains its forecast of higher than historical customer additions in this region, particularly in Terrace and Kitimat, to reflect the increase of economic activity fueled by the LNG Canada construction work.

16.2 For each of PNG’s service areas, please provide a graph in a similar format to Figure 42 above, demonstrating the historical and forecasted correlation between the growth in small commercial customer additions and the trend in household formations for the period 2002 to 2038. Please include forecasts provided in PNG’s two most recent resource plans.

Response:

Please see the following charts.





On page 91 of the Exhibit B-1, PNG states:

To reflect the impact of the CleanBC Plan, namely an increased focus on the electrification of space heating, PNG is forecasting a decline in capture rates over the forecast period (Table 24). The decline is expected to be slightly more pronounced in PNG-West owing to the higher delivered cost of natural gas and perceptions of the relative costs of electricity and natural gas.

In its sensitivity analysis, PNG reflects the impact of lower capture rates on the small commercial demand forecast.

Table 24: New commercial customer capture rates over forecast period

Commercial	Capture Rates (Reference Case)		
	2020	2029	2038
PNG-West (West)	85%	79%	74%
PNG-West (East)	85%	79%	74%
FSJ/DC	100%	95%	91%
Tumbler Ridge	100%	95%	91%

On page 79 of the Application in the PNG(N.E.) 2015 Resource Plan for the Fort St. John/Dawson Creek and Tumbler Ridge Distribution Systems proceeding, PNG(N.E.) stated:

Consistent with the assumptions for the residential customer additions, PNG(N.E.) has assumed a capture rate of 100 percent for the small commercial market. In its sensitivity analysis, PNG(N.E.) has determined the impact of a lower capture rate on the small commercial demand forecast.

16.3 Please explain why PNG-West is split into East and West for analysis of the capture rates.

Response:

The PNG-West service area serves communities from Vanderhoof to Prince Rupert and Kitimat. There are significant variations, both climatically and economically, between the eastern and western portions of the service area. For the purpose of the forecast of commercial customer additions, PNG has applied a consistent capture rate across the entire service area.

The PNG-West (West) region is defined as that part of the PNG-West service area that includes the communities of Prince Rupert, Port Edward, Kitimat, Terrace and Thornhill. This region is influenced by the north coast marine climate and experiences warmer winters than experienced in the other regions. Normalized heating degree days in this region vary from approximately 3,400 in Prince Rupert to 3,700 in Kitimat. In addition, the municipalities in this region have experienced some economic

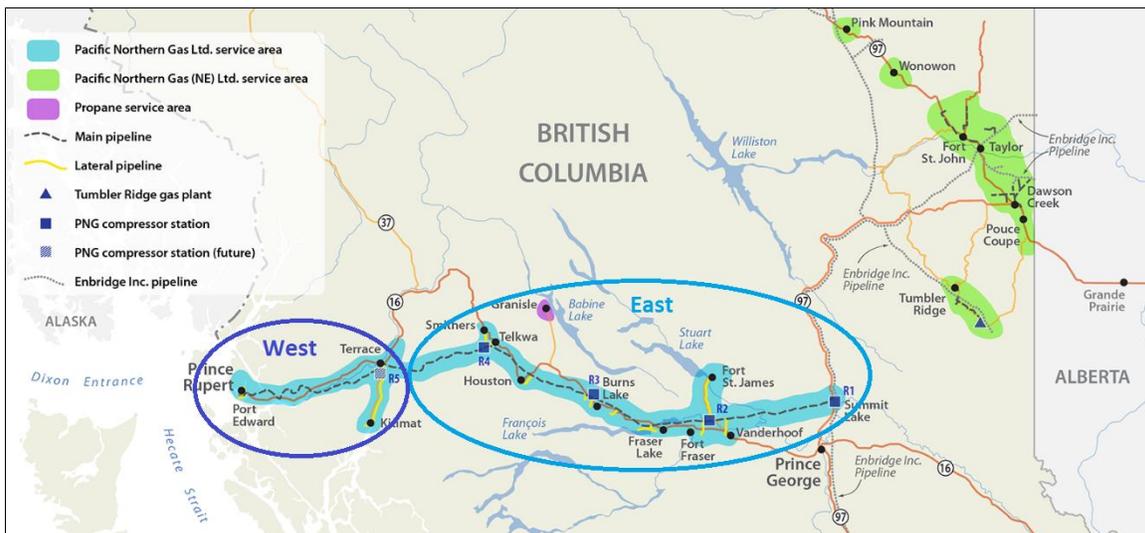
growth due to an increased workforce in response to the increased volumes of container traffic at the Port of Prince Rupert, the construction of the LNG Canada facility, and the feasibility studies for numerous LNG liquefaction plants being proposed for Prince Rupert and Kitimat.

The PNG-West (East) region is defined as that part of the PNG-West service area that lies east of Terrace/Thornhill and includes the communities of Smithers, Houston, Vanderhoof, Fort St. James and Burns Lake. This region has a drier and colder climate than experienced in the western region. Normalized heating degree days in this region vary from approximately 4,600 in Houston to 5,600 in Burns Lake. The main economic activities of the region are forestry and agriculture. The strength of the local economies is therefore susceptible to the economic cycles of the resource sectors; most notable are recent declines due to weakness in the forestry sector. Consequently, this region is characterized by a lower rate of housing additions compared to the western region.

16.3.1 Please explain which areas are classed as East and West and provide a map to illustrate the two areas.

Response:

Please see the map that follows.



- 16.4 Please explain how the decrease in capture rates were forecasted, addressing what assumptions were made regarding the impact of the CleanBC Plan and the increased focus on the electrification of space heating.

Response:

PNG has simply applied a decline in capture rates of small commercial customers to its forecast. This is a refinement of the forecasting method used in both the 2014 Resource Plan for PNG-West and the 2015 Resource Plan for PNG(N.E.) which did not reflect any changes over time, in commercial customers' preferences regarding natural gas as a source for space and domestic water heating.

In its Decision approving the 2014 Resource Plan for PNG-West, the BCUC accepted PNG's forecasting method stating that it "is more transparent than the one previously used and produces a reasonable forecast". The BCUC went one step further, noting the "improvements PNG has made to its forecasting methodology and appreciates that PNG clearly identified the assumptions and inputs that went into its forecast. Further, the Panel also notes that the methodology was practical, frugal in its implementation and not overly elaborate. The Panel commends PNG for this approach." (Decision, G-140-14, p. 6).

In consideration of these comments from the BCUC, PNG has maintained its practical approach to forecasting commercial demand, and made a small yet meaningful adjustment to the capture rates over time to reflect PNG's view that the policies identified in the CleanBC Plan, especially the focus on the electrification of space heating load, are expected change the penetration of natural gas in serving new commercial loads.

- 16.5 Please provide a graph comparing the capture rates forecasted in PNG's most recent resource plans and the actual capture rates for the period 2015 to 2019. For any notable variances between the actual and forecasted capture rates, please provide a brief discussion of the reasons for the variation.

Response:

PNG does not collect data that enables it to accurately ascertain actual capture rates.

On page 92 of the Exhibit B-1, PNG states:

In the PNG-West region, PNG exhibited a net loss of 15 customers, rather than a gain of 30 as forecast in the 2014 Resource Plan. Despite this discrepancy, PNG maintains its forecast of higher than historical customer additions in this region, particularly in Terrace and Kitimat, to reflect the increase of economic activity fueled by the LNG Canada construction work.

- 16.6 Please discuss the assumptions made in relation to the increase in economic activity resulting from the LNG Canada construction work.

Response:

PNG has simply assumed that the LNG Canada construction project will result in an increase in net migration into the Terrace – Kitimat area, and that this will result in a growth in services and other businesses. For this reason, PNG has maintained its forecasting methodology based on B.C. Stats' forecast of household additions which also projects modest growth after a period of stagnation over the past ten years. Please see also the charts provided in response to Question 16.2.

- 16.6.1 Please explain how these assumptions have been used to inform the forecast trend in Small Commercial Customer Count for PNG-West.

Response:

Please see the response to Question 16.6.

**17.0 Reference: Annual Demand Forecast
Exhibit B-1, Section 7.3.2, pp. 94, 96
Small Commercial Customers – Use per Account Forecast**

On page 94 of the Application, PNG states:

In forecasting the use per account of these customers, PNG has applied an exponential decline rate extrapolated from the past 10 years of actual UPA's. In addition, in order to reflect the impact of CleanBC and expected incentives for commercial building energy efficiency retrofits through EfficiencyBC, PNG is forecasting an additional decrease in the UPA of existing commercial customers of five percent by 2030.

To reflect the goals of the CleanBC Plan, the UPA of new commercial construction is forecast to decline by 20 percent by 2025, by 40 percent by 2027 and by 80 percent by 2032, compared to 2018 levels. Forecasts for each region are shown in Figure 36 through Figure 39.

- 17.1 Please explain how a decrease of five percent by 2030 in the Use per Account (UPA) was established. Please detail the assumptions made and provide supporting analysis and rationale.

Response:

PNG estimates that the CleanBC policy goal related to improving the energy efficiency of existing buildings will have an impact on the small commercial Use per Account (UPA) of five percent that is in addition to the continuing trend in declining UPA that PNG exhibits in all of its service areas. In its sensitivity analysis, PNG presents forecasts of small commercial demand that reflect UPA decline rates ranging from 0 to 10 percent in excess of those forecast based on an extrapolation of the current trend. Table 29 of the Application presents the forecast decline rates of the small commercial UPA for each delivery area and for each of the three planning scenarios (Reference, Competitive Gas, and Competitive Electric).

17.2 Please explain how the 20, 40 and 80 percent decreases in the UPA of new construction by 2025, 2027 and 2032, compared to 2018 levels were established. Please detail the assumptions made and provide supporting analysis and rationale.

Response:

PNG has simply assumed that the CleanBC policy goal of making new construction 20 percent more energy efficient by 2022, 40 percent more energy efficient by 2027, and 80 per cent more energy efficient by 2032, will be reflected in the UPA of new commercial construction (CleanBC Plan, p. 27). While PNG concedes this is a simplifying assumption that may not entirely consider the end-use application – space heating vs. domestic hot water – PNG nevertheless considers this simplification appropriate in light of the small amount of small commercial construction activity experienced in its service territories to date, and which is expected to continue over the forecast period. Over the 20 year forecast period, PNG expects to add an estimated 946 small commercial customers to an existing base of over 5,200. PNG submits that further refinement of the impact of the CleanBC Plan on the UPA of new, small commercial customers will not have an appreciable impact on the forecast. Moreover, PNG has reflected a range of efficiency improvement rates for new construction under each of its planning scenarios. These are presented in Appendix C of the Application.

On page 96 of the Application, PNG provides the forecast UPA for small commercial customers in the Fort St. John and Tumbler Ridge service areas:

Figure 37: Forecast small commercial use per account (Fort St. John)

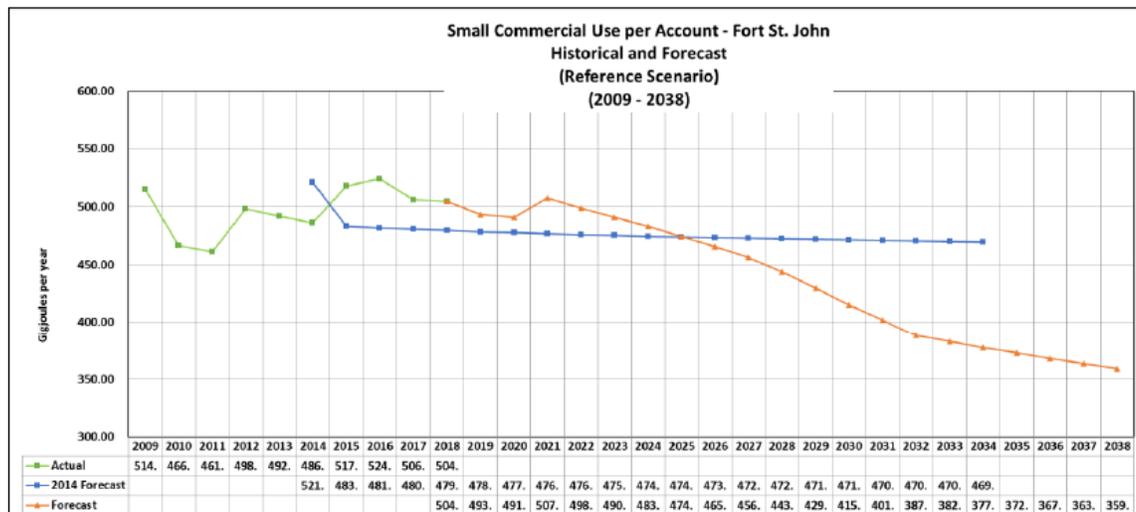
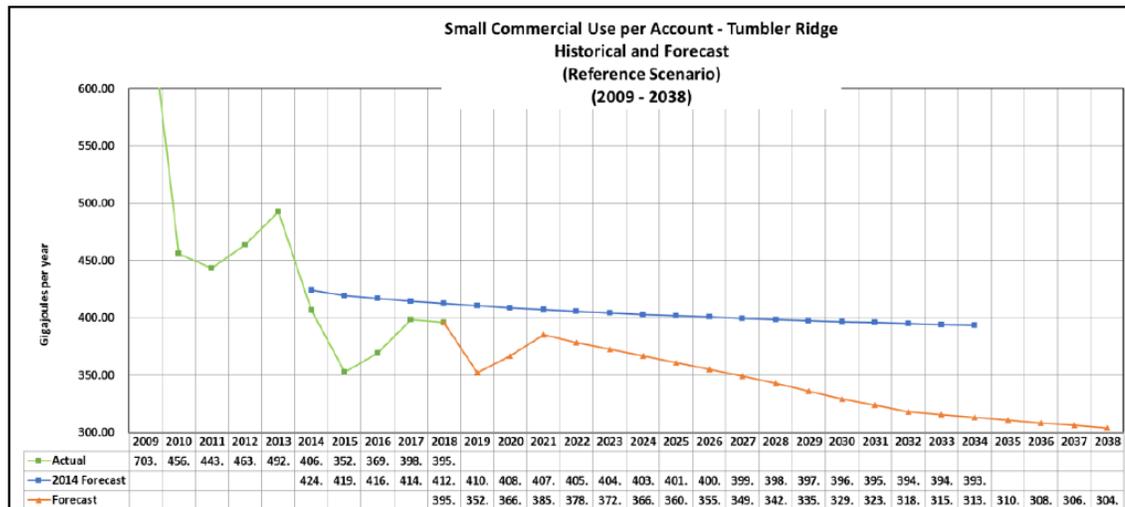


Figure 39: Forecast small commercial use per account (Tumbler Ridge)



17.3 Please explain the reasons for the forecasted decrease in small commercial UPA for both Fort St. John and Tumbler Ridge.

Response:

The forecast decrease in small commercial UPA in Fort St. John and Tumbler Ridge reflects (i) the continuation of the trend in declining UPA over the historical period extrapolated into the 20 year planning period; (ii) an additional decline of 5 percent under the Reference scenario to reflect additional improvements in the energy efficiency of existing buildings in response to goals outlined in the CleanBC Plan; and (iii) a decline in the UPA associated with new construction of 80 percent under the Reference scenario to reflect additional improvements in the energy efficiency of new construction in response to goals outlined in the CleanBC Plan.

Please see also the response to Questions 17.1 and 17.2.

- 18.0 Reference: Annual Demand Forecast
Exhibit B-1, Section 7.3.3, p. 97; PNG(N.E.) 2015 Resource Plan for the Fort
St. John/Dawson Creek and Tumbler Ridge Distribution Systems
proceeding, Exhibit B-1, p. 84
Large Customer Forecasts**

On page 97 of the Application, PNG states:

All of these customers provided a forecast of their 2020 natural gas consumption to PNG during the summer of 2019. In some cases, PNG has adjusted the customer's forecast to align more closely with their historical operations. The adjusted forecasts are included in the annual revenue requirements applications and are the basis for the long-term forecast. Unless identified specifically in the following sections, PNG has maintained the existing number and type of large customers over the planning period. The Company has no information at this time that would suggest changes to this number. The forecasts of the large customers for selected years of the 20-year planning period are presented in Table 25.

- 18.1 Please confirm, or otherwise explain, whether PNG's large customers provided forecasts for 2020 only.

Response:

Confirmed. Each summer, PNG's large commercial and industrial customers provide a forecast of their annual gas consumption for the following year.

18.1.1 If confirmed, please discuss how PNG extrapolated the 2020 forecasts to inform PNG's long-term demand forecasts. Please provide details of all assumptions with supporting rationale.

Response:

PNG has maintained the forecast demand for each large customer constant over the planning period unless PNG is aware of reasonably foreseeable changes to that customer's demand. Similarly, PNG has included demand from future customers identified at this time and which is reasonably expected to materialize. Finally, as described in Section 7.4 of the Application, PNG has included a sensitivity analysis of its large customer forecast that reflects possible alternative forecasts of known large customer demand.

PNG's method of forecasting the demand from large customers is consistent with the method employed in the 2014 Resource Plan for PNG-West and the 2015 Resource Plan for PNG(N.E.). In its Decision and Order approving the 2014 Resource Plan for PNG-West, the BCUC appreciated "it is difficult to refine the methodology for forecasting large commercial demand in a meaningful way, given the lumpy nature of industrial use" (Decision, G-140-14, p. 7). In its Decision and Order approving the 2015 Resource Plan for PNG(N.E.), the BCUC accepted PNG(N.E.)'s annual demand forecast, and "determines the forecast methodology to be appropriate" (Decision, G-155-15, p. 6). The BCUC went further to determine that "the level of rigour appropriate when evaluating a resource plan should be tailored to reflect the unique circumstances of the utility under review." (Decision, G-155-15, p. 25).

PNG submits that it has maintained, and in some cases increased, the level of rigour in developing demand forecasts for all of its customer classes, including the large customers, that is employed in the 2014 Resource Plan for PNG-West and the 2015 Resource Plan for PNG(N.E.), both of which were accepted by the Commission as adequate under Section 44.1(2) of the Utilities Commission Act (UCA) by way of Orders G-140-14 and G-155-15.

18.1.2 If not confirmed, please provide the time period for the forecasts.

Response:

Not applicable. Please see the responses to Questions 18.1 and 18.1.1

18.2 Please explain why PNG has adjusted some customer forecasts to align with historical operations. Please include in the discussion how previous customer forecasts have compared to their actual demand.

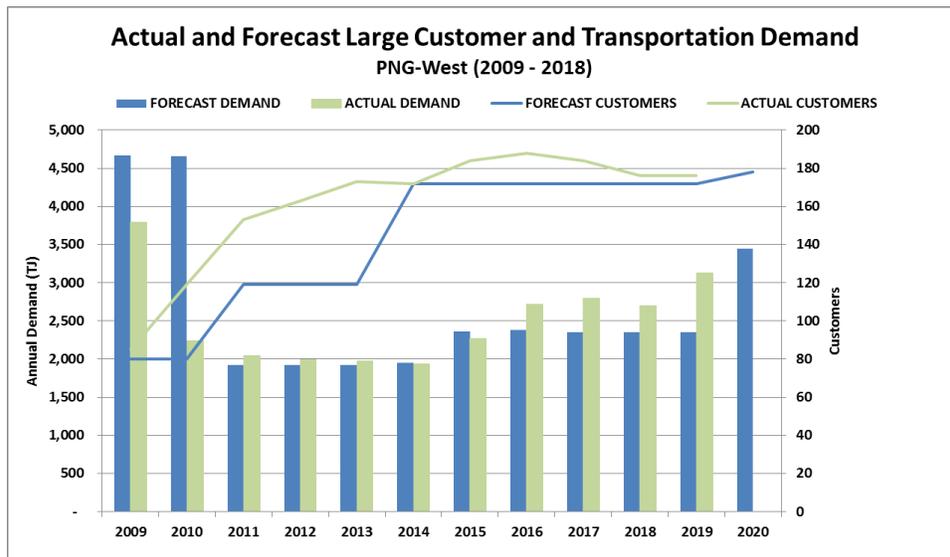
Response:

PNG bases its forecast demand from large customers on each customer’s forecast demand for the coming year, and on a review of historical deliveries and anticipated changes in use as gathered from discussions with the majority of these customers. In cases where customer’s forecasts differ from their historical demand, and no changes in the customer’s plant, equipment or operations are anticipated, PNG may, after discussions with the customer, adjust the customer-provided forecast to more closely reflect historical operations.

The following charts compare PNG’s forecast and actual large customer demand and customer count over the 2009 to 2018 period. Forecasts are taken from the 2009, 2011 and 2014 Resource Plans for PNG-West, and from the 2008, 2012, and 2015 Resource Plans for PNG(N.E.).

PNG-West

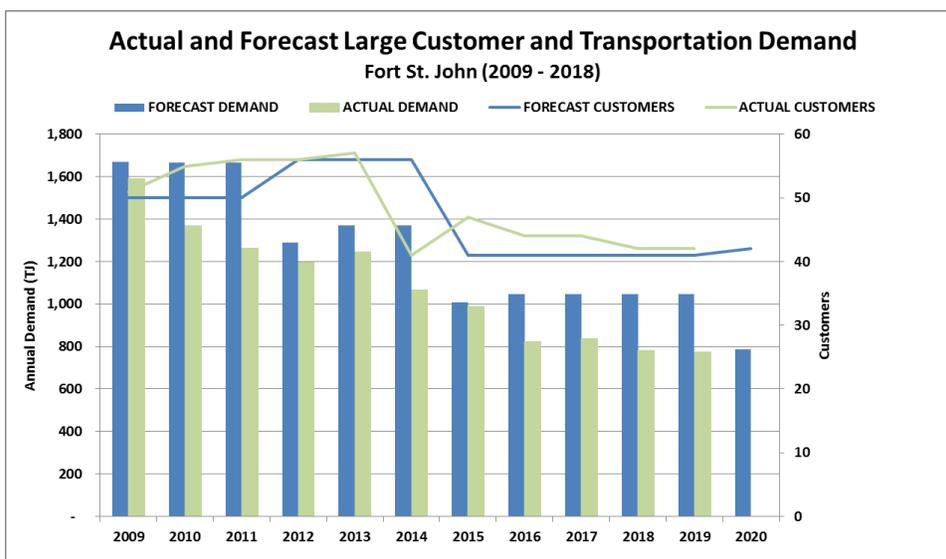
Forecast demand over the period 2009 – 2010 is taken from the 2009 Resource Plan for PNG-West, for 2011 – 2013 from the 2011 Resource Plan for PNG-West, and for 2014 – 2019 from the 2014 Resource Plan for PNG-West.

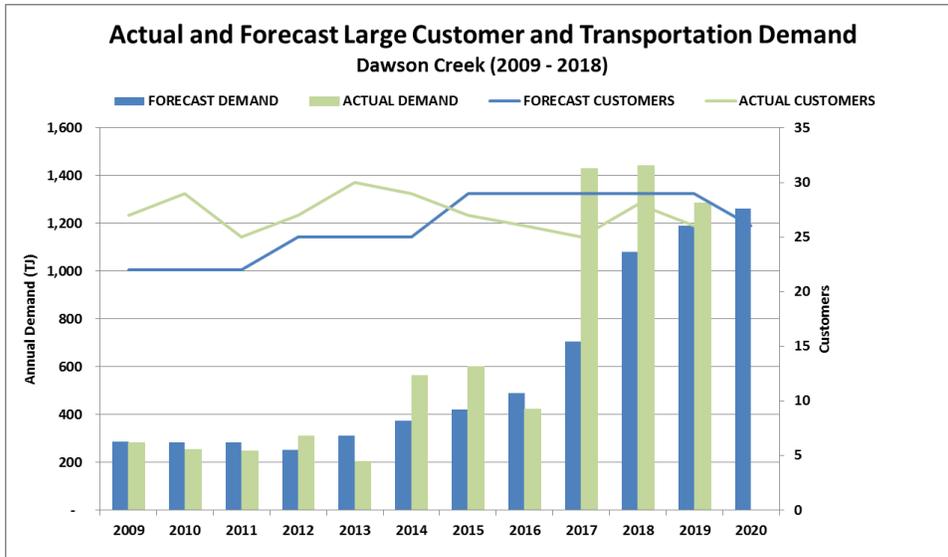


In January, 2010, one year after the 2009 Resource Plan for PNG-West was completed, Eurocan ceased operation, resulting in a loss of 2,200 TJ per year in throughput. Actual customer counts were notably higher than forecast over the period from 2009 to 2013 owing to higher than expected uptake by existing small commercial customers, of the small commercial transportation service. However, these customers only contribute approximately 50 TJ in annual demand to the Large Customer and Transportation forecast, all of it at the expense of small commercial sales demand and at no impact to the total demand on the PNG-West system. Finally variations between forecast and actual demand over the 2014 through 2019 period is largely due to variations in the demand from the BC Hydro generation facilities located in Prince Rupert. Annual demand from this facility varies widely: from a minimum of 14 TJ in 2011, to a high of 359 TJ in 2019, depending on BC Hydro’s need to supply power to Prince Rupert. PNG has increased the forecast of Large Customer and Transportation demand in 2020 and beyond to account for the demand from new large customers commencing service in 2019 (Skeena Bioenergy and the Ridley Island Propane Export Terminal), and in 2020 (LNG Canada workcamp and the Pembina Watson Island Propane Facility)

Fort St. John and Dawson Creek

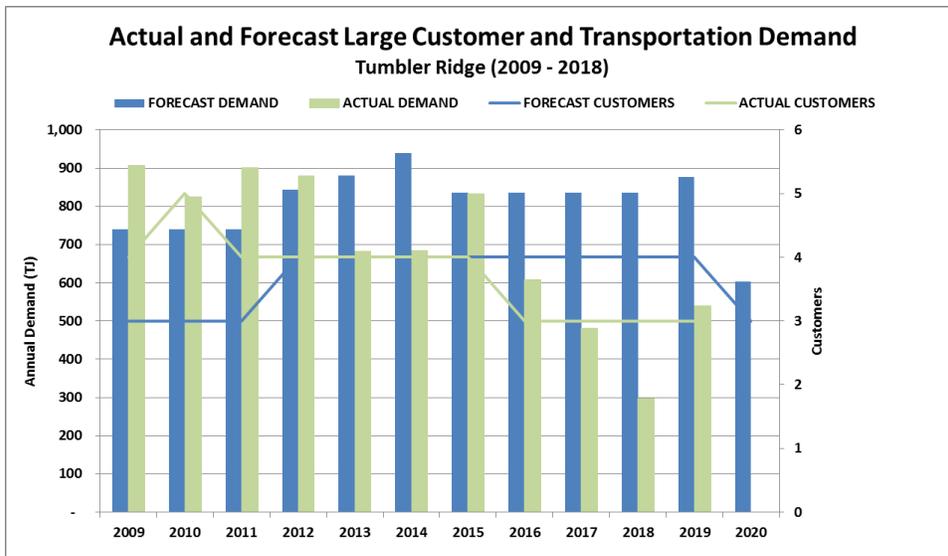
Forecast demand over the period 2008 – 2011 is taken from the 2008 Resource Plan for PNG(N.E.), for 2012 – 2014 from the 2012 Resource Plan for PNG(N.E.), and for 2015 – 2019 from the 2015 Resource Plan for PNG(N.E.). Demand for fuel gas supply from oil and gas producers in the Fort St. John area has declined steadily since 2013 as producers shut-in their production in PNG’s service area and focus increasingly on their assets in the Montney formation. Air Liquide, a nitrogen production facility located in Dawson Creek, commenced operation in 2014. Between 2014 and 2019, Air Liquide used natural gas service to supply its own power generation; switching to BC Hydro service in April of 2019 when sufficient capacity from the Dawson Chetwynd Area Transmission (DCAT) line was available. The Campus Energy regional LNG facility in Dawson Creek commenced operation in 2017, increasing deliveries on the Dawson Creek system by 980 TJ.





Tumbler Ridge

Forecast demand over the period 2008 – 2011 is taken from the 2008 Resource Plan for PNG(N.E.), for 2012 – 2014 from the 2012 Resource Plan for PNG(N.E.), and for 2015 – 2019 from the 2015 Resource Plan for PNG(N.E.). Changes in the large customer demand is due entirely to the demand for fuel gas by CNRL for its operations in the Murray River area. PNG’s forecast of demand for 2020 and beyond is based on detailed discussions with CNRL on their operations and production plans for the area.



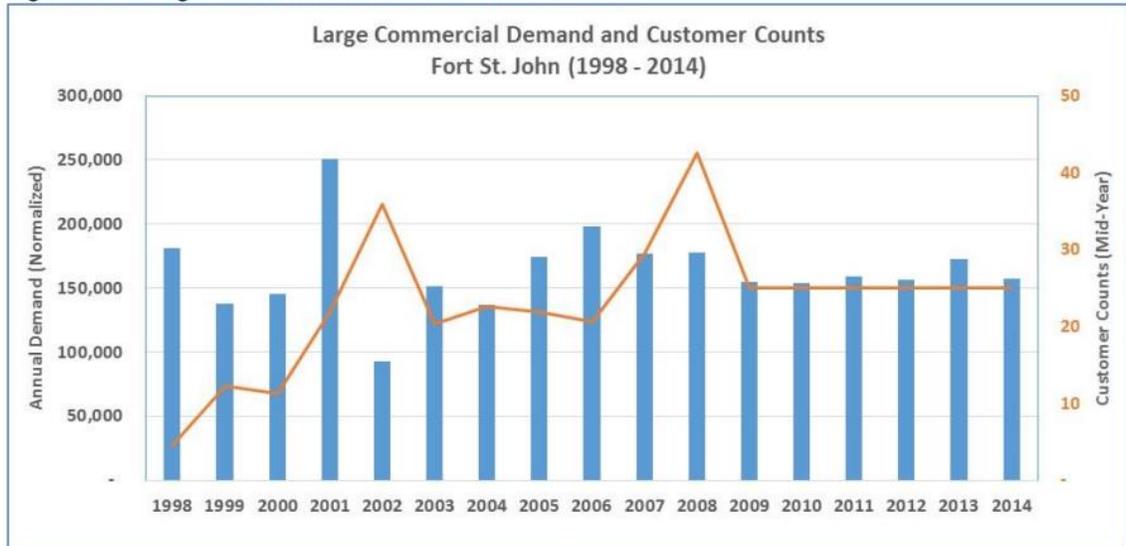
18.3 Please provide details of the adjustments that PNG has made to the customer forecasts.

Response:

Please see the response to Question 18.2.

On page 84 of the Application in the PNG(N.E.) 2015 Resource Plan for the Fort St. John/Dawson Creek and Tumbler Ridge Distribution Systems proceeding, PNG(N.E.) provided the Large Commercial demand for Fort St. John:

Figure 51: Large Commercial demand – Fort St. John



18.4 For each of PNG’s service areas, please provide a graph in a similar format to Figure 51 above, comparing the historic actual large commercial demand and customer counts with the forecasts as provided in previous resource plans for the period 2009 to 2019.

Response:

Please see the response to Question 18.2. PNG submits that the charts comparing actual and forecast demand illustrate the validity of PNG approach to forecasting large customer loads based on current loads and adjustments for known changes. PNG submits that large deviations of the actual loads from those forecast in some years could not be reasonably foreseen. PNG submits that its forecasting method, while simple, is entirely appropriate given the relatively small amount of change to PNG’s large customers and their operations, and that the forecasts are sufficiently accurate for the purposes of PNG’s long term planning exercise.

**19.0 Reference: Annual Demand Forecast
Exhibit B-1, Section 7.3.3, pp. 98, 100-101
Large Customer Forecasts – PNG-West**

On page 98 of the Application PNG provides Table 25, summarizing the Large Customer and Transportation Forecast:

Table 25: Large Customer Sales and Transportation Forecast

	2018 Actual	2019 Projected	2020 Forecast	2024 Forecast	2029+ Forecast
PNG-West					
Large Commercial Firm Sales	47,539	77,812	381,250	822,620	224,020
Commercial Firm Transportation	309,498	290,080	305,167	305,167	305,167
Small Industrial Sales (RS4)	126,647	293,300	627,880	627,880	627,880
Seasonal	21,421	22,573	18,400	18,400	18,400
NGV	-	-	-	-	-
Industrial Transportation ⁽¹⁾	1,287,765	1,251,299	1,301,914	1,301,914	1,301,914
Interruptible Sales and Transport	900,209	1,192,044	807,490	826,600	826,600
	2,693,080	3,127,107	3,442,101	3,902,581	3,303,981
Fort St. John					
Large Commercial Firm Sales (RS 3)	177,651	200,284	220,500	220,500	137,500
Commercial Transportation (RS23)	48,641	51,748	37,600	37,600	37,600
Small Industrial Sales (RS4)	216,094	251,514	238,000	202,800	185,200
Small Industrial Transportation	340,143	271,641	291,420	174,852	116,568
Total	782,529	775,188	787,520	635,752	476,868
Dawson Creek					
Large Commercial Firm Sales (RS 3)	177,383	179,792	196,000	196,000	196,000
Commercial Transportation (RS23)	20,659	21,869	15,500	15,500	15,500
Small Industrial Sales (RS4)	264,514	103,507	70,000	70,000	70,000
Small Industrial Transport (RS7) ⁽²⁾	980,025	980,025	980,025	980,025	980,025
Total	1,442,581	1,285,193	1,261,525	1,261,525	1,261,525
Tumbler Ridge					
Large Commercial Firm (RS 3)	14,292	19,269	18,000	18,000	18,000
Small Industrial Transportation (RS4)	283,238	520,098	585,600	585,600	585,600
Total	297,530	539,367	603,600	603,600	603,600

(1) Average actual demand. Rio Tinto Alcan Firm Contract Demand 120.1 e³m³ per day at heating

(2) Regional LNG Firm Contract Demand

19.1 Please confirm that the data represented in Table 25 is expressed in units of GJ per year.

Response:

Confirmed.

- 19.2 Please provide a discussion on the factors PNG considered when preparing the 2019 Projection and 2020 to 2029+ Forecasts for Interruptible Sales and Transport in the PNG-West service area.

Response:

Please see the responses to Questions 18.1.1 and 18.2. The loads from PNG's Interruptible Sales and Transportation customers are equally predictable as those from PNG's firm customers. With significant unutilized capacity on the PNG-West system, some of PNG's large customers understood that there is very little risk of curtailment of their interruptible service and that the reliability of Interruptible service is comparable to that of firm service.

On pages 100 to 101 of the Application, PNG states:

Over the longer term, [Ridley Island Propane Export Terminal] RIPET may offset some of its demand for natural gas with ethane produced from its fractionation plant. Under this situation, the demand from RIPET may be reduced to the minimum demand of 410 GJ per day specified in the 15-year firm gas sales agreement entered into with PNG. Accordingly, PNG has used a forecast based on the minimum contract demand, equivalent to approximately 150 TJ per year, in its Competitive Electricity scenario.

- 19.3 Please discuss why, with supporting rationale, the Reference and Competitive Gas scenarios do not assume that RIPET will offset some of its demand for natural gas with ethane.

Response:

The amount of ethane in RIPET's propane feedstock directly relates to how much may be available to offset the natural gas requirements. As a certain level of ethane must be removed from the feedstock in order to meet the propane quality specifications in Asia, and while this extraction process is expensive and there is no local market for ethane, RIPET is motivated to encourage its propane feedstock suppliers to keep the ethane content as low as possible. For this reason PNG has assumed that the propane feedstock delivered to RIPET will most likely have low ethane content and therefore RIPET will not offset an appreciable amount of natural gas with ethane.

- 19.4 Please confirm, or otherwise explain, that the 410 GJ per day (150 TJ annually) is provided under a take or pay contract.

Response:

Yes, the 410 GJ per day (150 TJ annually) is provided under a take or pay contract.

- 19.4.1 Please confirm, or otherwise explain, that the minimum RIPET demand is included in PNG's Annual Contracting Plan.

Response:

Yes, the minimum RIPET demand of 410 GJ per day (150 TJ annually) is included in PNG's Annual Contracting Plan.

- 19.5 How does PNG manage the volume imbalance between RIPET's forecast demand of 33,000 GJ/month (approximately 1.1 TJ/day) and the minimum contract demand of 410 GJ/day? Please also discuss how PNG manages its price risk exposure in this event.

Response:

PNG manages the volume imbalance between RIPET's forecast demand and the minimum contract demand as part of its daily gas balancing.

**20.0 Reference: Annual Demand Forecast
Exhibit B-1, Section 7.3.3, pp. 98, 101–102
Large Customer Forecasts – Fort St. John**

On pages 101 to 102 of the Application, PNG states:

Four oil and gas producers operate seven production facilities whose fuel gas requirements are provided by PNG on the Fort St. John system. Fuel gas loads in oil and gas field operations is typically consumed by compressors, line heaters and space heating. PNG anticipates that a portion of this load will be lost as producers respond to federal and provincial initiatives and convert their field compressors to electric drive units. PNG has reflected a loss of 60 percent of the compressor fuel gas load by 2030 under the Reference scenario, and a loss of all of the compressor fuel gas load by 2030 under the Competitive Electricity scenario (Figure 41). PNG has reflected no reduction in compressor fuel gas load under the Competitive Gas scenario.

- 20.1 Please discuss, and provide details of, the federal and provincial initiatives that PNG expects to result in oil and gas producers converting to electric drive units, including the anticipated timing for conversion.

Response:

The CleanBC Plan identifies electrification of the upstream oil and gas industry as an initiative:

For areas like the Peace Region, this means electrifying industrial operations which up until now have depended on carbon-intensive fuels. In the South Peace, demand for electricity is growing faster than in any other part of British Columbia, largely due to natural gas exploration and development in the nearby Montney region. The Dawson Creek/Chetwynd Area Transmission Project has doubled electricity capacity in the area, allowing natural gas activities to be powered by clean electricity and avoid millions of tonnes of new greenhouse gas emissions. In the meantime the Peace Region Electricity Supply (PRES) project will make it easier to replace natural gas combustion with electricity. Switching to clean electricity will make B.C.'s natural gas the cleanest in the world. (CleanBC Plan, p. 43)

- 20.2 Please explain how PNG established a loss of 60 percent by 2030 for the Reference and Competitive Electricity Scenarios. Please detail the assumptions made and provide supporting rationale.

Response:

As stated on page 101 of the Application, PNG serves four oil and gas producers operating seven production facilities whose fuel gas requirements are provided by PNG through the Fort St. John system. In its Reference, Competitive Gas and Competitive Electricity scenarios, PNG has included a range of plausible outcomes of the CleanBC electrification policy that reflect a loss of four, zero and all customers, respectively. PNG has no insight into the timing of these conversions, or whether they would in fact occur. However, PNG submits that not including some illustrative outcomes to the CleanBC policy would not be appropriate.

- 20.3 Please explain why PNG assumed no reductions in compressor fuel gas load under the Competitive Gas scenario. Please provide any relevant calculations in your response.

Response:

Please see the response to Question 20.2.

- 20.4 Please discuss the factors PNG considered when preparing the 2019 Projection and 2020 to 2029+ Forecasts for Commercial Transportation (RS23) in the Fort St. John service area.

Response:

Please see the responses to Questions 18.1.1 and 18.2.

**21.0 Reference: Annual Demand Forecast
Exhibit B-1, Section 7.3.3, pp. 98, 101
Large Customer Forecasts – Dawson Creek**

21.1 Please provide a discussion on the factors PNG considered when preparing the 2019 Projection and 2020 to 2029+ forecasts for Commercial Transportation (RS23) in the Dawson Creek service area.

Response:

Please see the responses to Questions 18.1.1 and 18.2.

**22.0 Reference: Annual Demand Forecast
Exhibit B-1, Section 7.3.3, pp. 98, 103-104
Large Customer Forecasts – Tumbler Ridge**

On pages 103 to 104 of the Application, PNG states:

Opportunities for [Canadian Natural Resources Ltd.] CNRL to electrify its Murray River fuel gas loads are limited by the proximity to the BC Hydro grid in all but the northern extent of the production area. The impact of the Province's electrification policies on the demand from CNRL Murray River are expected to be in the range of 10 to 15 percent of existing demand, with this reduction expected to be offset by increased demand from additional production in the area.

22.1 Please discuss the provincial electrification policies that PNG expects to impact CNRL.

Response:

Please see the response to Question 20.1.

22.2 Please explain how PNG established a reduction of 10 to 15 percent of existing demand. Please detail the assumptions made and provide supporting rationale.

Response:

PNG's forecast of demand for 2020 and beyond is based on detailed discussions with CNRL on their operations and production plans for the area. Please see pages 103 to 104 of the Application.

22.3 Please confirm, or otherwise explain, whether the increased demand referenced in the preamble above refers to CNRL restarting production from its low-pressure wells in Murray River.

Response:

Confirmed. Please see pages 103 to 104 of the Application.

**23.0 Reference: Annual Demand Forecast
 Exhibit B-1, Section 7.3.3, p. 105
 Season and NGV Demand**

On page 105 of the Application, PNG states: “PNG no longer has any customers under the [Natural Gas Vehicle Fleet] NGV rate.”

23.1 Please confirm, or explain otherwise, that PNG still offers the NGV rate.

Response:

Confirmed.

23.1.1 Please confirm when PNG ceased to have any customers under the NGV rate.

Response:

Customer taking deliveries under Rate 7 (Natural Gas Vehicles) ceased in April 2018.

23.2 Please provide a breakdown of actual historic demand attributed to large commercial, industrial, seasonal or NGV customers for 10 years prior to the last year a customer took service under the NGV.

Response:

Please see the table that follows.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
PNG-West											
Large Commercial Firm Sales	80,884	107,628	93,130	33,585	73,949	83,539	71,067	74,980	41,431	17,625	47,539
Commercial Firm Transportation	127,839	122,819	139,516	160,667	158,056	141,434	133,981	142,534	146,155	156,752	152,624
Small Industrial Sales (RS4)	594,603	698,531	704,019	833,955	780,603	736,199	758,854	778,203	886,942	982,382	873,850
Seasonal	16,353	17,528	14,256	17,946	16,970	18,786	16,360	22,776	40,297	43,488	34,300
NGV	15,467	13,381	10,838	10,618	9,274	7,661	5,823	4,210	2,770	675	12
Industrial Transportation ⁽¹⁾	-	-	-	-	-	-	-	-	-	-	-
Interruptible Sales and Transport	25,783	30,661	30,864	33,066	27,230	47,685	80,389	183,065	137,425	59,257	191,077
	860,929	990,548	992,623	1,089,838	1,066,082	1,035,304	1,066,473	1,205,768	1,255,019	1,260,179	1,299,402

(1) Rio Tinto Alcan Firm Contract Demand 120.1 e³m³ per day at

- 23.3 Please discuss the reasons why PNG no longer has any customers under the NGV rate.

Response:

Due to the high cost of compressor maintenance and the high natural gas cost at the time, PNG's sole CNG customer (Far West Fuels) removed their compression equipment and therefore there are currently no natural gas compression facilities located on or adjacent to the PNG-West system. Without this infrastructure, it is very difficult to market CNG to small fleets.

- 23.4 Please discuss whether PNG has considered options to attract new customers under this rate.

Response:

PNG has evaluated the opportunity to serve CNG customers on the PNG-West system but there are currently not sufficient numbers of large volume, return to base fleets to support the installation and operation of a CNG compressor facility in the region.

- 23.4.1 If no options have been considered, please explain why not.

Response:

Please see the response to Question 23.4.

- 23.5 Please provide a forecast of the number of potential NGV customers and their associated demand, detailing any assumptions made.

Response:

PNG currently projects zero NGV customers within this demand forecast period.

**24.0 Reference: Annual Demand Forecast
Exhibit B-1, Section 7.3.4, pp. 105–106
RECAP and Forecast Demand**

On page 105 of the Application, PNG states:

Recent changes in market conditions, especially in the LNG sector, have revived interest in PNG's transmission pipeline capacity. In response, PNG conducted an open season in the fourth quarter of 2018 to measure the demand for reactivated capacity as well as for expansion capacity on its pipeline system. PNG terminated that process because demand was not sufficient at that time to warrant the contemplated large-scale expansion of PNG's transmission system. The open season did, however, identify potential significant demand for capacity presently available on PNG's transmission system.

- 24.1 Please provide a summary of the potential for capacity demand identified during the fourth quarter 2018 open season.

Response:

During the fourth quarter of 2018, PNG solicited non-binding Expressions of Interest for potential capacity demand from various parties that totalled in excess of 1.4 BCF/day. With that in mind, PNG held a binding open season in Q1 2019, for reactivated capacity as well as for expansion capacity on its PNG West pipeline system. The open season resulted in parties prepared to commit up to a total of 326 MMCF/day, which was not sufficient to support the development of the expansion project.

- 24.2 Please discuss whether the identification of potential significant demand as discussed in the preamble above has been considered in PNG's forecasting scenarios.

Response:

PNG has not reflected any of these potential volumes in any of the forecasting scenarios.

Further on page 106, PNG states:

PNG has not reflected any outcomes of the RECAP in any of its forecasting scenarios. At this time, PNG has no clear indication of the outcome of the RECAP and will not speculate on any likely uptake of spare capacity.

Depending on the RECAP demands, and the requested delivery points, PNG has modeled the full extent of the capital costs for the reactivation recommissioning, and system reinforcement to be up to approximately \$120 million. The activities include compressor rehabilitation, pipeline reactivation and system reinforcement.

While PNG could reasonably include sufficient additional demand under the Competitive Gas scenario that would result in a fully utilized transmission system, such a forecast provides little if any meaningful information.

- 24.3 Please discuss the probable outcomes of the Process for Allocation of Reactivated Capacity (RECAP) and for each of the probable outcomes, please provide an updated demand forecast, clearly explaining how these outcomes would affect PNG's demand and supply portfolio.

Response:

As stated above, PNG has no clear indication of the outcome of the RECAP. It is possible that zero volumes could be allocated due to the changing world demand for LNG and then again it is possible that the full capacity could be contracted. The probability of each of these outcomes is currently unknown given the volatility in the political relations in Asia, the short and long term supply/demand for LNG and the current Coronavirus outbreak and resulting commercial/industrial shutdown in Asia.

- 24.4 Please discuss why PNG believes that including the forecast demand from the RECAP process in its forecasting scenarios does not provide any meaningful information.

Response:

PNG's application for the approval of the Reactivated Capacity Allocation Process (RECAP application) requests approval of the underlying elements that will support the PNG's proposed RECAP Open Season auction process, including a new tariff for large volume industrial transportation service.

On February 28, 2020 the BCUC issued Order G-35-20 approving all requests made in PNG's RECAP application.

PNG has determined the available spare capacity available to an Open Season on its PNG-West system giving due consideration of the current and future demand from its existing customers. Under all forecasting scenarios presented in Appendix E (Design Day Demand) of the Application, and with the exception of short term demand from the temporary LNG Canada workcamp between 2020 and 2024 (to 2028 in the Competitive Gas scenario), the demand on the PNG-West system is expected to be lower at the end of the 20 year planning period, than it is today.

PNG could have included demand forecast scenarios that reflect subscription of varying amounts of available capacity in the Open Season. However, under any outcome of the Open Season, the PNG-West system will have sufficient capacity to serve all of the demand from all of the loads that have been identified in the Application.

Depending on the amount of available capacity subscribed through the anticipated Open Season, PNG would initiate a project or projects to reactive one or more compressor stations. PNG expects that such projects would be fully described in either an application for a Certificate of Public Convenience and Necessity (CPCN) or through a revenue requirements application. PNG submits that these established processes are sufficient for the BCUC and Interveners to review the implications of these projects, specifically on the ability of the PNG-West system to serve current and future loads.

- 24.5 Please explain how PNG arrived at a capital cost estimate of \$120 million.

Response:

PNG prepared an Engineering Class 4 and 5 estimate of the capital required to facilitate various combinations of volumes and delivery locations, with the highest cost being estimated at \$120 million. This is addressed in the RECAP application.

**25.0 Reference: Residential and Small Commercial Demand
 Exhibit B-1, Section 1, p. 20, Section 6, pp. 73–76; PNG (N.E.) 2015 Resource
 Plan for the Fort St. John, Dawson Creek and Tumbler Ridge Distribution
 Systems Decision and Order G-155-15 dated September 30, 2015, p. 8
 Residential End Use Survey**

On page 20 of the Application, PNG provides the following table of BCUC requests and directives and the current status:

G-155-15	The Panel directs PNG(N.E.) to include a summary of the assessments performed and the results of such assessments PNG relied on to inform the timing of the REUS and small commercial customer survey in the next resource plan filing. (p. 8)	PNG decided not to refresh the results of the entire 2013 REUS. PNG has no indications from the year over year trend of its residential and small commercial use per accounts, that customer characteristics or end use behaviour has changed substantially. However in 2019, PNG completed a Customer Attitudes Survey targeted at both residential and commercial customers, that addressed a range of topics including attitudes and beliefs about the environment, natural gas and renewable energy; satisfaction with customer service interactions; interest in online services from PNG; participation and interest in energy-efficiency initiatives, and willingness-to-purchase natural gas augmented with bio-methane. A set of questions on customers natural gas appliances and dwelling characteristics, similar to those included in the 2013 REUS, were included as well. Section 3 presents a summary of the results.
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Further on page 73, of the Application, PNG states:

In 2013, PNG completed a residential end-use survey (2013 REUS) that collected information on factors influencing residential demand including: residential dwelling types, amount of insulation, types and numbers of natural gas and electric appliances, the age of natural gas furnaces and hot water heaters, and the number of occupants as well as their energy use behaviour.

The Customer Attitudes Survey, completed in 2019, collected information on the main and secondary sources of space heating, and the fuel used for heating domestic hot water. No statistically significant differences in the results from the 2013 REUS and the 2019 Customer Attitudes Survey were found.

- 25.1 Please explain how PNG can be informed of the year over year trend of its residential and small commercial use per accounts, customer characteristics and that end-use behaviour has not changed substantially, if it did not compete a REUS.

Response:

Please see the table that follows. PNG has compared the actual UPA in 2018, of its residential customers, with the UPA forecast for 2018 in the 2014 and 2015 Resource Plans for PNG-West and PNG(N.E.), respectively. While the decline in UPA over the period 2014 to 2018 in all divisions has been greater than predicted, it is not excessively so. Actual residential UPA in PNG-West and Fort St. John is approximately four percent lower than forecast, while in Dawson Creek, the forecast of UPA in 2018 matches the actual UPA. In Tumbler Ridge, which has a small customer base that is more susceptible to changes in occupancy of even a small number of dwellings, the forecast UPA was within 8 percent of the actual UPA in 2018.

Residential Use per Account	PNG-West	FSJ	DC	TR
2014 Forecast for 2018	69.5	112.5	98.9	79.0
2018 Actual	66.8	107.6	98.8	72.8
Difference	-3.9%	-4.4%	-0.1%	-7.8%

PNG submits that its forecasting error of residential UPA of less than 5 percent in all divisions except Tumbler Ridge illustrates that the current residential UPA forecasting model remains valid. PNG submits that the comparison of actual and forecast UPA does not suggest that a fundamental change in natural gas consumption amongst residential customers has occurred over the past six years since the REUS was completed. PNG has updated its residential end-use forecasting model to reflect an accelerated decline in residential UPA over the historical period between this and the last resource plans, and of the expected impact of the CleanBC policies and the Pan-Canadian Framework. Undertaking the additional effort and cost of updating the 2013 REUS would not provide sufficient improvements to PNG’s residential end-use model to be justified.

In addition, the 2019 Customer Attitudes Survey collected information on the main and secondary sources of space heating, the fuel used for heating domestic hot water, and residential housing mix. The comparison of these attributes is found in the tables that follow. These three factors are the primary influencers of residential UPA. PNG does not view the differences between the results from the 2013 REUS and the 2019 Customer Attitudes Survey as significant.

Comparison of natural gas penetration rates by end use: 2013 REUS and 2019 Customer Attitudes Survey

	Penetration of Natural Gas - Primary Space Heating		Penetration of Natural Gas - Secondary Space Heating		Penetration of Natural Gas - Domestic Hot Water	
	2013	2019	2013	2019	2013	2019
PNG-West	83.9%	90.2%	23.4%	30.4%	64.2%	70.1%
PNG(N.E.)	97.9%	97.2%	13.7%	22.3%	79.0%	79.5%

Comparison of residential dwelling types: 2013 REUS and 2019 Customer Attitudes Survey (Reproduced from Figure 20, p. 79 of the Application)

	SFD		MFD		Apartments		Mobile Homes	
	2013 ⁽¹⁾	2019 ⁽²⁾	2013	2019	2013	2019	2013	2019
PNG-West	84.5%	93.1%	6.2%	2.5%	0.4%	0.5%	8.3%	4.0%
PNG(N.E.)	80.0%	80.6%	7.0%	13.3%	0.3% ⁽³⁾	0.0%	11.0%	6.2%

(1) 2013 Residential End Use Survey

(2) 2019 Customer Attitudes Survey

(3) Only apartments having an individual gas meter, and where the occupant receives a gas bill, have been included in the Residential End-Use Survey. Apartment dwellings are therefore unrepresented in the survey.

Finally, PNG wishes to point out that the REUS is restricted to residential customers only. PNG's 2019 Customer Attitudes Survey was the first survey that provided a comprehensive set of information on PNG's commercial customers. It was more comprehensive than the 2015 survey that was restricted to property managers and owners of commercial and rental buildings.

- 25.2 Please explain how, if at all, PNG has satisfied the directive on page 8 of the PNG (N.E.) 2015 Resource Plan for Application for Acceptance of the 2015 Resource Plan for the Fort St. John, Dawson Creek and Tumbler Ridge Distribution Systems Decision.

Response:

The REUS that PNG completed in 2013 was the first in depth survey of residential customers that PNG has ever completed. It provided a comprehensive view of the makeup and energy related consumptive behaviour of residential customers that was generated at considerable effort and expense. While these results are of a point in time, given the low rate of growth of PNG's residential customers, and the favourable attitude of customers towards natural gas, PNG expects the data and associated analyses to remain valid for a considerable period of time.

Therefore in 2019, six years after the first REUS was completed, PNG decided to test continued validity of its 2013 REUS results with a new survey that would collect a new set of information from residential and commercial customers and also collect data on dwellings and primary end uses of natural gas that can be compared to the results from the 2013 REUS. As discussed in the response to Question 25.1, the results from the 2019 Customer Attitudes Survey validated the continued applicability of the results from the 2013 REUS. Based on these findings, and on the response to Question 25.1, PNG does not anticipate undertaking the considerable expense and effort to update the 2013 REUS in the immediate future.

- 25.2.1 How does Customer Attitudes Survey serve as an adequate substitute or proxy to a REUS? Please discuss.

Response:

Please see the responses to Question 25.1 and 25.2.

- 25.3 Please provide a summary of the differences between the 2013 REUS and the 2019 Customer Attitudes Survey.

Response:

Please see the response to Question 25.1.

- 25.4 Please provide a summary and comparison of the results of the 2013 REUS and the 2019 Customer Attitudes Survey for PNG-West and PNG(N.E) for each factor influencing residential demand.

Response:

Please see the response to Question 25.1.

- 25.5 Please provide a detailed explanation of how PNG concluded that there are no indications of substantial change in residential and small commercial use per accounts, customer characteristics or end use behaviour without carrying out a REUS.

Response:

Please see the response to Question 25.1.

On pages 73–76 of the Application, PNG has provided information on residential end-use characteristics and annual use per account including figures 12, 13 ,14, 15, 16 and 17.

- 25.6 Please explain the source of the information provided on the pages referenced in the preamble above.

Response:

The source of the data presented in Figures 12 through 16 on pages 74 and 75 of the Application is the 2013 REUS. The proportional representation of the end-uses of natural gas amongst residential customers that is presented in Figure 17 (page 75) of the Application is based on the results of the 2013 REUS and associated conditional demand analysis. The UPA, expressed as GJ per year, presented in each chart in Figure 17 reflects the actual 2018 weather normalized UPA.

- 25.7 Please provide details of the time, resources required and estimated cost to update the 2013 REUS in its entirety.

Response:

Based on PNG's costs to execute the 2013 REUS, analyze and report on the results, and develop the Conditional Demand Analysis (CDA) that forms the basis for the residential forecasting model, PNG estimates that completing a similar scope of work today for only residential customers would cost in the neighbourhood of \$125 to \$150 thousand. By way of comparison, PNG's 2019 Customer Attitudes Survey cost approximately \$50 thousand to execute, and provided information on both residential and commercial customers.

**26.0 Reference: Demand Forecasting
Exhibit B-1, Section 7.3.1.1, pp. 81–85
Residential Customer Additions Forecasts**

On page 82 of the Application, PNG states:

The number of households in the Local Health Areas (LHA) served by PNG-West is expected to increase by an average of 0.7 percent per year over the forecast period. The number of households in the North and South Peace LHA's are expected to increase on average 1.8 percent per year, and 0.6 per cent per year, respectively over the forecast period.

26.1 Please explain which of PNG's service areas correspond to the North and South LHAs described in the preamble above.

Response:

The Fort St. John service area corresponds to North Peace LHA; Dawson Creek and Tumbler Ridge correspond to the South Peace LHA.

On page 82 of the Application, PNG states:

The capture rates are determined in a manner consistent with that described 2015 Resource Plan for PNG(N.E.) and is based on a comparison of housing starts and actual customer additions in each region over the past five years. Housing starts in PNG-West have not kept pace with the loss of customers over the past 10 years. Consequently, capture rates cannot be determined using this approach. The very low level of building activity in Tumbler Ridge does not provide a statistically meaningful value for customer capture rates in that region.

PNG has adjusted its customer captures rates used in its residential demand forecasts, based on the analysis presented here. Capture rates adopted for the demand forecasts for 2020 in all regions are approximately 10 percent lower than those used in the 2014 and 2015 Resource Plans

Table 21: New customer capture rates – Historical and Forecast (2020)

	Historical Average			Forecast (2020)		
	10-Year	5-Year	3-Year	Reference	Competitive Gas	Competitive Electricity
PNG-West (West)	-128%	-82%	2%	65%	75%	50%
PNG-West (East)				90%	90%	70%
FSJ/DC	88%	74%	93%	90%	90%	70%
Tumbler Ridge	68%	130%	na	90%	90%	70%

26.2 Please reconcile the statement ‘capture rates are determined in a manner consistent with that described 2015 Resource Plan for PNG(N.E.)’ and ‘Consequently, capture rates cannot be determined using this approach’.

Response:

Capture rates of new construction are determined by comparing data on housing starts from BC Stats with actual customer additions. The results averaged over three, five and ten years are shown in Table 21, page 82 of the Application. This method is only applicable in cases where customer additions are significantly greater than customer losses. This has not been the case in PNG-West which experienced a net loss of customers over the past five and ten years, and a small net gain over the past three years.

PNG wishes to comment that the number of customer additions in each of PNG service areas is exceedingly small. In 2018, PNG(N.E.) added 72 customers in Fort St. John, and 47 in Dawson Creek, while Tumbler Ridge experienced a net loss of 2 customers. PNG-West experienced a net loss of 32 customers.

PNG could spend a significant amount of effort developing a more sophisticated forecast of customer additions, and also spend a great deal of effort discussing it in its Application and in these information requests. However, the fact is that, at such low rates of growth, refining the residential customer forecast does very little to improve the validity of the residential demand forecast, and contributes even less to the precision of the overall demand forecast.

PNG has simply reduced capture rates developed in its 2014 and 2015 resource plans by 10 percent to reflect that actual customer additions have generally been lower than those forecast in the 2014 and 2015 resource plans. As a refinement to its customer additions forecast, PNG has implemented a capture rate that declines over the forecast period to reflect the impact of the CleanBC Plan, namely an expectation of an increased rate of decline in customer demand.

PNG has maintained its method of forecasting customer additions used in the 2015 Resource Plan for PNG(N.E.) that was approved by the BCUC and has refined its forecast to reflect the impact of anticipated policies and regulation coming out of the CleanBC Plan. PNG submits that its practical approach is sufficient for the purposes of developing load forecasts for the purposes of the Resource Plan.

Please confirm, or explain otherwise, that PNG has utilized an alternative method for calculating capture rates in the Application.

Response:

Please see the response to Question 26.2.

26.2.1 Please explain how the capture rates for PNG-West (West) and PNG-West (East) have been determined.

Response:

Please see the response to Question 26.2.

26.2.2 Please explain how the capture rates for Tumbler Ridge have been determined.

Response:

Please see the response to Question 26.2.

26.3 Please confirm, or explain otherwise, that PNG calculated capture rates using a method other than using housing starts and this method is consistent with the 2015 Resource Plan for PNG(N.E.).

Response:

Please see the response to Question 26.2.

26.4 Please explain, providing calculations where relevant, how PNG derived capture rates adopted in the demand forecast for 2020 which were 10 percent below those found in the 2014 and 2015 resource plans.

Response:

Please see the response to Question 26.2.

Further on page 83 of the Application, PNG has provided declining capture rates for each of PNG's services areas in the following table:

Table 22: New residential customer capture rates over forecast period

Residential	Capture Rates (Reference Case)		
	2020	2029	2038
PNG-West (West)	65%	57%	50%
PNG-West (East)	90%	79%	69%
FSJ/DC	90%	82%	75%
Tumbler Ridge	90%	82%	75%

26.5 Please explain how PNG has forecasted the decreases in the capture rates for 2029 and 2038 described for each of its service areas in the preamble above.

Response:

Please see the response to Question 26.2.

26.6 Please confirm if the capture rates have been adjusted for the competitive gas and competitive electricity scenario.

Response:

Appendix C of the Application presents a table of residential captures rates for select years of the planning period for each of the three planning scenarios: Reference, Competitive Gas, Competitive Electric. This table is reproduced below.

New Customer Capture Rates Residential	REFERENCE			COMPETITIVE GAS			COMPETITIVE ELECTRICITY		
	2020	2030	2038	2020	2030	2038	2020	2030	2038
PNG-West (Western Region)	65%	56%	50%	65%	65%	65%	65%	36%	23%
PNG-West (Eastern Region)	90%	78%	69%	90%	90%	90%	90%	61%	44%
Fort St. John	90%	81%	75%	90%	90%	90%	90%	74%	63%
Dawson Creek	90%	81%	75%	90%	90%	90%	90%	74%	63%
Tumbler Ridge	90%	81%	75%	90%	90%	90%	90%	74%	63%

26.6.1 If yes, please provide the details of the same.

Response:

Please see the response to Question 26.7.

26.6.2 If no, please explain why they have not been adjusted.

Response:

Not applicable. Please see the response to Question 26.7.

On pages 83 and 84 of the Application, PNG states:

In the Fort St. John/Dawson Creek area, actual customer additions over the period from 2014 to 2018 have exceeded forecast additions by seven percent. In the PNG-West region, PNG exhibited a net loss of customers, rather than a gain of over 500 as forecast in the 2014 Resource Plan. Despite this discrepancy, PNG maintains its forecast of higher than historical customer additions in this region, particularly in Terrace and Kitimat, to reflect the increase of economic activity fueled by the LNG Canada construction work. Tumbler Ridge also exhibited little or no growth in customers over the 2014 – 2018 period. In this case, PNG has revised downwards, the forecast based on the LHA projections.

26.7 Please explain why the effects of the increased economic activities described in Section 2.2.2.2 on pages 47 to 54 for PNG(N.E.) service areas have not been considered in PNG's forecast of customer additions and capture rates.

Response:

PNG bases its forecast of residential customer additions on the BC Stats forecast of household formations in the Local Health Areas (LHA's) associated with each of PNG's systems. The BC Stats forecast takes into account anticipated economic activity in the LHA's.

On pages 84 and 85, PNG has provided Figures 22, 23, 24 and 25 with the 2014 forecast and actual (2014-2018) customer additions for each of its services territories. Except for Fort St. John, PNG's forecasts for each of its services territories were overestimated for the 2014-2018 period.

26.8 Please explain the reasons for the differences between the forecast and actual customer additions for 2014-2018 period for each of PNG's service territories.

Response:

PNG has not determined the reasons for the differences between the forecast and actual customer additions for the 2014 to 2018 period. As stated in PNG's response to Question 26.2, PNG could spend a significant amount of effort analyzing historical results in order to develop a more sophisticated forecast of customer additions. However, PNG submits that, at such low rates of growth, refining the residential customer forecast will not significantly improve the validity of the residential demand forecast, nor would it contribute appreciably to the precision of the overall demand forecast

**27.0 Reference: Demand Forecasting
 Exhibit B-1, Section 7.3.1.2, pp. 85–90, Appendix B-1, Appendix B-2
 Residential Use per Account (UPA) Forecast**

On page 88 of the Application, PNG states:

Actual UPA in all systems over the period from 2014 to 2018 has been lower than forecast in the previous resource plans.

27.1 Please explain the reasons for the differences between the forecast and actual UPA for 2014-2018 period for each of PNG’s service territories.

Response:

The difference between the forecast and actual UPA’s for each service area is shown in the table that follows.

	Residential UPA in 2018 (Forecast vs Actual)		
	Reference Forecast	Actual	% Difference
PNG-West	69.62	67.00	-3.8%
Fort St. John	112.53	107.60	-4.4%
Dawson Creek	98.91	98.84	-0.1%
Tumbler Ridge	78.95	72.69	-7.9%

PNG has not analyzed the reasons for the differences between forecast and actual UPA’s. PNG submits that achieving a deviation between actual and forecast UPA in the fifth year of a forecast period of less than five percent for all residential customers outside of Tumbler Ridge reflects very positively on PNG’s forecasting method. Even in Tumbler Ridge, which includes approximately 1,100 residential customers, PNG has achieved a deviation of less than eight percent.

PNG’s end use forecasting model, used to develop the forecast UPA’s, is based on the results of the 2013 REUS, on a sophisticated statistical analysis of customer attributes and recorded demand, and on the weather normalization of historical residential UPA. All of these analyses rely on imperfect data. PNG submits that achieving an accuracy of five percent after five years is therefore a very reasonable outcome.

Nevertheless, as stated on page 88 of the Application, PNG does note that in all cases except for Dawson Creek, actual 2018 UPA is consistently less than forecast. PNG has adjusted its end-use forecasting model to account for the expected impact of the CleanBC Plan, namely a sharper decrease in the natural gas consumption in new construction dwellings, penetration of natural gas for space

heating applications that declines over the planning period, new customer capture rates that decline over the planning period, and an increased impact of energy retrofits on existing homes to make them more energy efficient. All of these factors are presented in Appendix C of the Application. The impact of these adjustments is a sharper decrease in the forecast residential UPA, as illustrated in Figures 26 through 29 (pages 88-90) of the Application.

- 27.2 Please explain how the UPA forecasts have been adjusted to account for results of the 2019 Customer Attitudes Survey.

Response:

The residential UPA forecasts have not been adjusted to account for the results of the 2019 Customer Attitudes Survey. As stated in PNG's response to Question 25.1, the 2019 Customer Attitudes Survey collected information on the primary influencers of residential UPA: the main and secondary sources of space heating, the fuel used for heating domestic hot water, and residential housing mix. PNG does not view the differences between the results from the 2013 REUS and the 2019 Customer Attitudes Survey as significant. For an explanation of how PNG has adjusted its UPA forecasts, please see the response to Question 27.1.

On page 1 of Appendix B-2 of the Application, PNG states:

The attributes have been quantified in terms of their degree of penetration in each housing segment. In the case of the existing stock archetype, the degree of penetration has been taken from the results of the Residential End-Use Survey.

Further on pages 2-6 of Appendix B-2, PNG provides its annual use per account and degree of penetration for attributes in each of its service areas for Building Archetypes.

- 27.3 Please explain if the penetration of existing stock archetype has been updated with the results from the 2019 Customer Attitudes Survey.

Response:

PNG has not updated the penetration of the existing stock archetype.

27.3.1 If yes, please provide details of how these have been updated.

Response:

Not applicable.

27.3.2 If no, please explain why these have not been updated.

Response:

As presented in its response to Question 25.1, PNG compared the makeup of residential dwelling types as determined from its 2013 REUS and 2019 Customer Attitudes Survey. The comparison, presented in Figure 20, p. 79 of the Application, is reproduced below. PNG does not view the differences between the results from the 2013 REUS and the 2019 Customer Attitudes Survey to be significant.

	SFD		MFD		Apartments		Mobile Homes	
	2013 ⁽¹⁾	2019 ⁽²⁾	2013	2019	2013	2019	2013	2019
PNG-West	84.5%	93.1%	6.2%	2.5%	0.4%	0.5%	8.3%	4.0%
PNG(N.E.)	80.0%	80.6%	7.0%	13.3%	0.3% ⁽³⁾	0.0%	11.0%	6.2%

(1) 2013 Residential End Use Survey

(2) 2019 Customer Attitudes Survey

(3) Only apartments having an individual gas meter, and where the occupant receives a gas bill, have been included in the Residential End-Use Survey. Apartment dwellings are therefore unrepresented in the survey.

**28.0 Reference: Sensitivity Analysis
Exhibit B-1, Section 2.1.1, pp. 23–32; Section 2.2.2, pp. 47–54; Section 7.4,
pp. 110–111
Policy Environment and Outlook and Scenario Assumptions**

On pages 110 to 111 of the Application, PNG states:

PNG has developed a Reference scenario that reflects the current mix of natural gas appliances and insulation in existing construction, and the current mix of SFD and MFD buildings being constructed in PNG’s service areas. Forecasts of UPA for residential and commercial construction reflect changes to the mix of new construction as well as improvements to the energy efficiency of new construction, and building retrofits, that are aligned with the policy actions and targets identified in the CleanBC Plan. Forecast changes to large customers’ loads are based on known additions and removals of these loads as well as on an estimated response to the CleanBC policy to promote the electrification of the upstream oil and gas sector.

- 28.1 For each federal, provincial and municipal policy or incentive summarized in section 2.1.1 of the Application, please compare the assumptions made in the Reference scenario against the assumptions made in the Competitive Gas and Competitive Electric scenarios. Please provide the rationale for any differences.

Response:

All of the influences of public policies are laid out in Section 7 of the Application and summarized in Appendix C. More specifically, PNG has varied the new customer capture rates to reflect a range of outcomes that could be expected under each of the three planning scenarios (Reference, Competitive Gas, Competitive Electric) (Table 21, p. 83). As a refinement to its existing residential and small commercial forecasting models, PNG has decreased the capture rates over the planning period under both the Reference and the Competitive Electric scenarios (Table 22, p. 83 and Appendix C) to reflect the anticipated impact of the CleanBC Plan’s focus on the electrification of space heating. PNG has applied a similar decline to the penetration of natural gas heated new construction (Table 23, p. 87 and Appendix C). PNG has reflected the CleanBC Plan’s goal of achieving net-zero ready efficiencies in new construction by forecasting a decline in the UPA of new construction of 20 percent by 2025, 40 percent by 2027, and 80 percent by 2032 (p. 87).

The assumptions concerning the demand from large customers under each of the planning scenarios are presented in Section 7.3.3 of the Application. The CleanBC Plan’s stated policy of electrifying industrial operations, notably the electrification of the upstream oil and gas industry, has been reflected to varying degrees in each of the planning scenarios.

- 28.2 For each noteworthy project summarized in section 2.2.2 (Tables 7 to 17) please provide the probability of the project advancing to completion under the Competitive Gas and Competitive Electric Scenarios.

Response:

PNG has not assigned any probabilities to the projects summarized in Section 2.2.2. The purpose of this section is to describe the economic environment in which PNG currently operates. PNG notes that not all of these projects, even if they were completed, would become customers of PNG.

PNG submits that it is very difficult to assign meaningful probabilities to any of the projects identified. The myriad considerations, influencers and decisions that affect the outcome of any large scale resource based project cannot simply be distilled into a probability of whether that project advances. To illustrate this point, consider the current situation in which the Coastal Gas Link project now finds itself. As recent as 12 months ago, one could have reasonably assigned a probability of close to 100 percent to this project progressing to completion as designed, and as scheduled. Today, that probability may be lower, depending on weight given to various influencing factors.

Finally, PNG questions the purpose of assigning probabilities. PNG submits that a probability-weighted demand has little relevance to system planners. Demand from new projects will either materialize, or it won't. There is little to be gained for planning for 50% of the demand from a large customer whose likelihood of materializing has been assigned a probability of 50%.

- 28.2.1 If probabilities have not been calculated, please explain why not.

Response:

Please see the response to Question 28.2.

- 28.3 Please explain how the probabilities have been used to establish the Competitive Gas and Competitive Electricity scenarios. In your response, please explain how the probabilities have been used to inform the capture rates and the use per account for the Residential and Small Commercial customers, and the forecast for the Large Customer Demand.

Response:

PNG has not assigned probabilities to establish the Competitive Gas and Competitive Electric scenarios. PNG has developed these alternative scenarios to present a range of demand forecasts that could plausibly be expected, depending on how public policies, particularly the CleanBC Plan, are enacted into regulation and law.

**29.0 Reference: Sensitivity Analysis
Exhibit B-1, Section 7.4, p. 111; Appendix C, pp. 1–2
Capture Rates Scenario Assumptions**

On page 111 of the Application, PNG states:

The underlying growth in households and small commercial enterprises remains the same in all scenarios, while the capture rates are adjusted to reflect varying degrees of probability that these new households and commercial enterprises become customers of PNG.

On pages 1 to 2 in Appendix C of the Application, PNG summarizes the demand determinants used in each of the planning scenarios for the following categories:

- New Customer Capture Rates Residential
- Portion of New Construction that is Single Family Dwellings
- New Construction (SFD) heated by natural gas
- New Customer Capture Rates Small Commercial
- Energy Efficiency Retrofits
- Energy Efficiency New Construction

29.1 For each category, please provide an overview of how PNG established the demand determinants, detailing any assumptions.

Response:

Please see the responses to Questions 27.1 and 28.1. PNG has developed alternative scenarios to present a range of demand forecasts that could plausibly be expected, depending on how public policies, particularly the CleanBC Plan, are enacted into regulation and law.

**30.0 Reference: Sensitivity Analysis
Exhibit B-1, Section 7.4.1, p. 112
Competitive Gas Scenario**

On page 112 of the Application, PNG states:

Improvements to the energy efficiency of new construction are half those targeted under the CleanBC Plan, while no significant improvements to the energy efficiency of building retrofits are reflected.

- 30.1 Please explain why, with supporting rationale, PNG has assumed that improvements to the energy efficiency of new construction will be half those targeted under the CleanBC Plan for the Competitive Gas scenario.

Response:

Please see the responses to Questions 27.1 and 28.1. PNG has developed these scenarios to present a range of demand forecasts that could plausibly be expected, depending on how public policies, particularly the CleanBC Plan, are enacted into regulation and law.

**31.0 Reference: Sensitivity Analysis
Exhibit B-1, Section 7.4.2, pp. 112–113
Competitive Electric Scenario**

On page 113 of the Application, PNG states: “Improvements to the energy efficiency of new construction meet the CleanBC targets, and improvements to the energy efficiency of building retrofits reach 10 percent by 2030.”

- 31.1 Please explain why, with supporting rationale, PNG has assumed that improvements to the energy efficiency of building retrofits reach 10 percent by 2030 for the Competitive Electric scenario.

Response:

Please see the responses to Questions 27.1 and 28.1. PNG has developed these alternative scenarios to present a range of demand forecasts that could plausibly be expected, depending on how public policies, particularly the CleanBC Plan, are enacted into regulation and law.

**32.0 Reference: Sensitivity Analysis
Exhibit B-1, Section 2.4, p. 57; Section 7.4.3, p. 113
Summary of Scenarios**

On page 113 of the Application, PNG states: “In all systems, the residential and small commercial use per accounts forecast exhibits declines under all three scenarios (Figure 51 through Figure 58).”

32.1 In consideration of the forecasted decrease in demand across all service areas for all scenarios, please discuss whether there is a point at which the PNG system would reach its operational limit.

Response:

PNG is unclear on the reference to “operational limit”. The design day demand is relevant to system capacity planning. Table 35, p. 122 of the Application shows that all of PNG’s systems have adequate capacity to reliably serve current and forecast demand during a design day, which is the demand on the coldest day that is forecast to occur once in 50 years. Declining throughput is not a factor affecting the reliability of the gas distribution system. The distribution system can be thought of as a “pressurized storage bottle” holding a quantity of natural gas at some operating pressure that is automatically regulated through controlled inflows of gas from supply sources when the pressure of the system drops due to demand from customers.

32.1.1 If so, please elaborate further on the operational limits for the system in each service area, and provide any supporting analyses, plans or studies conducted by PNG.

Response:

Please see the response to Question 32.1.

32.1.2 Could the operational limit be reached or exceeded under any of the scenarios presented in the Resource Plan? Please discuss.

Response:

Please see the response to Question 32.1.

32.1.3 How would PNG mitigate the effects, and the impact to customers, in this event? Please discuss.

Response:

Please see the response to Question 32.1.

On page 57 of the Application, PNG provides comparisons of the residential gas rates against the electricity equivalent for PNG’s service areas based on reference gas price forecast and the high carbon plus 5 percent renewable natural gas at \$30 per GJ:

Figure 9: PNG burner tip vs. electricity costs

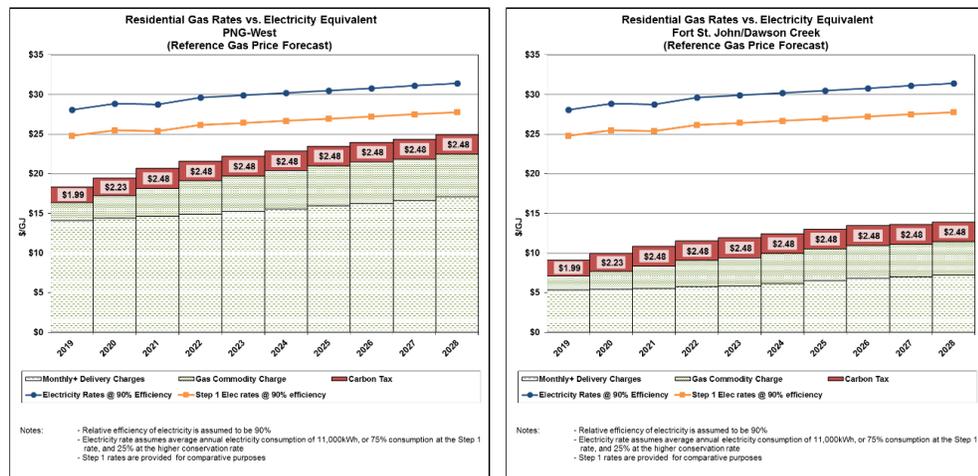
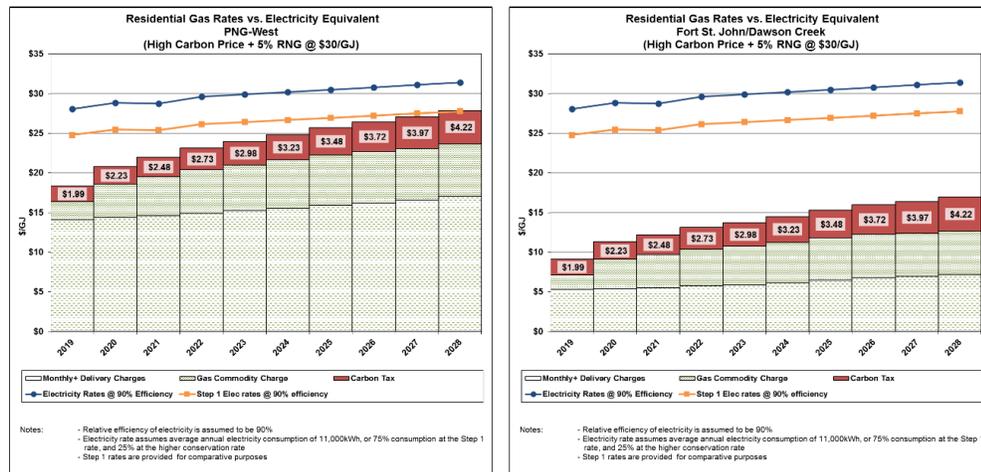


Figure 10: PNG burner tip vs. electricity costs (high carbon price scenario)



- 32.2 For each service area, please provide a comparison of the natural gas rates versus the electricity equivalents, adjusting the Monthly Delivery Charges to represent the demand forecasts under the Reference, Competitive Gas and Competitive Electricity scenarios. Please provide a comparison for (i) Residential; (ii) Small Commercial Customers; and (iii) Large Customers.

Response:

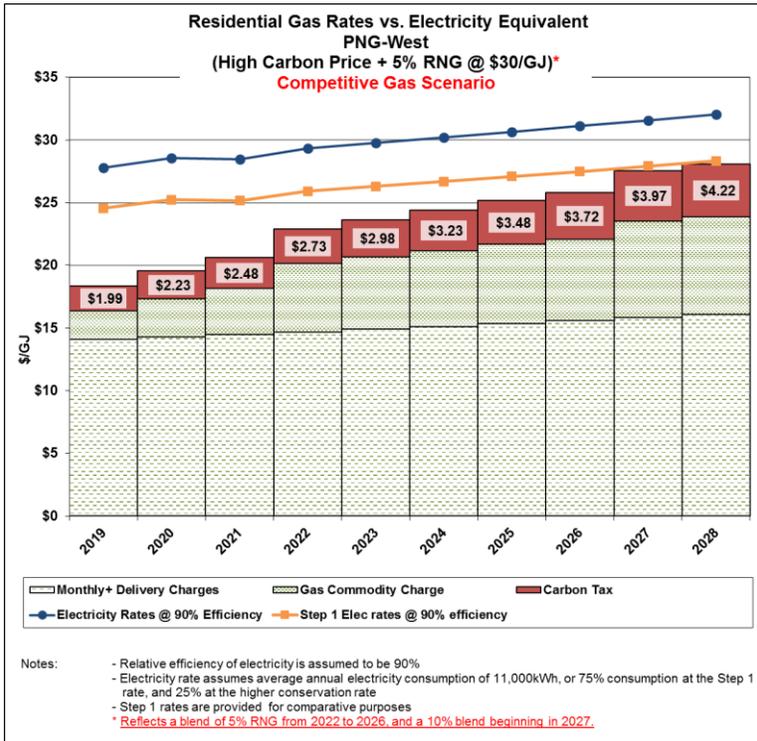
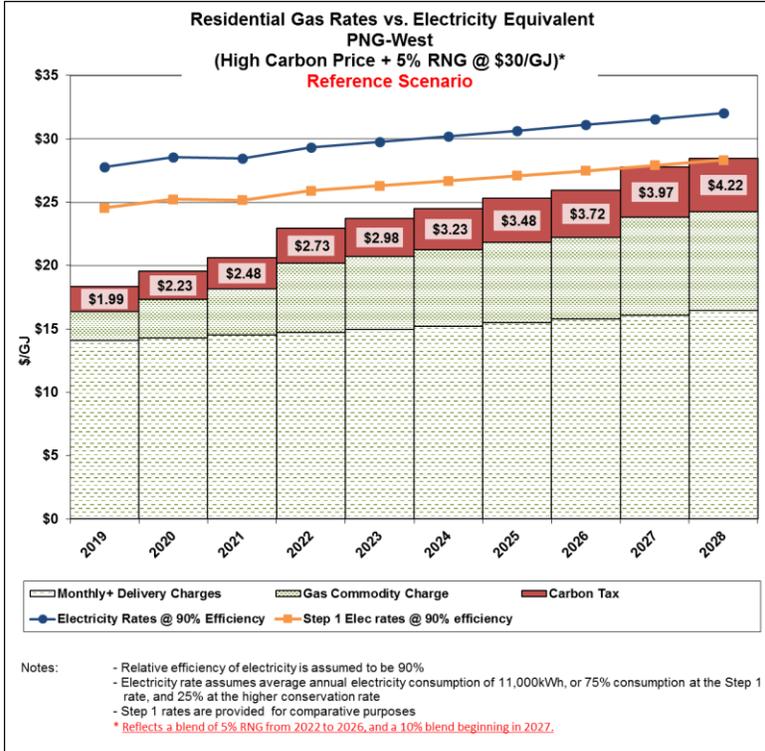
In its comparison of the forecasts of PNG's burner tip rates and electricity costs presented in Figure 10, p. 57 of the Application, PNG has escalated the monthly fixed charge and the delivery charge based on the UPA and system throughput, respectively. Delivery charges are forecast to change in proportion to changes in the throughput forecast for each system, as well as by forecast inflation. This treatment is consistent with how rates are set to recover revenue deficiencies as determined through PNG's revenue requirements applications. The monthly fixed charge is unitized to a cost per GJ, based on the annualized monthly fixed charges, and the annual UPA. Since the UPA is forecast to decline in all planning scenarios, the unitized monthly fixed charge, and therefore the burner tip rate will increase accordingly.

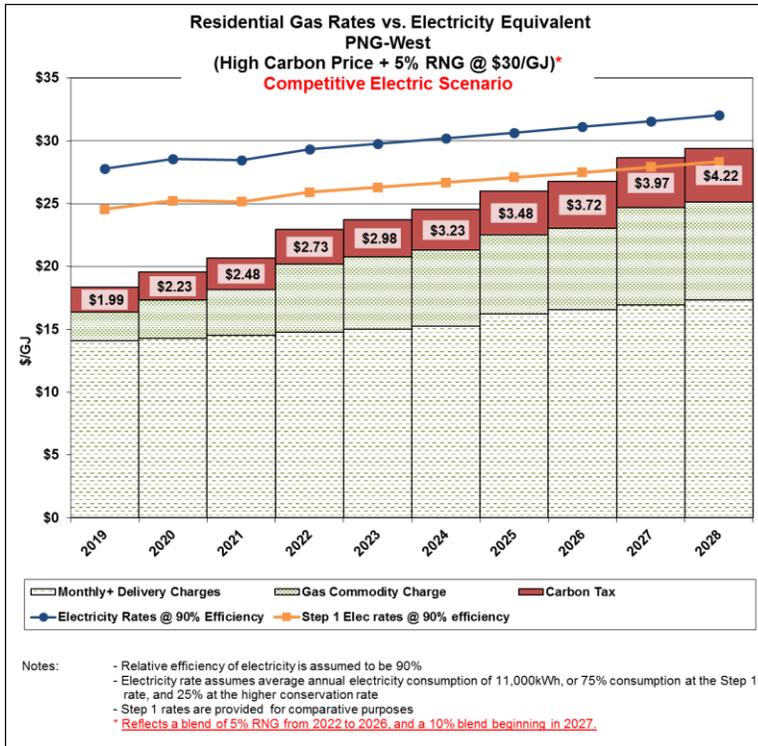
In response to this request, PNG has presented the requested analyses for the residential burner tip rates for PNG-West only. Changes to the forecast UPA and system throughput under each of the planning scenarios are not significant enough to change, significantly, the competitiveness of natural gas with respect to electricity. In Fort St. John and Dawson Creek, the price gap remains significant, whereas natural gas is expected to have some challenges to its cost competitiveness in PNG-West beginning in the later part of this decade.

In light of the considerable effort of doing so, PNG respectfully questions the utility of providing similar charts for all of PNG's customer classes. The competitiveness analysis presented here is based on a number of assumptions including the carbon price, commodity cost, RNG cost and RNG blend, as well as on PNG's cost of service. Suffice to say that upward pressure on any of these cost drivers will decrease the competitiveness of PNG's natural gas deliveries vis a vis electricity. Whether competitiveness alone will result in customer losses is unknowable. Many factors including regulations and incentives promoting electrification, and customer's attitudes will also play a significant role.

PNG also wishes to clarify that the "High Carbon" scenario presented in Figure 10, p. 57 of the Application reflects a blend of 5 percent RNG beginning in 2022, and a 10 percent blend beginning in 2027.

In the charts that follow, PNG has reproduced Figure 10 for PNG-West that includes a note explaining the blending scenario.





32.2.1 Based on the analysis, please discuss whether there is a point at which the rates would be considered uneconomical for PNG’s customers, resulting in a higher rate of customer losses.

Response:

Please see the response to Question 32.2.

- 32.3 Please discuss PNG's proposals for increasing its customer base over the short, medium and long-term.

Response:

PNG is evaluating opportunities to supply remote communities by connecting via our pipeline system or alternate natural gas pipeline supplies.

PNG through its RECAP process is holding an open season auction for capacity on the PNG West system which, if successful, could increase the throughput by upwards of 80 MMCFD for a term of 20 years or greater.

In addition, PNG continues to review opportunities to utilize CNG or LNG to supply the transportation market in Northern BC. Please see also the response to Question 10.1.

- 32.4 Please discuss whether PNG has identified any new areas to which it could provide service.

Response:

Please see the response to Question 9.1.

- 32.4.1 Please provide any estimates of the likelihood, anticipated timelines and costs of any opportunity PNG has identified.

Response:

Please see the response to Question 9.1. PNG anticipates that some opportunities may be realizable within the 2020 to 2021 period.

**33.0 Reference: Sensitivity Analysis
 Exhibit B-1, Section 7.4.3, pp. 117–120
 Summary of Scenarios**

On page 117 of the Application, PNG states:

Demand from residential and small commercial customers comprises 40 percent of the throughput on the PNG-West system. Differences in throughput between all three scenarios from 2019 to 2024 are due primarily to differences in the forecast UPA and customer additions. Increased demand during the period from 2019 to 2024 is due to deliveries to the LNGC temporary construction facilities; this demand is extended an additional five years under the Competitive Gas scenario.

On page 118 of the Application, PNG provides the following table:

Table 30: Cumulative and Average Change in Demand (PNG-West)

Cumulative and Average Annual Change in Demand of:	(2018 - 2038)		
	Reference	Competitive Gas	Competitive Electric
Residential	-25.04% / -1.43%	-14.23% / -0.76%	-32.90% / -1.97%
Small Commercial	-6.17% / -0.32%	7.99% / 0.38%	-11.49% / -0.61%
Total Demand	5.97% / 0.29%	11.49% / 0.55%	-2.22% / -0.11%

On pages 118 to 120 of the Application, PNG summarizes the Cumulative and Average Change in Demand for all service areas under the Reference, Competitive Gas and Competitive Electricity scenarios in Tables 30 to 33.

33.1 Please explain how PNG calculated the cumulative and average change in demand for each of the scenarios in Table 30.

Response:

PNG calculated the cumulative change in demand by comparing the demand forecast at the end of the planning period, in 2038, with the actual weather normalized demand recorded in 2018. The average annual change in demand, when compounded over 20 years, yields the cumulative change in demand.

33.2 For all service areas, please provide a breakdown of the average differences in throughput between all scenarios according to the contributing factor (e.g. forecast UPAs, customer additions etc.). Please provide the analysis both in terms of GJ and percentage weighting.

Response:

Please see the tables that follow.

Cumulative and Average Annual Change in Demand due to:		PNG-West		
		(2018 - 2038)		
		Reference	Competitive Gas	Competitive Electric
Change in Residential Customers (%)	%	9.1% / 0.4%	10.4% / 0.5%	7.0% / 0.3%
Change in Residential Customers (Demand @ 2018 UPA)	GJ	108,112 / 5,406	122,465 / 6,123	82,651 / 4,133
Change in Residential UPA (%)	%	-31.3% / -1.9%	-22.3% / -1.3%	-37.3% / -2.3%
Change in Residential UPA (Demand @ customers in 2038)	GJ	(404,098) / (20,205)	(290,631) / (14,532)	(471,465) / (23,573)
Residential Demand	%	-25.0% / -1.4%	-14.2% / -0.8%	-32.9% / -2.0%
Residential Demand	GJ	(295,986) / (14,799)	(168,166) / (8,408)	(388,813) / (19,441)
Change in Small Commercial Customers (%)	%	9.0% / 0.4%	11.5% / 0.5%	7.5% / 0.4%
Change in Small Commercial Customers (Demand @ 2018 UPA)	GJ	68,515 / 3,426	87,888 / 4,394	57,240 / 2,862
Change in Small Commercial UPA (%)	%	-14.0% / -0.7%	-3.2% / -0.2%	-17.7% / -1.0%
Change in Small Commercial UPA (Demand @ customers in 2038)	GJ	(115,873) / (5,794)	(27,536) / (1,377)	(145,129) / (7,256)
Small Commercial Demand	%	-6.2% / -0.3%	7.9% / 0.4%	-11.5% / -0.6%
Small Commercial Demand	GJ	(47,368) / (2,368)	60,351 / 3,018	(87,889) / (4,394)

Cumulative and Average Annual Change in Demand due to:		FSJ		
		(2018 - 2038)		
		Reference	Competitive Gas	Competitive Electric
Change in Residential Customers (%)	%	31.8% / 1.4%	35.0% / 1.5%	28.9% / 1.3%
Change in Residential Customers (Demand @ 2018 UPA)	GJ	375,429 / 18,771	413,503 / 20,675	341,986 / 17,099
Change in Residential UPA (%)	%	-31.1% / -1.8%	-17.9% / -1.0%	-38.2% / -2.4%
Change in Residential UPA (Demand @ customers in 2038)	GJ	(484,711) / (24,236)	(285,515) / (14,276)	(581,573) / (29,079)
Residential Demand	%	-9.2% / -0.5%	10.8% / 0.5%	-20.3% / -1.1%
Residential Demand	GJ	(109,283) / (5,464)	127,989 / 6,399	(239,587) / (11,979)
Change in Small Commercial Customers (%)	%	35.9% / 1.5%	38.0% / 1.6%	34.0% / 1.5%
Change in Small Commercial Customers (Demand @ 2018 UPA)	GJ	315,677 / 15,784	334,035 / 16,702	298,591 / 14,930
Change in Small Commercial UPA (%)	%	-28.9% / -1.7%	-6.8% / -0.4%	-32.4% / -1.9%
Change in Small Commercial UPA (Demand @ customers in 2038)	GJ	(344,774) / (17,239)	(82,213) / (4,111)	(382,166) / (19,108)
Small Commercial Demand	%	-3.3% / -0.2%	28.6% / 1.3%	-9.5% / -0.5%
Small Commercial Demand	GJ	(29,097) / (1,455)	251,822 / 12,591	(83,574) / (4,179)

Cumulative and Average Annual Change in Demand due to:		Dawson Creek		
		(2018 - 2038)		
		Reference	Competitive Gas	Competitive Electric
Change in Residential Customers (%)	%	11.2% / 0.5%	12.0% / 0.6%	10.5% / 0.5%
Change in Residential Customers (Demand @ 2018 UPA)	GJ	70,155 / 3,508	75,388 / 3,769	65,472 / 3,274
Change in Residential UPA (%)	%	-24.2% / -1.4%	-16.7% / -0.9%	-30.2% / -1.8%
Change in Residential UPA (Demand @ customers in 2038)	GJ	(168,148) / (8,407)	(117,099) / (5,855)	(208,584) / (10,429)
Residential Demand	%	-15.7% / -0.8%	-6.7% / -0.3%	-22.9% / -1.3%
Residential Demand	GJ	(97,992) / (4,900)	(41,710) / (2,086)	(143,112) / (7,156)
Change in Small Commercial Customers (%)	%	11.8% / 0.6%	12.3% / 0.6%	11.2% / 0.5%
Change in Small Commercial Customers (Demand @ 2018 UPA)	GJ	55,625 / 2,781	58,157 / 2,908	53,240 / 2,662
Change in Small Commercial UPA (%)	%	-15.0% / -0.8%	-2.6% / -0.1%	-19.1% / -1.1%
Change in Small Commercial UPA (Demand @ customers in 2038)	GJ	(79,194) / (3,960)	(13,568) / (678)	(100,315) / (5,016)
Small Commercial Demand	%	-5.0% / -0.3%	9.4% / 0.5%	-9.9% / -0.5%
Small Commercial Demand	GJ	(23,569) / (1,178)	44,588 / 2,229	(47,075) / (2,354)

Cumulative and Average Annual Change in Demand due to:		Tumbler Ridge		
		(2018 - 2038)		
		Reference	Competitive Gas	Competitive Electric
Change in Residential Customers (%)	%	8.8% / 0.4%	9.6% / 0.5%	8.1% / 0.4%
Change in Residential Customers (Demand @ 2018 UPA)	GJ	7,285 / 364	7,962 / 398	6,678 / 334
Change in Residential UPA (%)	%	-26.0% / -1.5%	-18.4% / -1.0%	-31.5% / -1.9%
Change in Residential UPA (Demand @ customers in 2038)	GJ	(23,466) / (1,173)	(16,723) / (836)	(28,221) / (1,411)
Residential Demand	%	-19.5% / -1.1%	-10.6% / -0.6%	-26.0% / -1.5%
Residential Demand	GJ	(16,181) / (809)	(8,760) / (438)	(21,543) / (1,077)
Change in Small Commercial Customers (%)	%	11.8% / 0.6%	12.3% / 0.6%	11.3% / 0.5%
Change in Small Commercial Customers (Demand @ 2018 UPA)	GJ	4,803 / 240	5,021 / 251	4,598 / 230
Change in Small Commercial UPA (%)	%	-23.2% / -1.3%	-2.6% / -0.1%	-26.9% / -1.6%
Change in Small Commercial UPA (Demand @ customers in 2038)	GJ	(10,562) / (528)	(1,179) / (59)	(12,186) / (609)
Small Commercial Demand	%	-14.1% / -0.8%	9.4% / 0.5%	-18.6% / -1.0%
Small Commercial Demand	GJ	(5,759) / (288)	3,842 / 192	(7,588) / (379)

**34.0 Reference: Design Day Demand Forecast
 Exhibit B-1, Section 1.1.1, pp. 2–3; Section 7.5.1, pp. 122–123
 Results – PNG-West**

On pages 2–3 of the Application, PNG states:

With the closure of Methanex’s methanol/ammonia facility in Kitimat in November 2005, PNG deactivated its compressor stations at Vanderhoof, Burns Lake, and Telkwa, as well 85 kilometres of 10 inch pipeline...These deactivated facilities have been partially maintained for potential future use.

On page 122 of the Application, PNG provides the Forecast Design Day Demand in Table 35:

Table 35: Forecast Design Day Demand

	Design Day Demand in 2038 vs. Current System Capacity (GJ/D)			
	Reference	Competitive Gas	Competitive Electricity	System Capacity
PNG-West at Summit Lake	39,889	42,813	37,558	134,309
Fort St. John	25,306	31,846	22,740	na*
Dawson Creek MS52	16,103	17,514	15,330	27,597
Tumbler Ridge Plant	3,243	3,941	3,049	5,731

* The Fort St. John system is a distribution network supplied from nine receipt points

On page 123 of the Application, PNG states:

While the system capacity presented in Table 35 represents the original design capacity of the PNG-West system reflecting the reactivation of compressor stations R2, R3 and R4, the design day demand forecast over the planning period does not reflect any future demand resulting from the RECAP process. As stated in Section 7.3.4, PNG has no clear indication of the outcome of the RECAP and will not speculate on any likely uptake of spare capacity.

- 34.1 Given that compressor stations R2, R3 and R4 have been deactivated since 2005, please discuss the likelihood and anticipated date when these compressor stations may become reactivated.

Response:

The need for the reactivation of the compressor stations is dependant on the throughput volume required and the location of the delivery points. Depending on the uptake of the capacity in the open season auction, none or all of the compressors may need to be reactivated. The first compressor to be reactivated could be in service as early as late 2021 and last could be in service by 2024.

In addition to capacity, PNG also considers reliability, resiliency and operational flexibility in its consideration of whether to reactivate compressor stations R2, R3 and R4.

- 34.1.1 Do these compressors require a minimum level of throughput for maintenance purposes? Please discuss.

Response:

The compressors do require a minimum volume throughput to make their operation economically viable. The compressor stations also need a minimum level of capital investment/maintenance capital to preserve the assets and to enable support for emergency situations. However, depending on the capacity required, one or more of the reactivated compressors may need to be run to provide added capacity under high demand scenarios.

- 34.1.2 At the current partial level of maintenance, please provide an estimate of the remaining useful life for each compressor stations. Please elaborate.

Response:

Once reactivated, and maintained to industry standards, each compressor station should have at least a 20 year operating life.

34.2 Please update Table 35 to include the design capacity of the PNG-West system without the reactivation of compressor stations R2, R3 and R4.

Response:

Please see the table that follows. The currently available capacity of the PNG-West system at Summit Lake is approximately 68,000 GJ per day. The PNG-West system has ample capacity to meet the design day demand under all forecasting scenarios which do not include additional demand resulting from the RECAP open season.

	Design Day Demand in 2038 vs. Current System Capacity (GJ/D)			
	Reference	Competitive Gas	Competitive Electricity	System Capacity
PNG-West at Summit Lake	39,889	42,813	37,558	68,000/134,309*
Fort St. John	25,306	31,846	22,740	na**
Dawson Creek MS52	16,103	17,514	15,330	27,597
Tumbler Ridge Plant	3,243	3,941	3,049	5,731

* Showing both currently available and reactivated capacity

** The Fort St. John system is a distribution network supplied from nine receipt points

**35.0 Reference: Design Day Demand Forecast
Exhibit B-1, Section 7.5.1, p. 124
Results – Dawson Creek**

On page 124 of the Application, PNG states:

The Dawson Creek distribution system consists of a high pressure pipeline running from a connection with the Enbridge Dawson Creek Lateral located roughly 12 kilometres north of the Dawson Creek City centre. This pipeline is comprised of a two kilometre line purchased from PennWest in 2014 (the PennWest segment), followed by the 10 kilometre Sunrise Lateral running south to the Dawson Creek Gate Station.

Since its purchase of the PennWest pipeline in 2014, PNG has imposed a limit of 3,800 kPa (550 psi) that is below the maximum acceptable operating pressure (MAOP). The capacity of the PennWest segment is therefore reduced to approximately 60 percent of its design capacity of 41,300 GJ per day.

PNG intends to remove this self-imposed limit when and if it establishes the structural integrity of the pipeline through a corrosion survey and investigative digs. However, at this time, PNG has determined that it has sufficient capacity to reliably serve the customers of Dawson Creek.

35.1 Please explain, with rationale, whether PNG is currently required to test the structural integrity of the PennWest pipeline when operating:

35.1.1 Below the self-imposed limit;

Response:

As is the case with all PNG high pressure pipelines licensed under the purview of the BC Oil and Gas Commission and subject to the operating criteria of CSA Z662, PNG is required to have a pipeline system integrity program. The PennWest pipeline falls within this regime. The PNG integrity management program includes many forms of inspection and monitoring to ensure pipeline system safety. For pipelines such as the PennWest that are not designed or constructed to be internally inspected by inspection tools, inspection is limited to external direct assessment. Inspection of this nature occurs on a 7 to 10 year frequency and is primarily comprised of external coating and corrosion inspection, wall thickness assessment at investigative dig locations, and confirmation of cathodic protection sufficiency. Overall assessment results during investigative digs inform decisions on any recommended additional works.

35.1.2 Below the MAOP.

Response:

Please see the response to Question 35.1.1.

35.2 Please provide the timelines for completing the assessment of the structural integrity of the PennWest pipeline through corrosion surveys and investigative digs.

Response:

The PennWest pipeline was subject to external integrity assessment in 2017 as part of the routine inspection regime within the PNG integrity management program. This included external coating condition inference via Direct Current Voltage Gradient (DCVG) survey, as well as the completion of cathodic protection sufficiency survey, and assessment of depth of cover and presence of third-party interference along the pipeline centreline and right of way. Resultant direct assessment work is ongoing and will be concluded in 2020.

35.2.1 Please explain how PNG would serve its customers in the event of a PennWest pipeline failure.

Response:

Presently, like many of the towns serviced by PNG, Dawson Creek has a single high-pressure feed (the PennWest and Sunrise pipeline) sufficient to maintain service to the entire customer base. This is not unique to Dawson Creek, nor is it unique to PNG. In the event of a pipeline failure, PNG would exercise its emergency response plan, curtailing as required those high volume industrial and commercial customers without firm service. PNG would make use of system line pack and existing pipeline looping to sustain customer service until such time that compressed natural gas (CNG) and liquefied natural gas (LNG) could be deployed and introduced to the pipeline system, a strategy and arrangement that PNG has established and drawn upon in the recent past for planned outages. PNG would then execute a repair, making use of a bypass line as required while permanent full flow repairs are completed.

G. DEMAND SIDE MANAGEMENT

36.0 Reference: DEMAND SIDE MANAGEMENT
Exhibit B-1, Section 8, pp. 130, 131–133; Appendix V, pp. 12, 24–25;
PNG(N.E.) 2015 Resource Plan for the Fort St. John, Dawson Creek and
Tumbler Ridge Distribution Systems Decision and Order G-155-15 dated
September 30, 2015, p. 10; *Utilities Commission Act*, section 44.1(2)(f)
DSM Funding Scenarios

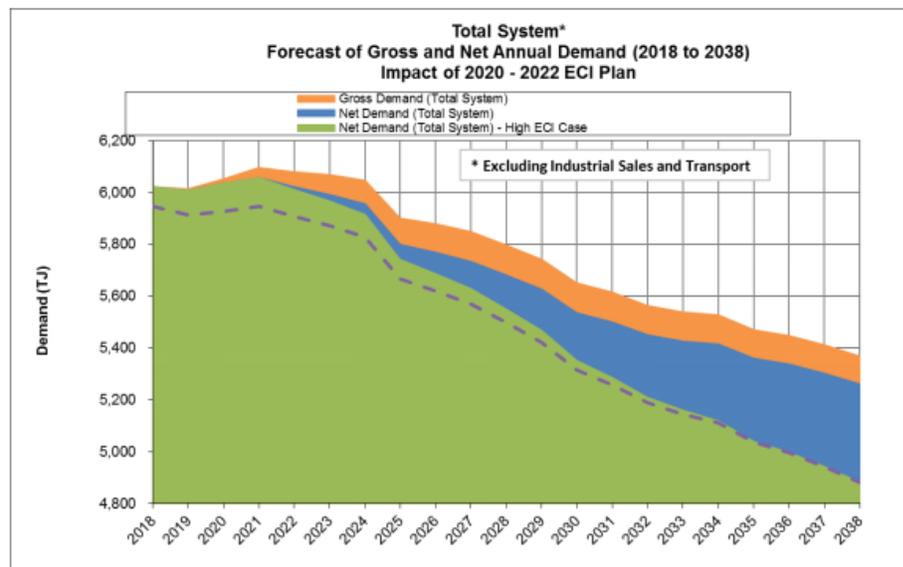
In its Decision attached to Order G-155-15 approving the 2015 Resource Plan for PNG(N.E.), the BCUC directed PNG to include in its next and subsequent resource plans “different DSM funding scenarios which should at a minimum include a “reference” DSM funding scenario with ‘high DSM’ and ‘low DSM’ scenarios relative to the reference funding scenario.”

On page 130 of the Application, with respect to these DSM funding scenarios, PNG states:

PNG has based the reference funding scenario on the forecast energy savings of the 2020 – 2022 ECI portfolio assuming a continuation of a similar level of funding in 2023 and beyond, with market saturation occurring after five years, in 2027. PNG has developed a “high DSM” scenario based on the results of the 2017 CPR [Conservation Potential Review] Market Potential Review that estimated three percent in cumulative gas savings market potential as a percentage of consumption by 2022, increasing by 0.5 percent annually and reaching 7.9 percent by 2035.

On page 131, Figure 64 shows the forecast gross and net annual demand (TJ) after DSM:

Figure 64: Forecast Gross and Net Annual Demand (TJ)



On pages 132 to 133 of the Application, PNG states:

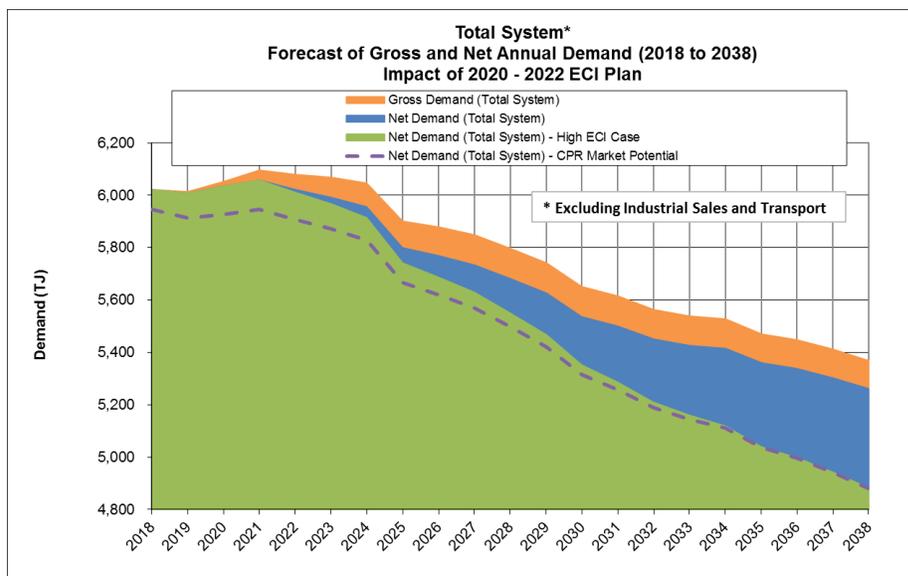
Once participation in the ECI programs increase, PNG will be in a better position to assess the actual cost effectiveness of the ECI programs to date, and make an extrapolation of the costs to achieve further reductions approaching the theoretical market potential.

On pages 24 – 25 of the Conservation Potential Review attached as Appendix V, Navigant Consulting states that “Natural change accounts for changes in consumption that are naturally occurring and are not the result of utility-sponsored programs or incentives.”

36.1 Please clarify the purpose of the dashed line on Figure 64.

Response:

Please see the revised version of Figure 64, below. PNG has corrected the formatting error in Figure 64. The dashed purple line indicates the total net system demand if the market potential savings identified in the 2017 Conservation Potential Review were realized.



- 36.2 Please explain on what basis PNG has assumed market saturation will occur after 2027 in the reference scenario.

Response:

For the purpose of the analysis presented in Figure 64, p. 131 of the Application, PNG estimates that the measures proposed in the 2020 – 2022 DSM Plan will be extended beyond the requested funding period and that these measures are estimated to reach market saturation in a further five years. PNG fully expects to continue to expand its ECI portfolio of programs and associated measures and expects to attain savings that are in addition to those forecast as presented in Figure 64.

- 36.2.1 Please confirm, or explain otherwise, that market saturation refers only to the measures contemplated in the 2020-2022 DSM Plan, and that further DSM savings would be possible post-2027 if different DSM measures were contemplated at that time.

Response:

Please see the response to Question 36.2.

- 36.2.2 Given the assumption of market saturation after 2027, please explain whether PNG has made any assumptions for a decline in DSM savings towards the end of the period covered by the CRP, as measures reach the end of their useful life, or accounting for “natural change”.

Response:

PNG has not made any assumptions for a decline in DSM savings towards the end of the period covered by the Conservation Potential Review.

- 36.3 Please explain if PNG has made any high-level calculations of the cost-effectiveness values for implementing the reference scenario and the high scenario over the period covered by the CRP. If so, please provide these values, as a TRC ratio and \$/GJ saved, with any relevant supporting explanation or caveats.

Response:

Please refer to Section 4.6 of the DSM Plan attached as Appendix F of the Application. The most appropriate use of the 2017 CPR Market Potential Review is to provide portfolio level directional guidance to PNG DSM planning. The CPR market potential estimates are not intended to be program-specific and are most reasonable when results are considered in aggregate.

PNG completed cost-effectiveness calculations for the "reference" scenario that is the ECI portfolio proposed for 2020-2022 and presented in the DSM Plan. Please refer to section 10 of the DSM Plan.

PNG did not complete high-level calculations of the cost-effectiveness of the "high DSM" scenario.

- 36.4 Please discuss how the competitive gas scenario and the competitive electricity scenario would affect the long-term forecasts of DSM funding scenarios, considering factors including the likely adoption rates of DSM measures, overall energy and demand reductions, and cost-effectiveness.

Response:

PNG has not completed this analysis.

On page 12 of the Conservation Potential Review attached as Appendix V, Navigant Consulting states:

Given that PNG has limited historic experience administering conservation programs, the team relied on FortisBC Gas data to calibrate key model assumptions... To customize this evaluation for PNG's service territory, Navigant applied PNG-specific building stock and end use intensity forecasts, avoided costs, retail rates and discount rates. By using PNG-specific building stock and end use intensities, this study's results are appropriately scaled to reflect the unique characteristics of PNG's service territory.

- 36.5 Please discuss if there are any key limitations of the applicability of the CPR Market Potential analysis to the specific situation of PNG's service territory.

Response:

Please refer to Section 4.6 of the DSM Plan attached as Appendix F of the Application. The most appropriate use of the 2017 CPR Market Potential Review is to provide portfolio level directional guidance to PNG DSM planning. The CPR market potential estimates are not intended to be program-specific and are most reasonable when results are considered in aggregate.

Section 44.1(2)(f) of the *Utilities Commission Act* (UCA) states that a long-term resource plan must include:

(f) an explanation of why the demand for energy to be served by the facilities referred to in paragraph (d) and the purchases referred to in paragraph (e) are not planned to be replaced by demand-side measures;

36.6 Based on the information filed in the Application, please provide an explanation that satisfies the requirement of section 44.1(2)(f) of the UCA.

Response:

PNG has not identified any facilities that it intends to construct to serve the demand from current and existing customers. As illustrated by Table 35, p. 122 of the Application, PNG anticipates having adequate capacity to meet the forecast design day demand under all planning scenarios.

Every year, PNG prepares an Annual Gas Contracting Plan (ACP) that describes the physical gas supply resources PNG intends to secure to meet the projected peak day and average daily gas demand of PNG's gas sales customers over the gas year beginning November 1. Each ACP is subject to review and acceptance by the BCUC.

The physical gas supply resources that PNG contracts for each year reflects the forecast design day demand expected in the coming winter. This demand is based on projected customer counts and UPA's that have been updated based on the most recent counts and UPA's which reflect the impact of PNG's ECI (DSM) programs.

H. PORTFOLIO EVALUATION AND PLANNING

- 37.0 Reference: Portfolio Evaluation and Planning
Exhibit B-1, Section 9.4, p. 135; BC Oil and Gas Commission Compliance
Assurance Protocol – Integrity Management Program (IMP) for Pipelines, p.
4
Integrity Management Program**

On page 135 of Application, PNG states:

PNG's System Betterment/General Plant capital plans are driven primarily by PNG's asset risk management process and regulatory compliance requirements. PNG has embarked on a sequence of activities to assess the integrity of the PNG-West and Tumbler Ridge transmission systems over the next five years and will be addressed in either future rate applications or CPCN applications. These include:

- Electromagnetic Acoustic Technology (EMAT) tool runs to help PNG determine whether instances of Stress Corrosion Cracking (SCC), known for catastrophic pipeline failures in industry incidents, exist on PNG's transmission systems.
- Pipeline Cut Outs: With increased EMAT tool runs, PNG expects to identify additional segments of pipe to be cut out and replaced.
- Salvus to Galloway Remediation: Repair of sections of the Prince Rupert eight inch pipeline traversing treacherous mountainous terrain in environmentally sensitive areas between Salvus and Galloway.
- New Pig Barrels: Three new pig receiving barrels are required on the PNG-West and Tumbler Ridge transmission systems in order to properly inspect segments of high-pressure pipeline.

- 37.1 Please elaborate on the rationale for conducting the activities listed in the above preamble, including a description PNG's risk management process, risk assessments conducted and relevant regulatory compliance requirements, including any existing compliance concerns.

Response:

EMAT Tool Runs:

Pipeline inline inspection (ILI) is industry standard for assessing the presence of many integrity concerns such as internal/external corrosion, mechanical damage, weld seam anomalies, and cracking. Routing completion of ILI is part of PNG's Integrity Management Plan (IMP) for pipelines designed and constructed for the successful passage of inline inspection tools (pigs). Past investigative digs for conventional external corrosion features identified by ILI have resulted in the identification of Stress Corrosion Cracking (SCC). Furthermore, PNG's operating conditions, pipeline vintage, external coating product, and environmental conditions for some of its pipeline segments make them a candidate for near-neutral PH SCC. EMAT tools are designed for crack detection. With the recent emergence of EMAT tool availability in the PNG-West pipeline diameter range (equal to or greater than 10"), PNG has embarked on an EMAT tool program as part of its regular ILI regime in order to search for and react to any remaining presence of SCC.

Additional Cutouts Stemming from EMAT Runs:

Prior to the availability of EMAT crack detection tools in the PNG pipeline diameters, SCC, long seam anomalies, and other crack-like defects were found as a result of other indirectly related investigative digs (primarily for external corrosion). EMAT tools, in combination with other modern and highly precise in-line inspection tool technologies (known as combo-tool platforms) target and detect pipeline features not previously detected on legacy inspection runs. As a result, the data returned from these runs grows nearly exponentially from previous instances, and the ability to accurately locate suspected defects becomes more certain. With this comes a substantial increase in the number of identified investigative digs required following a combo-tool run, subsequently resulting in an increased number of required repairs. This new trend has proven itself following all PNG in-line inspections since 2016.

Salvus to Galloway Remediation:

The portion of the PNG Prince Rupert mainline that traverses the mountainous and tight coastal river valley terrain between Salvus Camp and PNG's Galloway station was constructed in 1968 via acceptable practices of the day. Since this time the pipeline has been subject to both geotechnical and hydrotechnical risk (collectively geohazards), resulting in pipeline exposures, reduced depth of cover, and pipeline failures. PNG has managed these risks under the technical purview of the BC OGC. Increasing focus on risk reduction by PNG, the BC OGC, and associated governing regulations requires a greater level of proactive response to geohazards and the remediation of any existing regulatory, code, or standards related non-compliances associated with, but not necessarily limited to, exposed

pipe, insufficient depth of cover, potential for horizontal or vertical displacement from environmental forces, external corrosion, or mechanical damages. Results from a 2018 combo-tool platform inline inspection returned results indicating the presence of numerous metal loss features (external corrosion) and dents requiring investigation. Survey and field investigation work conducted in 2018 and 2019 have identified locations of geohazard related risk requiring further assessment, monitoring, and/or mitigation under the multi-year program pursued by PNG.

New Pig Barrels:

In PNG-West new pig barrels are required to return two sections of pipeline to a state where in-line inspection can be completed. A previous pipeline washout and resulting pipeline section abandonment has inhibited this in recent past, limiting integrity inspection to over the line assessment. Re-establishing the ability to complete in-line inspection re-aligns these sections of pipeline with the requirements of the PNG IMP, and the interests of the technical regulator.

The Tumbler Ridge transmission pipeline is immediately downstream of a gas processing (sweetening) plant and was not designed or constructed for the passage of inline tools. Until recently, untethered (free swimming) inline inspection tools were not easily available for the associated pipeline diameters (3" and 4"). Technical regulators in BC, across Canada, and the US are increasing expectations and requirements that operators develop their integrity programs to include pipelines identified as Difficult to Inspect (DTI). Recent advancements in small diameter free swimming inspection tools have resulted in the market availability of tools suitable for the Tumbler Ridge pipeline, softening arguments around any previous DTI status. In order to benefit from the availability of these tools and in-line inspection opportunity, new sending and receiving barrels will be required.

37.2 Please explain the urgency and prioritization of each activity, when the activity is planned to be undertaken, and the scope and anticipated cost of each activity.

Response:

Through the exercising of PNG’s established risk identification, prioritization, and management processes, the scheduling, scope, and associated estimated cost of each of the above identified activities are as follows:

EMAT In-Line Inspection Tool Runs:

More than one pipeline segment is planned to have an EMAT inspection in each of the coming years. This is in line with PNG’s pre-existing ILI schedule and plan (7-10 year repeat frequency as a default) and as laid out in the following table.

Pipeline	Size	Length	Segments to be Inspected by Year			
Section	(inch)	(miles)	2020	2021	2022	2023
R1 - R2 Loop	12	24		EMAT		
R2 - R3 Mainline	10	71	EMAT			
R2 - R3 Loop	12	24		EMAT		
R3 - R4 Mainline	10	64				EMAT
R3 - R4 Loop	12	4		EMAT		
R4 - MP 209	16	7	EMAT			
MP 209 - MP 240	10	35			EMAT	
MP 231 - MP 248	12	17			EMAT	
MP 248 - MP 251	10	3				EMAT
MP 251 - MP 256	12	5			EMAT	
MP 256 - PLS	10	12				EMAT
PLS - MP 273	10	5	EMAT			
PLS - R5 Loop	12	7			EMAT	
R5 - Methanex	10	35				EMAT

Estimated costs associated with planned EMAT activities are as follows. Similar costs beyond 2023 will be incurred as EMAT runs repeat frequencies perpetuate within the overall PNG ILI program.

	2020	2021	2022	2023
TOTAL	\$ 2,174,000	\$ 2,896,000	\$ 3,299,000	\$ 3,500,000

Additional Cutouts Resulting from EMAT Runs:

The exact scope and magnitude of additional cutout activities are subject to refinement following the return of data from the associated EMAT run(s). Increased costs have been budgeted in both 2020 and 2021 as a projection from the most recent tool run and repair cycle. Actuals incurred in both 2020 and 2021 will inform projections for subsequent budget cycles.

	2020	2021
TOTAL	\$ 1,000,000	\$ 990,000

For most recent historical perspective, \$583,000 was spent in 2019 as a result of a single 2018 EMAT run. The budget established in 2017 for the 2018/2019 rate application was \$199,000.

Salvus to Galloway Pipeline Remediation:

The eventual scope and overall magnitude of the Salvus to Galloway pipeline remediation project is still in a state of definition and determination. Works commenced in 2018 with geohazard identification studies and completion of an ILI run. In 2019 potential remediation and risk mitigation projects were progressed through various degrees of front-end engineering and design, permitting preparation, and cost estimating. This work is ongoing. 2018-2021 actuals and proposed budgets are as follows, with anticipated scope to include repair of critical ILI defined pipe anomalies, mitigation of high probability of failure geohazards, and improvement to remote right of way access and line isolation capability.

	Past Actuals (2018/2019)	2020	2021
TOTAL	\$ 852,000	\$ 1,451,000	\$ 2,556,000

Tumbler Ridge Transmission Mainline:

The modifications to the Tumbler Ridge transmission system are proposed to take place across 2020-2022, with the scope including the design, construction, and installation of two sets of sending and receiving barrels and minor retrofit work to remove tight bends and fittings in order to accommodate the passage of inline inspection tools. Feasibility assessment and front end engineering are proposed to be completed in 2020. Detailed engineering and permitting are proposed to be completed in 2021, with construction / installation completion in 2022. Anticipated costs are as follows.

	2020	2021	2022
TOTAL	\$ 104,000	\$ 158,000	\$ 925,000

West Transmission System:

Two sets of sending and receiving barrels are proposed to be designed, constructed, and installed across 2021-2022 on two sections of pipeline currently in a discontinuous state due to a river washout. Permitting, engineering, and design are proposed to be completed in 2021, with fabrication and construction proposed for 2022.

	2021	2022
TOTAL	\$ 505,500	\$ 1,747,000

On page 4 of the BC Oil and Gas Commission Compliance Assurance Protocol – Integrity Management Program (IMP) for Pipelines states: ¹

As required by the BC Oil and Gas Commission (Commission) under Section 7 of the Pipeline Regulation (PR), every permit holder planning, designing, constructing, operating, maintaining or abandoning pipeline infrastructure within the province of British Columbia must have a fully developed and implemented IMP. To facilitate compliance assurance, all permit holders must act in accordance with the most current version of the CSA Z662 standard.

- 37.3 Please confirm, or otherwise explain, that PNG has a fully developed and implemented IMP, which is compliant with the most current version of the CSA Z662 standard.

Response:

Yes, PNG has a fully developed and implemented IMP which is compliant with the requirements of the most current version of CSA Z662.

- 37.4 Please confirm, or otherwise explain, that PNG has identified and assessed all potential hazards that can lead to failure or external interference incidents during operation of its transmission pipelines.

Response:

Via the execution of the many programs and activities within its IMP, PNG identifies to the best of its ability all potential hazards that can lead to incidents associated with the operation of its pipeline systems. Like most operational programs, the PNG IMP is subject to continuous improvement, leveraging learnings from other pipeline industry incidents, and benefiting from the knowledge of external third party subject matter experts to improve and further develop PNG's understanding and mitigation of potential hazards and threats.

¹ [BC Oil and Gas Commission Compliance Assurance Protocol](#)

- 37.5 Please discuss whether there are any potential hazards on PNG's transmission pipelines that could be an integrity or compliance concern but are not addressed in PNG's System Betterment/General Plant capital plan.

Response:

PNG utilizes industry accepted hazard, threat, and risk identification, mitigation, prioritization, and management practices to ensure the ongoing integrity of its pipeline systems. Through application of such things as its IMP, the leveraging of a comprehensive risk matrix that identifies PNG's level of risk tolerance, and the completion of a robust annual risk review workshop (to name a few), PNG believes all potential integrity and compliance concerns have been and will continue to be addressed in its system betterment/general plant capital plans on an ongoing prioritization basis in line with industry accepted levels of risk tolerance.

**38.0 Reference: Portfolio Evaluation and Planning
Exhibit B-1, Section 9.4, p. 134; BCUC Resource Planning Guidelines, p. 4
Resource Portfolios – Identification of supply and demand resources**

On page 134 of the Application, PNG states:

Leaving aside the prospect of significant additional demand on the PNG-West system as a result of the RECAP, no new supply or capacity resources are required to meet identifiable customer demand at this time or within the near future. The development of resource portfolios was therefore not considered necessary and PNG concludes that there is no requirement to complete a resource portfolio evaluation for this Consolidated Resource Plan.

Section 3 of the BCUC's Resource Planning Guidelines requires the identification of supply and demand resources.

- 38.1 Please identify the supply and demand resources for both PNG-West and PNG(N.E.). Please include a list of the feasible individual supply and demand resources, both committed and potential.²

Response:

Every year, PNG prepares an Annual Gas Contracting Plan (ACP) that describes the physical gas supply resources PNG intends to secure to meet the projected peak day and average daily gas demand of PNG's gas sales customers over the gas year beginning November 1. Each ACP is subject to review and acceptance by the BCUC. PNG's most recent 2019/20 ACP was accepted by the BCUC by way of Letter Order L-39-19.

PNG has prepared a DSM Plan for the period 2020 to 2022 related to ongoing and proposed programs and initiatives under its ECI Program in order to comply with the provisions of subsection 44.1(2) (b) of the UCA, which requires a public utility to file a long term resource plan that includes a plan of how the public utility intends to reduce demand by taking cost-effective demand-side measures. A copy of the DSM Plan is attached to the Application as Appendix F: DSM Plan.

² Individual resources are defined as indivisible investments or actions by the utility to modify energy and/or capacity supply, or modify (decrease, shift, increase) energy and/or capacity demand.

- 38.2 Please discuss the requirements PNG considers necessary to complete a resource portfolio evaluation with respect to RNG supply.

Response:

As stated on page 68 of the Application, PNG intends to develop a portfolio of RNG supply as enabled under the Greenhouse Gas Reduction Regulation (GGRR) voluntary five percent RNG target. PNG expects that such supply will initially be in the form of biomethane, but that other forms of RNG, will also be pursued. PNG expects to acquire RNG, either through entering into supply agreements with third parties, or by developing its own supply projects. PNG anticipates adopting and filing for approval with the BCUC, a set of principles governing its ability to develop RNG supply infrastructure. PNG expects to begin acquiring RNG supply by late 2020 or 2021.

**39.0 Reference: Portfolio Evaluation and Planning
Exhibit B-1, Section 9.4, p. 134; BCUC Resource Planning Guidelines, p. 4
Resource Portfolios – Measurement of supply and demand resources**

Section 4 of the BCUC's Resource Planning Guidelines requires a measurement of the supply and demand resources.

- 39.1 For both PNG-West and PNG(N.E.), please provide a measurement of the supply and demand resources. In your response, please address the following:
- (i) Measurement of each supply-side and demand-side resource against the objectives established in section 1.4 of the Application, to include utility and customer costs (life cycle costs, impact on rates, etc.), associated risks, and lost opportunities;
 - (ii) Characterization of the feasible supply and demand resources, discussing how the resources perform relative to specific social and environmental objectives; and
 - (iii) Cost estimate for the supply and demand resources, representing the full costs of achieving a given magnitude of the resource. The cost estimates may be represented as supply curves.

Response:

For all of the reasons presented in its letter attached to the Application seeking BCUC acceptance of the Application, PNG respectfully submits that it has prepared a 2019 Consolidated Resource Plan that meets the adequacy requirements of section 44.1(2) of the UCA, and that the 2019 Consolidated Resource Plan is in the Public Interest. PNG's 2019 Consolidated Resource Plan presents the results of data gathering, fact finding, strategic planning and analyses that exceed those provided in both the 2014 Resource Plan for PNG-West and the 2015 Resource Plan for PNG(N.E.). The BCUC accepted both Resource Plan by way of Orders G-140-14 and G-155-15, respectively. For the reasons above, PNG has not completed this analysis.

PNG also respectfully reminds the BCUC that PNG is not a large utility and has limited resources. PNG serves a natural gas load comparable in size to the cities of Coquitlam or Kelowna. PNG supplies approximately 6.8 petajoules (PJ) of natural gas to approximately 40,000 customers across small communities in northern B.C. and does so with a staff of approximately 125, including approximately 20 head office staff. PNG's customers in PNG-West and Tumbler Ridge pay the highest costs, at the burner tip, for natural gas service in B.C. PNG continues to actively and aggressively work to attract additional loads on the PNG-West system but, in the mean time, PNG continues vigilance on containing costs that would otherwise be borne by its customers. For that reason, PNG does not have a dedicated planning department and the responsibility for developing all aspects of a resource plan, including the associated DSM Plan, falls under the responsibility of the Manager, Energy Management and DSM. This individual also has other responsibilities which include executing PNG's initiatives such as the ECI program, developing its RNG strategy and managing the implementation of its geographic information

system (GIS) as well as addressing gas supply matters.

Regardless of the foregoing, PNG respectfully submits that the BCUC Resource Planning Guidelines (2003 Guidelines), which outline a process to assist in the development of resource plans to be filed with the BCUC, do not distinguish between utilities that provide generation, transmission or distribution services. Therefore, some aspects of the 2003 Guidelines, including the analysis of supply-side resources, apply more readily to integrated electric utilities. PNG finds the statements made by FEI in the proceeding associated with FEI's 2014 Resource Plan succinctly identify the important characteristics of a gas distribution utility that differentiate it from a vertically integrated electric utility that owns and operates its supply (i.e. generation and storage) resources. In its response to BCUC questions on whether a key purpose of a utility's "resource plan is to assess multiple objectives and trade-offs between alternative resource portfolios.", FEI stated that:

"For a gas utility that does not own its own gas reserves and files for approval of its Annual Contracting Plan and whose bill is disaggregated showing supply side resource (gas) costs separately, the purpose of a Resource Plan is not to develop alternative supply side resource portfolios for comparison to alternative demand side resource portfolios... Rather its purpose is primarily to assess energy delivery infrastructure requirements needed to deliver gas to end-use customers on the natural gas utility system." (FEI 2014 Resource Plan Proceeding, Exhibit B-2, BCUC IR 1.1.4, p. 4.)

The BCUC agreed with FEI's characterisation, stating:

"... The Panel agrees with the FEU that the steps required to undertake a resource plan for an integrated electric utility are different than for a gas utility. For example, for an integrated electric utility, the load forecast is a critical first step and a portfolio-based approach can be used to develop and evaluate different portfolios of 'network infrastructure/generation investment/energy purchases/DSM' to meet the expected load. However, for the FEU, the load forecast is not such a critical first step. Gas is purchased from the market, new gas infrastructure can generally be put in place in less than five years and the addition of one significant customer can quickly overwhelm any refinement in the load forecasting approach for existing customers." (FortisBC Energy Utilities 2014 Long-Term Resource Plan, Decision dated December 3, 2014, Order G-189-14, pp. 5, 6.)

PNG submits that the BCUC, when reviewing resource plans, should consider the unique operating circumstances of the utility in question when referring to the 2003 Guidelines. PNG has adhered to the 2003 Guidelines where, in PNG's view, they are relevant and applicable to PNG's operating environment.

PNG submits that the information it has provided in its 2019 Consolidated Resource Plan, including its DSM Plan, and in its Annual Gas Contracting Plans provide the BCUC a sufficiently detailed view of PNG's operations, its customers and forecast demand. PNG submits that it has considered the 2003 Guidelines in the context of a small natural gas distribution utility when developing its 2019 Consolidated Resource Plan and has endeavoured to adhere to those 2003 Guidelines in a practical and cost effective manner.

PNG respectfully submits that it has met the adequacy requirements of section 44.1(2) of the UCA, and that the 2019 Consolidated Resource Plan is in the Public Interest and should be approved.

- 40.0 Reference: Portfolio Evaluation and Planning
Exhibit B-1, pp. 54–55, 58; Section 9.4, p. 134; BCUC Resource Planning
Guidelines, p. 4
Resource Portfolios – Evaluation and selection of resource portfolios**

On pages 54 and 55 of the Application, PNG states:

As production shifts westward in western Canada to access the sources richer in condensate and NGLs, pipeline capacity has not kept pace with production. Additional pipeline capacity is being constructed in those areas. The construction can cause interruptions to existing pipeline capacity resulting in periods when some gas in western Canada is sold at very low or even negative prices to find a market.

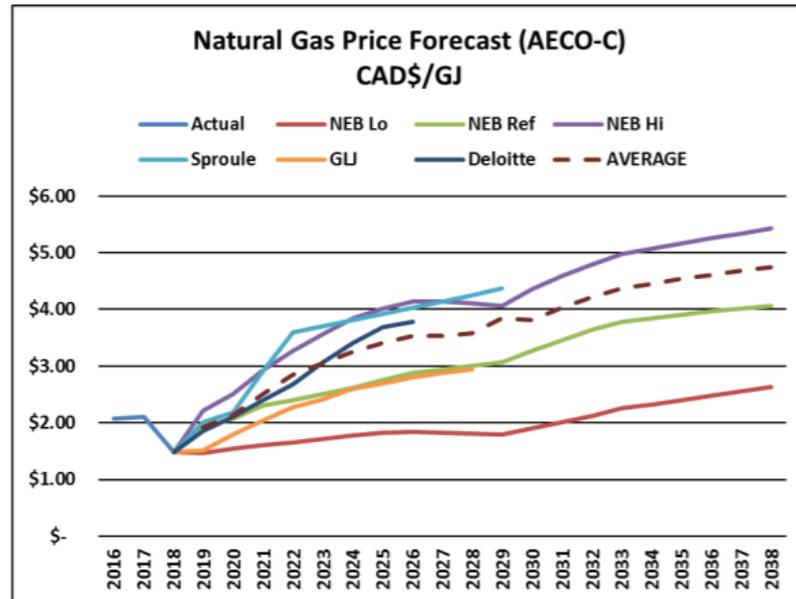
[T]he startup of LNG Canada's export project on B.C.'s West Coast, expected in 2025, should help clear the western Canadian natural gas market and help balance out supply and demand. This is expected to positively affect the price of AECO-C. The AECO-C price is projected to gradually increase to \$2.10/GJ by 2020, and reach \$3.80/GJ by 2028.

Due to the continued depressed pricing in western Canada and specifically at Station #2, the liquidity for term gas supply has decreased. Many producers have scaled back their drilling programs for the upcoming gas year and some production has already been shut in. In addition, the pending completion of the North Montney Mainline, will further reduce the gas supply on the Westcoast system. The forward pricing at Station #2 has strengthened relative to AECO as a result. PNG anticipates this trend to continue until pricing increases and new supplies start to come on the system.

On page 58 of the Application, PNG states:

PNG purchases almost all of its gas supply at Westcoast Stn 2, with approximately half of the gas supply priced off of the AECO near month index, and the remainder at the daily price at Stn 2. Despite periodic capacity constraints on Westcoast T-South that depress prices at Station 2, over the long term, the prices at Station 2 are expected to follow those at AECO. For this comparative cost analysis, PNG has used an average of the “NEB Reference”, “NEB High” and industry forecasts, with a small discount to reflect purchases of gas at Stn 2.

Figure 11: AECO-C Natural Gas Price Forecasts



On page 134 of the Application, PNG states:

The purpose of preparing this Consolidated Resource Plan was to determine whether any actions are required at this time and over the foreseeable future with respect to supply side system capacity additions or the implementation of ECI programs. Leaving aside the prospect of significant additional demand on the PNG-West system as a result of the RECAP, no new supply or capacity resources are required to meet identifiable customer demand at this time or within the near future.

The development of resource portfolios was therefore not considered necessary and PNG concludes that there is no requirement to complete a resource portfolio evaluation for this Consolidated Resource Plan.

Section 6 of the BCUC's Resource Planning Guidelines requires an evaluation and selection of resource portfolios.

40.1 Please explain why PNG did not provide an evaluation and selection of resource portfolios in the Application, as set out in the Resource Planning Guidelines.

Response:

Please see the response to Question 39.1.

- 40.2 Please explain how the BCUC could determine that the Long-Term Resource Plan is in the public interest without development, analysis and selection of a resource portfolio.

Response:

Please see the response to Question 39.1.

- 40.3 In the absence of a resource portfolio, please discuss how PNG is prepared and mitigates against exogenous supply-side risks. In your answer, please discuss the effects of the decline in station 2 prices and resultant liquidity, the economics of new gas production and supply, pipeline capacity, and market events, such as a pipeline failure.

Response:

PNG is prepared to mitigate exogenous supply-side risks by maintain a diverse mix of assets which includes: supply sourced at market hubs, supply sourced directly from the producer outlet, as well as natural gas storage capacity. PNG also works with a gas marketing company with a larger portfolio of assets to help mitigate supply disruptions.

The decline in pricing in western Canada has not impeded the access to supply. While forward market liquidity at Station 2 has decreased in the last year, the shorter term nature of PNG's supply contracting has meant that it has been able to secure the necessary resources. PNG has ample counterparties to transact with, and continues to look for new producers to source supply from. As interconnectivity between the Westcoast and NOVA systems increases, the security of supply for PNG will also increase. However, the PNG West system remains exposed to a single point of failure on the T-South system. This was highlighted by the rupture, south of Summit Lake, on the T-South System in October of 2018. PNG would rely on Line-Pack in the event of a failure north of Summit Lake, however this risk is one that PNG continues to evaluate.

- 40.4 Please update Figure 11 to include Station 2 prices, based on the same NEB and industry forecasts.

Response:

There is no forward pricing for Station 2 that extends out to this time frame. However, PNG believes that Station 2 prices will track closely with the AECO market as interconnectivity continues to increase.

- 40.5 For each of the gross demand forecasts developed for PNG-West and PNG(N.E.), please assess the set of alternative resource portfolios that match the forecast against the objectives outlines in Section 1.4 of the Application. In your response please provide:
- i. an analysis of the trade-offs between the portfolios;
 - ii. a description of how the portfolios perform under uncertainty;
 - iii. an identification of the portfolio that performs best relative to the stated objectives; and
 - iv. the selection of a set of preferred resource portfolios, with each portfolio matching one of the gross demand forecasts.

Response:

PNG has not prepared this analysis. Please see the response to Question 39.1.

**41.0 Reference: Portfolio Evaluation and Planning
Exhibit B-1, Section 9.4, p. 134; BCUC Resource Planning Guidelines, p. 5
Resource Portfolios – Development of an action plan**

Section 7 of the BCUC's Resource Planning Guidelines requires the development of an action plan.

41.1 Please provide PNG's an action plan for both PNG-West and PNG(N.E.), based on the evaluation and selection of resource portfolios. Please include:

- (i) the detailed acquisition steps for those resources (from the selected resource portfolio) which need to be initiated over the next four years in order to meet the most likely gross demand forecast;
- (ii) contingency plans, specifying how PNG would respond to changes in circumstances, such as changes in loads, market conditions or technology and resource options; and
- (iii) For resources with considerable uncertainty, the action plan should incorporate an experimental design and monitoring plan to allow for hindsight evaluation of associated market impacts and full resource costs.

Response:

PNG has not prepared this analysis. Please see the response to Question 39.1.

I. ENERGY CONSERVATION AND INNOVATION PORTFOLIO FUNDING

- 42.0 Reference: ENERGY CONSERVATION AND INNOVATION PORTFOLIO FUNDING
Exhibit B-1, Appendix F, p. 43
Demand-Side Measures Regulation B.C. Reg. 117/2017 (DSM Regulation),
section 3(1)
Adequacy Measures

On page 43 of the DSM Plan, PNG outlines the budget for “General Conservation Education and Outreach”, which includes a program titled “Codes and Standards.”

Section 3(1)(E) of the DSM Regulation specifies that a public utility's plan portfolio is adequate for the purposes of section 44.1 (8) (c) of the Act only if the plan portfolio includes:

one or more demand-side measures to provide resources as set out in paragraph (e) of the definition of "specified demand-side measure", representing no less than

(i) an average of 1% of the public utility's plan portfolio's expenditures per year over the portfolio's period of expenditures, or

(ii) an average of \$2 million per year over the portfolio's period of expenditures; [*Emphasis added*]

Paragraph (e) of the definition of specified demand-side measure reads:

financial or other resources provided

(i) to a standards-making body to support the development of standards respecting energy conservation or the efficient use of energy, or

(ii) to a government or regulatory body to support the development of or compliance with a specified standard or a measure respecting energy conservation or the efficient use of energy in the Province. [*Emphasis added*]

- 42.1 Please discuss if PNG’s “Codes and Standards” program, or elsewhere in the DSM Plan, includes a measure(s) that provides financial or other resources to the relevant bodies and for the purposes set out in paragraph (e) of the definition of specified demand-side measure.

Response:

PNG proposes to continue its Codes and Standards program that supports training of building contractors and trades in techniques that achieve varying levels of the B.C. Energy Step Code. The BCUC previously approved PNG’s Codes and Standards program over the period 2019 to 2020 by way of Order G-121-19.

42.1.1 Please confirm, or explain otherwise, that this measure(s) represents an average of at least 1% of PNG's portfolio expenditures per year over the 2020 to 2022 period.

Response:

Please refer to Table 20: Budget – General Conservation Education and Outreach on page 43 of the DSM Plan attached as Appendix F to the Application. Table 20 lists the proposed expenditures for Codes and Standards: \$10,000 in each of 2020, 2021, and 2022. Total proposed DSM expenditures are \$781,000 (2020), \$880,100 (2021), \$907,100 (2022). As shown in the table that follows, PNG's proposed expenditures for Codes and Standards represent 1.28%, 1.14%, and 1.10% in 2020, 2021, 2022 respectively.

DSM Reg Codes and Standards Compliance (1% of proposed expenditures)	2020	2021	2022
Proposed Expenditures	\$ 781,000	\$ 880,100	\$ 907,100
Codes and Standards	\$ 10,000	\$ 10,000	\$ 10,000
C&S as % of Proposed Expenditures	1.28%	1.14%	1.10%

43.0 Reference: ENERGY CONSERVATION AND INNOVATION PORTFOLIO FUNDING Exhibit B-1, Cover Letter, p. 3; PNG 2015 Conservation and Energy Management (CEM) proceeding, Exhibit B-1, p. 11 Approvals sought for flexibility in transferring DSM funds

PNG states on page 3 of the Cover Letter:

In addition, PNG requests that the BCUC grant approval allowing PNG flexibility in the reallocation of expenditures amongst ECI programs and between program years, subject to the total amount spent by PNG on ECI activities between the date of approval and 2022 not exceeding the total amount of \$2,278,000 sought in this Application, unless otherwise approved by the BCUC. PNG proposes to continue the program funding transfer rules that were approved under Order G-121-19.

PNG's funding transfer rules, which were set out in the 2015 CEM application and originally approved by Order G-115-15A are repeated below:

- Funding transfers under 25 percent from one approved Program Area to another approved Program Area would be permitted without prior approval of the Commission.
- In cases where a proposed transfer out of an approved Program Area is greater than 25 percent of that approved Program Area, prior Commission approval would be required.
- In cases where a proposed transfer into an approved Program Area is greater than 25 percent of that approved Program Area, prior Commission approval would be required.
- Further, in the event that PNG spends more or less than the full approved amount for a particular year, PNG also seeks approval to have the difference allocated to the DSM program spending in the following year, subject to the total expenditures by PNG on DSM activities between the date of approval and 2018 not exceeding the total amount sought in this Application, unless otherwise approved by the Commission. (2015 CEM application, p. 11)

43.1 Please confirm, or explain otherwise, that PNG is requesting a change to the funding transfer rules approved by G-115-15A, to provide additional flexibility regarding DSM expenditures

Response:

Not confirmed. PNG is not requesting a change to the funding transfer rules approved by G-115-15A. In PNG's 2018 Energy Conservation and Innovation Program Funding Application, PNG proposed to continue with the existing fund transfer rules approved by G-115-15A. The BCUC approved the continuation of these rules in Order G-121-19. In the current Application, PNG proposes to continue the program funding transfer rules that were approved under Order G-121-19.

43.1.1 If confirmed, please discuss the reasons for PNG requesting a change to the approved transfer rules.

Response:

Not applicable. Please see the response to Question 43.1.

**44.0 Reference: ENERGY CONSERVATION AND INNOVATION PORTFOLIO FUNDING
Exhibit B-1, Appendix F, Tables 6, 7, 8, pp. 27–29
DSM Expenditure to date**

Tables 6, 7 and 8 of Appendix F present actual and forecast expenditures on PNG's Residential, Commercial, and Conservation Education and Outreach Program Areas from 2016-2022, including actual and forecast applicants for the commercial and residential programs.

44.1 Please provide updated versions of Tables 6, 7 and 8 showing 2019 actual expenditures for the existing programs.

Response:

PNG files DSM annual reports with the BCUC no later than April 30th of the immediately following year that provide, amongst other things:

- A comparison of the DSM accepted budget to amount spent (for each year and period to date);
- A description of key milestones achieved in the delivery of programs;

PNG has yet to complete the necessary work related to its DSM annual report that contains information on actual expenditures and other program metrics. PNG expects to file its 2019 Annual Report on or before April 30, 2020.

44.2 Please provide updated versions of Tables 6 and 7, showing actual applicants in 2019 for the existing residential and commercial programs respectively.

Response:

Please see the response to Question 44.2.

**45.0 Reference: ENERGY CONSERVATION AND INNOVATION PORTFOLIO FUNDING
 Exhibit B-1, p. 132; Appendix F, p. 13; Table 20; Appendix F, Table 20, p. 43
 Level of awareness of DSM programs**

Page 13 of Appendix F states:

Awareness of PNG energy efficiency programs is low. Only 17 percent of residential customers were aware of PNG’s low-income program prior to taking the survey. The lack of awareness was common to respondents in all regions, customer sizes, and household incomes. For commercial survey respondents, only six percent were aware of PNG’s Commercial Efficient Water Heater Program, three percent were aware of the Commercial Efficient Boiler Program, and one percent were aware of the Commercial Efficient Kitchens Program.

Table 20 of Appendix F presents the overall budget for General Conservation and Outreach:

Table 20: Budget – General Conservation Education and Outreach

Conservation Education and Outreach	2016	2017	2018	2019	2020	2021	2022	Total
	(Act)	(Act)	(Act)	(F/C)	(F/C)	(F/C)	(F/C)	(F/C)
K-12 Conservation Education and Outreach	\$ 6,570	\$ 24,774	\$ 26,445	\$ 39,983	\$ 60,000	\$ 60,000	\$ 60,000	\$ 277,772
Post-Secondary Conservation Education and Outreach				\$ 24,000	\$ 24,000	\$ 31,700	\$ 31,700	\$ 111,400
General Conservation Education & Outreach		\$ 4,838	\$ 15,040	\$ 85,800	\$ 33,500	\$ 115,900	\$ 92,900	\$ 347,978
Codes and Standards Support				\$ 14,052	\$ 10,000	\$ 10,000	\$ 10,000	\$ 44,052
Innovation				\$ 35,000	\$ 35,000	\$ 50,000	\$ 50,000	\$ 170,000
Enabling Activities	\$ 202,770	\$ 28,668	\$ 62,985	\$ 6,000	\$ 6,000	\$ 10,000	\$ 60,000	\$ 376,423

On page 132 of the Application PNG states it has increased the budget for marketing all programs to its customers and increased the level of activity of its Conservation Education and Outreach (CEO) activities.

45.1 Please elaborate on the reason(s) for the changes in proposed expenditure between years during the test period in the General Conservation Education & Outreach line item, as shown in Table 20.

Response:

PNG notes the following reasons for the changes in proposed expenditure between 2019 and 2022 for the General Conservation Education & Outreach line item:

- In 2019, the cost of the 2019 Customer Attitudes Survey was incurred in General Conservation Education and Outreach.
- In 2021, the General CEO budget includes completion of an ECI Communications Plan as well as its implementation by an ECI delivery partner.
- In 2022, the General CEO budget includes continued implementation of the ECI Communications Plan by an ECI delivery partner.

- 45.2 Given the low levels of awareness identified in the 2019 Customer Survey despite expenditure on general outreach between 2017 and 2019, what steps is PNG taking to ensure that the funds are targeted more effectively in the test period, and that the number of participants is maximized? Please elaborate.

Response:

Please see Table 20 on page 43 of the DSM Plan attached as Appendix F to the Application. PNG has planned and budgeted for a communications plan and its implementation.

PNG is working with Summerhill to define an ECI Communications Plan. The draft plan includes paid (Facebook Advertising, Print Advertising), owned (Website, Newsletter, Regional Representatives, Customer Service Representatives, bills), earned (media stories, contractors, community organizations), and shared marketing (social posts, word of mouth, community events) strategies.

The draft plan includes the following objectives: (1) increase awareness of how PNG is helping their residential and commercial customers save energy and (2) meet the residential and commercial program participation targets outlined in program objectives.

Please refer to Section 3.2.1 of the DSM Plan for a description of Summerhill. Summerhill is experienced in marketing DSM to remote and Northern communities.

- 45.3 Other than increased expenditure, please explain in more detail what PNG is doing to ensure that its outreach activities result in an increase in DSM awareness.

Response:

Please see the response to Question 45.2.

On page 41 of Appendix F, PNG states: “Owing to the success of Energy is Awesome, PNG proposes to increase investment in the program by refreshing materials and applying PNG’s brand, working with NEAT to keep staff and students engaged, and increasing outreach to students’ parents.”

45.4 Please explain what methodology PNG is using to determine the success of the Energy is Awesome K-12 outreach, and of all outreach in general.

Response:

PNG has set as a goal, to provide the “Energy is Awesome” program to every child in grades four and five on a two year revolving basis. Once the program delivery is fully ramped up, approximately 2,300 students in 75 classrooms will receive the program every year. PNG measures the performance of the Energy is Awesome program based on the number of students receiving the program, and on whether the program is delivered within the allocated budget.

**46.0 Reference: ENERGY CONSERVATION AND INNOVATION PORTFOLIO FUNDING
Exhibit B-1, Appendix F, p. 40; PNG and PNG(N.E.) Energy Conservation and
Innovation Program Funding Application proceeding, Exhibit B-2, BCUC
Information Request (IR) 4.2
Free-ridership and spillover assumptions**

In response to BCUC IR 4.2 in the PNG and PNG(N.E.) Energy Conservation and Innovation Program Funding Application 2019 PNG ECI proceeding, PNG stated that:

With the exception of the Low Income programs (ESK and ECAP) that are operated by BC Hydro on PNG's behalf, PNG has adopted all of the free ridership and spillover rates used by FEI in determining the cost effectiveness of their DSM programs in their 2019-2022 DSM Expenditures Plan that has been accepted by the BCUC by way of Order G-10-19.

PNG has adopted BC Hydro's free ridership and spillover rates applicable to its ESK and ECAP programs as presented in its Fiscal 2017 – 2019 Revenue Requirements Application (Section 5.3, Appendix V – Demand Side Management Initiatives Descriptions).

On page 40 of Appendix F, PNG states that as a change from analyses presented in PNG's 2019 –2020 ECI Program Funding Application, the free ridership rate for the Commercial Efficient Kitchen Program has been reduced from 20 to zero percent to reflect the low participation to date.

- 46.1 Please confirm, or explain otherwise, that the remaining free-rider and spillover assumptions for each of the existing ECI programs remain unchanged to assumptions those in FEI's 2019-2022 DSM Expenditures Plan.

Response:

PNG confirms that the free-rider and spillover assumptions for each of the existing ECI programs, except the Efficient Kitchen Program, remain unchanged to assumptions presented in FEI's 2019-2022 DSM Expenditures Plan.

- 46.2 Please provide all relevant sources for the free-rider and spillover assumptions used for the proposed new Residential Efficient Heating program, and the Commercial HVAC Controls program.

Response:

PNG has made conservative estimates for high level planning purposes based on professional experience and opinion and participation rates for other PNG programs. PNG notes that the free-rider and spillover rates are not major influencers of the cost benefit test results. A doubling of the free-rider rate from 10 to 20 percent would reduce the Total Resource Cost (TRC) test result for the Residential Efficient Heating program by roughly 0.04, from 0.42 as presented in Table 11, p. 33 of the 2019 DSM Plan, to 0.38. Similarly, doubling the free-rider rate reduces the TRC of the HVAC Controls program to approximately 1.46, from 1.56 as presented in Table 15, p. 37 of the 2019 DSM Plan.

Refining the free-rider and spillover rates does not alter the outcome of the cost effectiveness tests for either program. The Residential Efficient Heating program will remain cost effective, as determined by the mTRC, while the HVAC Controls program remains cost effective on the basis of the TRC alone.

47.0 Reference: ENERGY CONSERVATION AND INNOVATION PORTFOLIO FUNDING Exhibit B-1, Appendix F, p. 33; Table 14, p. 35; Demand-Side Measures Regulation B.C. Reg. 117/2017 (DSM Regulation, section 3(1.8)) Proposed Residential Efficient Heating Program

Under Section 3(1.8) of the DSM Regulation, the BCUC may determine that a demand-side measures, excluding certain types as specified in the regulation, is not cost-effective if the measure would not be considered cost-effective under the utility cost test.

On page 33 of Appendix F, table 11 shows that the proposed Residential Efficient Heating Program has a TRC of 0.42, an mTRC of 2.53, and a UCT of 0.35.

Table 14 summarizes the Residential programs including non-program specific expenditures, the total number of participants, and the expected annual energy savings.

Table 14: Budget – Residential Program Area

Residential Program Summary							
Program	Forecast Participant	Forecast Expenditures			Cumulative Annual Savings (GJ)		
		2020	2021	2022	2020	2021	2022
Efficient Heating	400	\$ 193,700	\$ 188,700	\$ 188,700	1,224	3,672	6,120
Energy Conservation Assistance Program	100	\$ 48,500	\$ 48,500	\$ 48,500	1,100	1,833	2,566
Energy Saving Kits	381	\$ 12,900	\$ 12,900	\$ 12,900	4,054	5,083	6,111
Total	881	\$ 255,100	\$ 250,100	\$ 250,100	6,378	10,587	14,797

Using the information in Table 14 BCUC staff calculate the proposed Residential Efficient Heating Program to account for 75.7% of the proposed residential budget over the test period.

47.1 Please discuss how PNG determined the annual budget for each of the residential programs.

Response:

Please see Section 4.2 of the DSM Plan attached as Appendix F to the Application for a description of the ECI Guiding Principles. PNG's residential programs are developed based on the ECI Guiding Principles.

PNG notes that the ESK and ECAP programs form part of previous DSM plans and were most recently approved by Order G-121-19. The budget for these programs was determined by cost per participant forecasts plus the estimated cost of administration.

Please refer to Section 10.2.1 of the DSM Plan for a description of why the Efficient Heating program was chosen. The budget for this program was determined by cost per participant forecasts plus the estimated costs of administration and marketing.

47.1.1 Please discuss how PNG views the UCT results, and how they are used to inform the development of PNG's ECI program.

Response:

The Utility (or Program Administrator) Cost Test measures the net costs of a demand-side management program as a resource option based on the costs, including incentive costs, incurred by the utility and excluding any net costs incurred by the participant. The benefits for a natural gas distribution utility are similar to the benefits considered under a Total Resource Cost (TRC) test and are restricted to the avoided cost of natural gas supply. A UCT test result for a DSM program that is less than one means that the utility incurs costs in excess of benefits to administer the program; costs that are recovered from all of the utility's customers through delivery rates.

PNG does not give particular weight to the UCT at this stage of the development of its ECI program where the impact on customer's rates is small. PNG notes that its Residential Efficient Heating, Energy Conservation Assistance Program (ECAP), and its Commercial Efficient Hot Water Heater and Commercial Efficient Kitchen measures all exhibit a UCT that is less than one. With the exception of the Residential Efficient Heating measure, all of these measures have been previously approved by the BCUC.

**48.0 Reference: ENERGY CONSERVATION AND INNOVATION PORTFOLIO FUNDING
Exhibit B-1, Appendix F, Section 10, p. 36
Commercial HVAC Controls program**

On page 36 of Appendix F PNG states:

PNG proposes a new HVAC Controls program to provide incentives up to 50 percent of the cost to commercial business owners who upgrade their HVAC Controls. Commercial customers would work with the HVAC controls contractor of their choice to propose a HVAC controls system and submit an application for preapproval. Once approved, the work would be completed, and the contractor would show the PNG incentive as a discount on the customer invoice and receive payment from PNG directly.

PNG estimates HVAC system upgrade costs an average of \$2/m² of floor space. PNG proposes to fund \$1/m². PNG proposes to initially target five percent of commercial floor space (180,000m²) per year and plans to focus on public sector buildings.

- 48.1 Please confirm if there is a maximum dollar value on the total HVAC cost allowed or a maximum dollar value on the total incentive amount available per applicant.

Response:

PNG plans to complete detailed program design upon BCUC approval of this DSM Plan.

PNG estimates that an incentive cap of approximately \$10,000 will be set.

- 48.2 Please discuss what steps PNG intends to take to verify the incentive claims made by individual contractors.

Response:

PNG will complete detailed program design upon BCUC approval of this DSM Plan.

The PNG incentive may be based on floor area. The application may include a declaration that would require signatures from the customer and contractor. Program participants may be selected for site visit.

**49.0 Reference: ENERGY CONSERVATION AND INNOVATION PORTFOLIO FUNDING
Exhibit B-1, Appendix F, pp. 37–38
Change in incentives for Commercial Efficient Boilers program**

PNG states on pages 37–38 of Appendix F:

Since April 2017, PNG has offered qualifying commercial customers incentives of up to \$2,700 towards the purchase and installation of ENERGY STAR® certified natural gas fired boilers sized up to 299 MBH, in order to replace their existing, low efficiency boilers. PNG proposes to increase the eligible boiler size to 1,500 MBH and provide incentives up to a maximum of \$11,000.

This proposed program change comes after a jurisdictional scan and customer analysis that determined that most replacement boilers purchased in PNG’s service territory have capacities in the range of 500-1500 MBH. The incentive level was found to be consistent with other jurisdictions and therefore remains unchanged at \$9/MBH.

- 49.1 Please discuss, in PNG’s view, to what extent the eligible boiler size was a key factor in the low uptake to date. Please include a discussion of what customer analysis was undertaken to support this change.

Response:

PNG considered that boiler size may be a factor in low uptake to date and plans to test this through implementation of the proposed revisions.

PNG’s analysis shows that 86 percent of PNG customers’ boilers are smaller than 1,500 MBH, while 53 percent are smaller than 300MBH, the current capacity limit.

PNG’s proposed incentive structure and eligibility criteria align with a similar program offered by FEI.

- 49.1.1 Is PNG aware of any other barriers to participation that could be affecting participation, other than low awareness.

Response:

PNG is not aware of any other barriers to participation that could be affecting participation, other than low awareness.

49.2 Please confirm, or otherwise explain, that the amount of incentive available to each applicant is capped at \$9/MBH.

Response:

PNG proposes to cap the incentive amount at \$9/MBH to a maximum of \$11,000.

PNG also proposes allowing housing providers that are local government, societies (as defined in section 1 of the *Societies Act* other than a member-funded society as defined in section 190 of that Act, or an association as defined in section 1 (1) of the *Cooperative Association Act*), and the governing body of a First Nation access to a higher incentive of \$15/MBH. This proposed program change comes in response to feedback received from BC Housing and the BC Not for Profit Housing Association.

49.3 Please discuss how this level of incentive compares to other jurisdictions.

Response:

PNG understands the FEI incentive for community housing providers to be \$15/MBH. PNG has not otherwise conducted a scan of how this incentive for community housing providers compares to other jurisdictions.

**50.0 Reference: ENERGY CONSERVATION AND INNOVATION PORTFOLIO FUNDING
Exhibit B-1, p. 131, Appendix F, p. 21
Portfolio balance and Industrial DSM**

PNG states on page 21 of Appendix F:

PNG acknowledges that the industrial sector is also an underserved market in the PNG service territory but notes that commercial rebates are also available to industrial customers. Industrial customers account for < 0.05 percent of PNG customers and represent 18 percent of the natural gas demand.

PNG states on page 131 of the Application:

While the ECI Commercial program can be accessed by PNG's industrial customers, the existing and proposed initiatives within the Commercial program are most applicable to small and larger commercial customers. Industrial customers include Campus Energy's Regional LNG facility in Dawson Creek, CNRL's fuel gas operations in Fort St. John and Tumbler Ridge, as well as pellet plants in PNG-West. Even under an ECI portfolio expanded to achieve the level of energy savings suggested by the 2017 CPR, there is limited opportunity to offer initiatives that would influence the demand of these types of customers.

- 50.1 Please discuss what work PNG has undertaken regarding any possible DSM measures targeted at the industrial sector, including any discussions with industrial customers to date.

Response:

Other than the 2019 Customer Attitudes Survey, PNG has not undertaken any analysis or discussions specifically targeting PNG's industrial customers.

- 50.2 Please confirm, or explain otherwise, that the CPR indicates that there are cost-effective measures that could be applicable to industrial customers.

Response:

PNG submits that, per section 4.6 of the DSM Plan, the most appropriate use of the 2017 CPR Market Potential Review is to provide portfolio level directional guidance to PNG DSM planning. The CPR market potential estimates are not intended to be program-specific and are most reasonable when results are considered in aggregate.

50.2.1 Please explain why there is “limited opportunity” to offer incentives to industrial customers.

Response:

PNG’s industrial customers are sophisticated entities who have the capacity and knowledge to make the best decisions on upgrading equipment based on their own feasibility studies. The CleanBC Clean Industry Fund and Industrial Incentive Program, and the Innovation Clean Energy Fund (ICE) are examples of provincial programs available to assist PNG’s industrial customers. PNG’s ECI program, having a proposed total annual budget of less than \$1 million, is too small to make a meaningful contribution to this sector.

50.3 Please clarify whether the offerings in the ECI Commercial program are suitable for most of PNG’s industrial customers. Why or why not?

Response:

PNG’s offers for commercial HVAC Controls, Efficient Boilers and Efficient Water Heaters programs may be suitable for the offices of industrial customers and some small industrial applications.

PNG’s offer for commercial Efficient Kitchens program is expected not to be applicable to most Industrial customers.

**51.0 Reference: ENERGY CONSERVATION AND INNOVATION PORTFOLIO FUNDING
Exhibit B-1, Appendix F, pp. 8, 30; Table 21, p. 44
Evaluation, Monitoring and Verification (EM&V)**

PNG states on page 30 of Appendix F: “PNG anticipates having sufficient uptake in the Residential program area to justify an EM&V review in 2022. An EM&V review of the Commercial program area is expected after 2022, once participation increases.”

Table 21 on page 44 of Appendix F includes the following note next to the Enabling line-item:
*2020 includes Portfolio EM&V.

51.1 Please confirm if the Portfolio EM&V activities will be occurring in 2020 or 2022.

Response:

PNG confirms that the Portfolio EM&V activities will be occurring in 2022.

On page 8 of Appendix F, PNG lists the various implementation partners involved in delivering its ECI program.

51.2 What preparatory work is PNG undertaking to ensure that an EM&V review can be successfully completed in 2022, particularly in light of the use of multiple 3rd party implementers?

Response:

PNG plans to complete detailed program design, including an EM&V Plan, upon BCUC approval of the DSM Plan.

**52.0 Reference: ENERGY CONSERVATION AND INNOVATION PORTFOLIO FUNDING
Exhibit B-1, Appendix F, pp. 11, 33
PNG ECI Program Market Intelligence**

PNG's states on page 11 of Appendix F:

Lower income households were more likely than other groups to choose "not at all interested" in any of the energy efficiency programs suggested on the survey. Similarly, the highest income households were most likely to be "very interested" in any of the programs. Programs where this pattern did not hold included installing programmable thermostats and furnace or heat pump tune-ups, which exhibited broad interest across all income groups.

On page 33, PNG states: "As a cost-effective way to get significant energy savings through the [Energy Conservation Assistance Program] ECAP, PNG proposes to add a smart thermostat offer to the bundle of measures currently being installed."

52.1 Please confirm if ECAP applicants will also be offered the furnace tune-up. If not, please explain why not.

Response:

PNG confirms that all residential customers will be offered the furnace tune-up, including those that participate in ECAP. PNG does not intend to alter the incentive level for income qualified customers.

52.2 Please confirm if Energy Saving Kit (ESK) applicants will be offered either the programmable thermostat or furnace tune up. If not, please explain why not.

Response:

PNG confirms that all residential customers will be offered the furnace tune-up, including those that participate in ESK. PNG does not intend to alter the incentive level for income qualified customers.

**53.0 Reference: ENERGY CONSERVATION AND INNOVATION PORTFOLIO FUNDING
 Exhibit B-1, Appendix F, pp. 28–29, 44
 Enabling Costs**

Table 21 on page 44 of Appendix F provides the allocation to individual programs in accordance with the methodology approved under G-121-19.

Table 21: Enabling Activities Allocation Factors.

	2019		2020		2021		2022	
	%	\$	%	\$	%	\$	%	\$
Efficient Heating	0.0%	\$ -	12.9%	\$ 7,714	12.9%	\$ 12,857	12.9%	\$ 12,857
ECAP	0.0%	\$ -	0.0%	\$ -	0.0%	\$ -	0.0%	\$ -
ESK	0.0%	\$ -	0.0%	\$ -	0.0%	\$ -	0.0%	\$ -
HVAC Controls	0.0%	\$ -	12.9%	\$ 7,714	12.9%	\$ 12,857	12.9%	\$ 12,857
Efficient Boiler	22.5%	\$ 13,500	12.9%	\$ 7,714	12.9%	\$ 12,857	12.9%	\$ 12,857
Efficient Water Heate	22.5%	\$ 13,500	12.9%	\$ 7,714	12.9%	\$ 12,857	12.9%	\$ 12,857
Efficient Kitchens	22.5%	\$ 13,500	12.9%	\$ 7,714	12.9%	\$ 12,857	12.9%	\$ 12,857
CEO - K-12	0.0%	\$ -	0.0%	\$ -	0.0%	\$ -	0.0%	\$ -
CEO - Post Secondary	0.0%	\$ -	12.9%	\$ 7,714	12.9%	\$ 12,857	12.9%	\$ 12,857
CEO - General	22.5%	\$ 13,500	12.9%	\$ 7,714	12.9%	\$ 12,857	12.9%	\$ 12,857
Enabling*	10.0%	\$ 6,000	10.0%	\$ 6,000	10.0%	\$ 10,000	10.0%	\$ 60,000
Total	100.0%	\$ 60,000	100.0%	\$ 60,000	100.0%	\$100,000	100.0%	\$150,000

*2020 includes Portfolio EM&V.

- 53.1 Please provide an itemized breakdown of the enabling activities which the make up the total expenditure shown in Table 21, including, but not limited to: resources required, number of FTE's and associated costs.

Response:

PNG notes that consultant costs make up the total expenditure.

In a note below Table 7 on page 28, and Table 8 on page 29 of Appendix F, PNG notes that the 2019 and 2020 Approved Expenditures have been adjusted for enabling costs that were previously allocated to the rejected Residential Furnace program.

- 53.2 Please explain how PNG has adjusted the 2019 and 2020 approved expenditures for each Program identified in tables 7 and 8 to account for the costs previously allocated to the Residential Furnace Program.

Response:

PNG distributed the \$10,800 enabling costs allocated to the Residential Furnace Program in 2019 amongst the other existing programs in the portfolio.

PNG distributed the \$10,800 enabling costs allocated to the Residential Furnace Program in 2020 amongst the other existing programs in the portfolio.

- 53.3 Please discuss the pros and cons of continuing with PNG's current percentage-based method for allocating enabling costs.

Response:

PNG's existing method of allocating costs that cannot be directly assigned to any particular program is simple to apply and easy to understand. PNG proposes to continue with its existing method, as set out in Table 21, p. 44 of the DSM Plan (Appendix F of the Application). However, PNG has made changes to its accounting records to allow it to identify cost drivers more precisely. Going forward, PNG expects the portion of costs that are not directly assignable to a specific program to be smaller. PNG submits that this modification is all that is required to improve the assessment of the cost effectiveness of PNG's ECI program areas and of specific measures.

- 53.3.1 Has PNG considered any alternative methods of allocating enabling costs? If so, please discuss the pros and cons of the alternative method and why this method has been considered.

Response:

Please see the response to Question 53.3.

53.3.2 Please provide a comparison of each method for allocating enabling costs, including their application and impacts on program expenditures.

Response:

PNG has not prepared this analysis at this time. Please see the response to Question 53.3.

**54.0 Reference: ENERGY CONSERVATION AND INNOVATION PORTFOLIO FUNDING
Exhibit B-1, Appendix F, Table 5, p. 26, 39; PNG and PNG(N.E.) Energy
Conservation and Innovation Program Funding Application proceeding,
Exhibit B-1, Table 3, pp. 12, 19
Updates to the Cost-Benefit Model**

Table 5 on page 26 of Appendix F provides updated assumptions of the PNG Cost Effectiveness Model (PCEM) for 2019, including updated assumptions for the cost of gas and carbon tax relative to the information provided in Table 3 on page 12 of the PNG and PNG(N.E.) Energy Conservation and Innovation Program Funding Application.

PNG states on page 39 of Appendix F that no changes are proposed for the Commercial Efficient Water Heater program, and reports a mTRC of 1.69.

On page 19 of the PNG and PNG(N.E.) Energy Conservation and Innovation Program Funding Application, PNG reported a mTRC of 1.32 for the Commercial Efficient Water Heater program.

- 54.1 Please discuss the reasons for any changes to the reported cost-benefit ratios, and to what extent the updated PCEM assumptions account for the change in reported cost-benefit values.

Response:

Changes to the PCEM assumptions, between the 2019-2020 ECI Program Funding Application, and the DSM Plan (Appendix F of the Application) are limited to changes to the delivery rates, commodity cost of natural gas, and the starting amount of the B.C. carbon tax. These changes are summarized in the table that follows. Increases to the commodity cost and carbon tax will increase the TRC ratio by approximately 25 percent; accounting for the majority of the increase. In some cases, PNG made small adjustments to the administration and marketing costs, and to participation rates. These changes will also influence the TRC.

PNG wishes to point out that all of these ratios are estimated on a prospective basis, using the best forecasts available at the time. As illustrated by the table that follows, changes to commodity costs and the carbon tax over the life of the measure, and of course the actual participation rates, will impact the actual cost effectiveness of the program.

	2020 - 2022 Application	2019 - 2020 Application	% Change
Distribution Rates			
PNG-West Residential	\$ 12.16	\$ 11.98	1.5%
FSJ Residential	\$ 4.66	\$ 4.60	1.3%
DC Residential	\$ 4.46	\$ 4.40	1.4%
TR Residential	\$ 10.84	\$ 10.56	2.7%
PNG-West Commercial	\$ 10.26	\$ 10.12	1.4%
FSJ Commercial	\$ 3.64	\$ 3.60	1.1%
DC Commercial	\$ 3.10	\$ 3.06	1.3%
TR Commercial	\$ 8.66	\$ 8.47	2.2%

Gas Cost			
PNG-West Residential	\$ 3.42	\$ 2.64	29.4%
FSJ Residential	\$ 2.94	\$ 2.22	32.4%
DC Residential	\$ 2.94	\$ 2.22	32.4%
TR Residential	\$ 3.98	\$ 3.25	22.2%
PNG-West Commercial	\$ 3.42	\$ 2.64	29.4%
FSJ Commercial	\$ 2.94	\$ 2.22	32.4%
DC Commercial	\$ 2.94	\$ 2.22	32.4%
TR Commercial	\$ 3.98	\$ 3.25	22.2%

Carbon Tax	\$ 1.99	\$ 1.74	14.3%
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**55.0 Reference: ENERGY CONSERVATION AND INNOVATION PORTFOLIO FUNDING
Exhibit B-1, Appendix F 2019 DSM Plan, p. 45, footnote 7
Incomplete footnote**

Footnote 7 at the end of the paragraph dealing with the alignment of the ECI Portfolio with BC's Energy Objectives on page 45 appears to be incomplete.

55.1 Please provide the complete footnote.

Response:

The entire footnote is: "Net savings account for free ridership and spillover effects. Energy and GHG reductions are aggregated over the life of the measure".