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Via E-File

August 23, 2024

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

File No.: 4.2.7(2024)

Attention: Patrick Wruck
Commission Secretary

Dear Patrick Wruck:

**Re: Pacific Northern Gas Ltd. and Pacific Northern Gas (N.E.) Ltd.
2024 Consolidated Resource Plan
August 2024 Evidentiary Update**

On June 28, 2024, Pacific Northern Gas Ltd. and Pacific Northern Gas (N.E.) Ltd. (collectively, PNG) submitted the PNG 2024 Consolidated Resource Plan (2024 CRP) to the British Columbia Utilities Commission (BCUC) for review and acceptance. On August 14, 2024, the BCUC issued Order G-215-24A which, among other things, established the regulatory timetable for the review of the 2024 CRP, including provision for PNG to submit an evidentiary update to the 2024 CRP. In this regard, Directive 5 of Order G-215-24A stipulated:

5. *PNG is directed to file an evidentiary update no later than Thursday, August 29, 2024, as described in Appendix A to this order.*

In compliance with Directive 5, appended to this letter is an update to the 2024 CRP that constitutes the Evidentiary Update. Further information on items reflected in the update is provided in the discussion that follows.

Evidentiary Update

In Order G-265-20, accepting PNG's 2019 Consolidated Resource Plan and PNG's 2020-2022 Energy Conservation and Innovation Expenditure Schedule, the BCUC directed PNG to file its next long-term resource plan no later than December 31, 2023. In accordance with that directive, and in anticipation of a December 31, 2023, submission date, PNG undertook the preparation of its consolidated resource plan that included long range forecasts of demand based on the most current actual demand from 2022. These forecasts were developed by Posterity Group using its Navigator model that forecasts natural gas consumption based on exogenous conditions that reflect current energy consumption patterns and incorporate known future changes, like expected customer growth, forecast demand-side measure (DSM) savings, changes to codes and standards, and government policy targets.

By letter to the BCUC dated December 6, 2023, PNG requested an amendment to the December 31, 2023, filing deadline for the consolidated resource plan. By Order G-356-23 dated December 19, 2023, the BCUC granted PNG's request for an extension and directed PNG to file its next consolidated resource plan upon the earlier of: within 3 months of the execution of the Cedar LNG Transportation Service Agreement, or by June 30, 2024. On June 28, 2024, PNG submitted the 2024 CRP in accordance with the directive of Order G-356-23.

In the first half of 2024, PNG determined that amending the long-term forecasts underpinning the 2024 CRP to reflect actual demand and actual customer additions in 2023, as well as a projection of demand and customer additions to the end of 2024 based on trends during the first quarter of 2024, was appropriate. During this time, PNG was also preparing its schedule of expenditures for its Energy Conservation and Innovation (ECI) programs for the period 2025-2027; PNG determined that an update to the long-term DSM plan that forms a portion of the 2024 CRP, to reflect the detailed forecast for the period 2025-2027, was also appropriate.

Updating the Navigator model to reflect the rebasing of the forecasts to demand and customer additions projected to the end of 2024 required significant time and effort and could not be completed by the effective filing deadline of June 30, 2024, imposed by Order G-356-23. PNG therefore made manual updates and adjustments to the Navigator forecasts and presented these in the Application. Updates to the Navigator model were subsequently completed in early August 2024, and the resulting updated forecasts have been reflected in the charts and tables provided in the appended Evidentiary Update.

Impact to the demand forecasts

As presented in the table that follows, in all cases the differences between the forecasts presented in the original 2024 CRP and those presented in the Evidentiary Update are not significant, resulting in a difference of less than 1.5 percent in gross (before the impact of DSM) consolidated demand across all planning scenarios and over the entire forecasting period.

Changes are constrained to residential and small commercial demand and design day demand forecasts in all four systems, as well as to Company use demand in PNG-West. The corrections to the residential and small commercial demand are the result of updates to the use per account (UPA) forecasts for these customers; no corrections to the customer count forecasts were necessary.

Summary of Forecast Demand Impacts – Evidentiary Update vs Original 2024 CRP

	Average Increase (Update compared to Application) in GJ and as a portion of total demand	
	GJ/year	**%**
PNG-West	39,867	0.7%
Fort St. John	32,514	1.0%
Dawson Creek	14,276	0.8%
Tumbler Ridge	640	0.1%
Consolidated	76,212	0.7%

The tables in the Evidentiary Update that have been updated to reflect the corrections to the forecasts are:

- Tables 14 to 17: Cumulative and Average Change in Demand (2023 – 2042) – (PNG-West, Fort St. John, Dawson Creek, Tumbler Ridge)
- Table 21: Forecast Design Day Demand
- Table 22: Forecast Design Day Demand: With Large Customer Additions
- Tables showing annual and design day demand forecasts provided in Appendix E and Appendix F

While the corrections also affect the charts presented in the original 2024 CRP, the impact is too small to be visible, and, with the exception of the charts showing the UPA forecasts for residential and small commercial customers (Figures 24 to 27 and Figures 35 to 38), they have not been updated in the Evidentiary Update.

Changes to the long-term DSM Plan

The Evidentiary Update also reflects changes to the forecast impact of the long-term DSM Plan. In starting to prepare its forecasts for the 2025-2027 ECI schedule of expenditures that PNG expects to file towards the end of the third quarter of 2024, PNG determined that its DSM energy savings projections, developed in reliance on a Conservation Potential Review and some macro-economic assumptions, were overly optimistic. As a result, PNG changed its forecast approach to more closely consider PNG’s actual DSM experience in recent years to allow for a more realistic energy savings forecast.

Notable updates to the DSM Plan found in Section 8 are:

- Figure 52 showing a decrease in the forecast total energy savings as a result of the 2025-2034 long-term DSM Plan, from 5,200 TJ to 809 TJ under the Reference DSM Case, and from 8,940 TJ to 1,046 TJ under the High DSM Case. As noted above, this reduction in forecast savings is due to: (i) a closer alignment of the forecast to the impact that the ECI programs currently have; (ii) a more realistic forecast of the achievable market potential savings over the period from 2025 to 2034; and (iii) a calculation of the total savings over the period from 2025 to 2034, rather than from 2025 to 2032 as originally presented in the original 2024 CRP.
- Table 24 showing a decrease in forecast spending over the period 2025 to 2034 under the Reference DSM Case, from $33.6 million over the period 2025 to 2032 as filed in the original 2024 CRP to $24.0 million over the period 2025 to 2034 in the Evidentiary Update.
- Table 25 showing a decrease in forecast spending over the period 2025 to 2034 under the High DSM Case, from $57.0 million over the period 2025 to 2032 as filed in the original 2024 CPR to $35.3 million over the period 2025 to 2034 in the Evidentiary Update.
- Figure 53: Consolidated Forecast of Total Gross and Net Annual Demand (2022 – 2042).
- Figure 54: Consolidated Forecast of Net Annual Demand – Percentage Reduction (2022 - 2042).
- Table 26: ECI Plan Impacts on Demand.
- Figures 55 to 57 showing the rate impacts of the DSM Plan on each customer class.

In addition, PNG has extended the long-term DSM Plan in the Evidentiary Update to cover the period from 2025 to 2034, up from 2025 to 2032 as presented in the original 2024 CRP.

<u>No change to the renewable natural gas (RNG) forecast</u>

The change to the demand forecasts presented in the Evidentiary Update has an immaterial impact on the quantities of RNG that PNG would have to acquire under the three forecast scenarios.

<u>Changes to the GHG emissions forecast and to the GHG reduction plan</u>

The change to the demand forecasts, along with the updates to the long-term DSM Plan, have an impact on the GHG emissions forecast presented in Figure 60 and Table 28. The emissions forecast is amended further by removing the contribution from the combustion of Company use gas that had erroneously been included in the forecast presented in the original 2024 CRP. Emissions from the combustion of Company use gas are accounted for as direct facility, otherwise referred to as Scope 1, emissions and should be excluded from PNG's customer (Scope 3) emissions presented in this figure and chart.

Update on Cedar LNG

The regulatory timetable for the proceeding was presented as Appendix A to Order G-215-24A. As a footnote to the regulatory timetable, the BCUC observed that Cedar LNG announced a positive final investment decision on June 25, 2024. The BCUC requested that PNG clarify whether the 2024 CRP demand forecasts (annual and design day) include the Cedar LNG project, and if not, to address the potential impact of the Cedar LNG project on PNG's demand forecasts and any related need for infrastructure upgrades.

In the April 10, 2024, update to the BCUC on the timing of submission of the 2024 CRP, PNG advised that on Friday, March 29, 2024, Cedar LNG notified PNG that it would not be extending the Transportation Reservation Agreement (TRA) (approved by the BCUC by Order G-337-23) beyond the quarterly option period which ended on March 31, 2024.

In the intervening period, PNG has continued to advance discussions regarding the provision of natural gas service to Cedar LNG under a Transportation Service Agreement (TSA). Absent firm service arrangements, PNG has not made any provision for potential Cedar LNG requirements in the 2024 CRP demand forecast. Further, the absence of firm service arrangements preludes any assessment of potential impacts of the Cedar LNG project on future demand forecasts and the requirement for reactivation and/or upgrading of existing system infrastructure.

Please direct any questions respecting this submission to my attention.

Yours truly,

Original on file signed by:

Verlon G. Otto

PACIFIC NORTHERN GAS LTD.

AND

PACIFIC NORTHERN GAS (N.E.) LTD.

2024 CONSOLIDATED RESOURCE PLAN

Resource Plan for the PNG-West and PNG(N.E.) Pipeline Systems

EVIDENTIARY UPDATE

August 23, 2024

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1 INTRODUCTION

This Consolidated Resource Plan (CRP) has been prepared by Pacific Northern Gas Ltd. (PNG or the Company) for its PNG-West division (PNG-West), along with the three distribution systems owned and operated by its wholly owned subsidiary, Pacific Northern Gas (N.E.) Ltd. (PNG(N.E.)). This CRP was prepared in accordance with the requirements of s. 44.1 of the *Utilities Commission Act* (UCA) and, to the extent applicable, the British Columbia Utilities Commission's (BCUC or the Commission) Resource Planning Guidelines for Regulated Utilities (Resource Planning Guidelines) issued by the Commission on December 15, 2003.

PNG is a company formed under the laws of British Columbia and is a wholly owned subsidiary of TriSummit Utilities Inc. (TSU), the owner of a number of utilities and renewable power infrastructure assets in Canada and the United States. The head and registered offices of the Company are located in Vancouver, British Columbia and its principal operating office is located in Terrace, British Columbia.

1.1 Overview of Operations

PNG owns and operates a natural gas transportation system and distributes gas to approximately 20,800 residential, commercial and industrial customers in communities in northwestern British Columbia via its PNG-West division. PNG(N.E.) is also a natural gas distribution utility, providing sales and transportation services to approximately 21,600 residential, commercial and industrial customers in the northeastern British Columbia communities of Fort St. John, Dawson Creek, and Tumbler Ridge. PNG and PNG(N.E.) are both regulated by the BCUC.

Figure 1 provides an illustration of the layout of PNG's transmission and distribution assets.

Figure 1: Overview of PNG and PNG(N.E.) Natural Gas Pipeline Systems

1.1.1 PNG-West

The PNG-West transmission pipeline system connects with the British Columbia pipeline system operated by Enbridge Inc. (Enbridge) near Summit Lake, British Columbia, and extends 587 kilometres to the west coast of British Columbia at Prince Rupert. The transmission pipeline between Summit Lake and Terrace has been partially twinned, or looped, to increase throughput capacity. PNG also owns and operates over 300 kilometres of lateral transmission pipelines extending into the various communities served in the PNG-West service area, the most significant being dual lines extending approximately 57 kilometres from Terrace into Kitimat.

There are a total of five compressor units at four stations that can be used to maintain pressure on the PNG-West transmission pipeline system: two units located at Summit Lake and one each at Vanderhoof, Burns Lake and Telkwa.

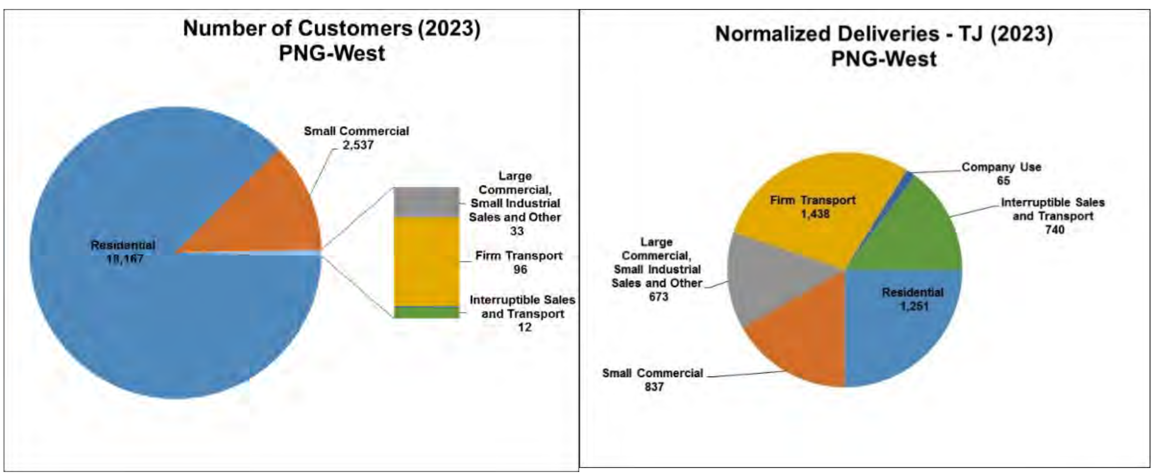
With the closure of Methanex's methanol/ammonia facility in Kitimat in November 2005, PNG deactivated its compressor stations at Vanderhoof, Burns Lake, and Telkwa, as well as 85 kilometres of 10-inch pipeline. Subsequently, PNG experienced the closure of West Fraser's Eurocan paper mill in January 2010, and the loss of other industrial forestry customers, and further de-activated 53 kilometres of 6-inch pipeline. While these deactivated compressor and pipeline facilities have been maintained, they do not represent idle system capacity. System reinforcement investment would be required to return these assets to service to allow PNG to serve any new large industrial loads that may require natural gas service.

At this time, only one compressor unit at Summit Lake is operating to meet base system load. The Burns Lake compressor was reactivated in 2023 and operates sporadically to provide winter system resilience and to support pipeline integrity maintenance work.

PNG also owns and operates natural gas distribution facilities including approximately 1,050 kilometres of distribution mains and 700 kilometres of service lines to deliver gas from its transmission pipeline system to homes and businesses in Prince Rupert, Port Edward, Kitimat, Terrace, Smithers, Telkwa, Houston, Burns Lake, Fraser Lake, Fort St. James and Vanderhoof. In addition, PNG operates a propane vapour distribution system serving approximately 135 customers in the town of Granisle.

PNG delivers approximately 5,000 TJ to approximately 20,800 customers in the PNG-West division.

Figure 2: PNG-West Customer Segments[1]



1.1.2 PNG(N.E.)

<u>Fort St. John System</u>

PNG(N.E.)'s Fort St. John system serves the communities of Fort St. John and Taylor, as

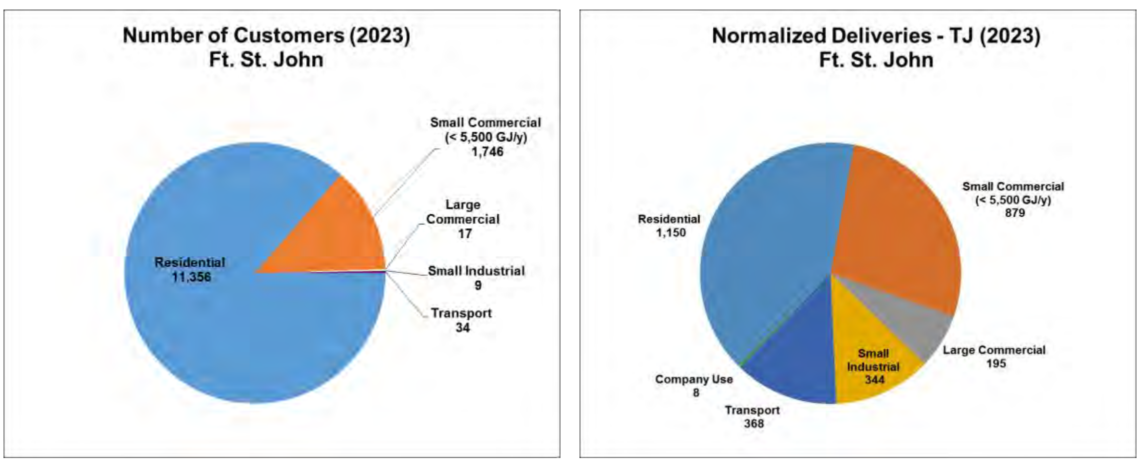
[1] In all delivery areas, small commercial customers are defined as those that consume less than 5,500 GJ per year, and large commercial customers as those that consume more than 5,500 GJ per year.

well as the rural communities and gas wells located near those centers. PNG(N.E.) delivers natural gas to its communities through a number of different connection points:

- The City of Fort St. John and surrounding rural communities receive gas through seven interconnections between the PNG(N.E.) and the Enbridge T-North pipeline system and two interconnections with Canadian Natural Resources Ltd.'s (CNRL) West Stoddard pipeline;
- The community of Wonowon, located along the Alaska Highway approximately 100 km north of Fort St. John, receives gas from the outlet of Aitken Creek Storage that is delivered through a network of third-party fuel gas pipelines; and
- The community of Pink Mountain, located 180 km northwest of Fort St. John, receives gas from a connection to the Enbridge Fort Nelson mainline.

The entire Fort St. John delivery system consists of approximately 130 km of transmission pipeline, 1,200 km of distribution pipeline, and 360 km of service lines. The Fort St. John system delivered 2,800 TJ to 13,000 customers in 2023.

Figure 3: Fort St. John System Customer Segments

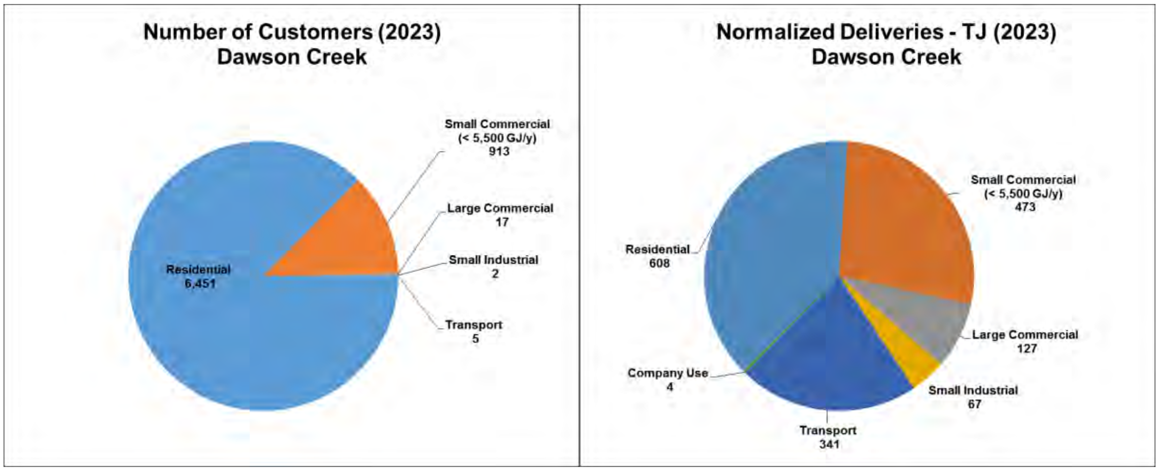


Dawson Creek System

PNG(N.E.)'s Dawson Creek system serves the communities of Dawson Creek, Pouce Coupe, Tomslake and Rolla, as well as the rural areas surrounding these communities from gas supplied through the Enbridge 26-inch Alberta mainline. PNG(N.E.) also provides service to the community of Doe River and the South Peace Hutterite Colony from an interconnection to the Enbridge 26-inch Alberta transmission line and to the Peaceview

Hutterite Brethren Colony from an interconnection with the Enbridge Parkland lateral. The entire delivery system consists of approximately 60 km of transmission pipeline, 860 km of distribution pipeline, and 290 km of service lines. In 2023, the Dawson Creek system delivered 1,600 TJ's to approximately 7,400 customers.

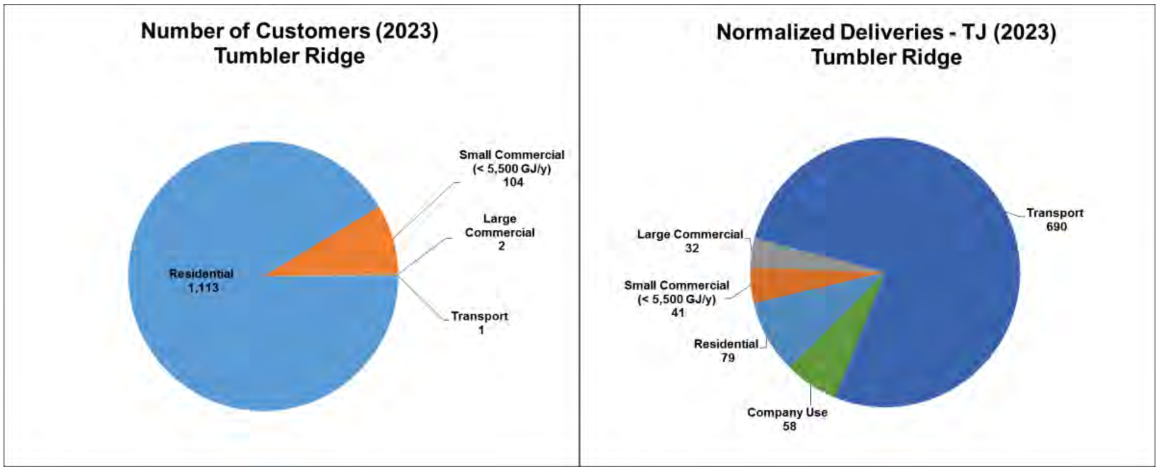
Figure 4: Dawson Creek System Customer Segments



Tumbler Ridge System

PNG(N.E.)'s Tumbler Ridge system is supplied from raw gas that is delivered to PNG(N.E.)'s Tumbler Ridge processing plant from CNRL's area gas field and gathering facilities. Over 80 percent of the sales gas output from the Tumbler Ridge processing plant is delivered to CNRL's fuel gas system at the Murray River delivery point. The remainder is delivered to the Quintette mine for site maintenance (the mine facility has been shut down since May 2000), the town of Tumbler Ridge and to a small industrial park upstream of the town gate station. In 2023, the Tumbler Ridge system delivered approximately 900 TJ to over 1,200 customers.

Figure 5: Tumbler Ridge System Customer Segments



1.2 Situational Context

PNG's size and operating characteristics provide important context for the consideration of this CRP. FortisBC Energy Inc. (FEI) is the largest gas utility in British Columbia. In comparison, PNG's pipeline network is over 10 times smaller than FEI's pipeline network and the amount of energy consumed by PNG's customers in 2023 amounted to approximately 4 percent of the total energy consumed by FEI's customers in the same period.[2]

In addition to being small, the PNG's pipeline system is not operated at capacity. As noted above, PNG experienced a decline in throughput on its PNG-West system of approximately 80 percent as the result of the loss of large industrial, anchor tenant customers between 2004 and 2010, the demand of which has not yet been replaced despite significant marketing efforts.

Further, the forecasts set out in this CRP show that PNG is expecting relatively flat demand across the residential and commercial rate classes. As described in Section 5.3.1, PNG has projected customer additions over the 20-year planning period based on projections of modest population growth by BC Stats. However, as an example of the context of these additions for PNG, PNG-West experienced 90 customer additions in 2023

[2] FortisBC, "Our service areas," accessed June 27, 2024, https://www.fortisbc.com/about-us/corporate-information/our-service-areas; FortisBC Energy Inc. - Annual Review for 2024 Delivery Rates, Table A2-1: FEI Customer Counts, Customer Additions, Use per Customer, and Energy, Appendix A-2, p. 2.

(i.e., the projected changes in customer count discussed in this submission are not significant when considered in real numbers).

For these reasons, this CRP does not forecast the need for new assets to address growth or system capacity utilization. PNG is not projecting that the modest forecast residential and commercial growth across its system will offset the expected reductions in use per account by customers. PNG is considering ways to maximize the use of its existing resources and to find the most efficient ways to continue to provide safe and reliable service to its existing customers. PNG does not trade-off resources since it buys traditional natural gas (or potentially renewable natural gas (RNG)) as needed to serve its projected loads.

PNG has also provided analysis and context with respect to its role in reducing greenhouse gas (GHG) emissions in B.C. to support the Province's targets, including discussing its efficiency programs that help customers to conserve gas and achieve bill savings, its projected GHG emission reductions based on actions it knows it can take today, as well as the potential for blending RNG into its natural gas system. PNG is committed to taking action to support these important objectives. However, PNG's small size and cold weather service area means that it must consider what actions are realistic and prudent to undertake while continuing to provide safe, reliable, and affordable service to its customers.

1.3 Regulatory and Legal Framework

Section 44.1 of the UCA specifies the legal framework by which long-term resource plans filed by a public utility must be considered. Additionally, the Resource Planning Guidelines provide further guidance for utilities in the development of their long-term resource plans. As described below, PNG's CRP meets the legal requirements specified in the UCA and aligns with the requirements set out in the Resource Planning Guidelines.

1.3.1 Utilities Commission Act

Section 44.1(2) of the UCA sets out the requirements for a utility's long-term resource plan. Table 1, below, specifies where in this CRP each of the elements have been considered.

Table 1: Elements of Section 44.1(2) of the UCA

Section 44.1(2) Requirement	Resource Plan Section
(a) an estimate of the demand for energy the public utility would expect to serve if the public utility does not take new demand-side measures during the period addressed by the plan;	Annual and peak day demand forecasts for each of PNG's systems are presented in Section 5 and Section 7, respectively.
(b) a plan of how the public utility intends to reduce the demand referred to in paragraph (a) by taking cost-effective demand-side measures;	PNG has prepared a Demand Side Management (DSM) Plan associated with its Energy Conservation and Innovation (ECI) portfolio for the period 2025 to 2032. Section 8 presents the DSM Plan.
(c) an estimate of the demand for energy that the public utility expects to serve after it has taken cost-effective demand-side measures;	Section 8 presents the estimated impact on demand, of PNG's ECI portfolio.
(d) a description of the facilities that the public utility intends to construct or extend in order to serve the estimated demand referred to in paragraph (c);	Section 11 describes PNG's evaluation of its system capacity requirements and its assessment of its gas supply resources.
(e) information regarding the energy purchases from other persons that the public utility intends to make in order to serve the estimated demand referred to in paragraph (c);	
(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;	
(g) any other information required by the commission.	PNG has addressed BCUC directives from the 2019 CRP. These directives have been identified in Section 1.5.

Additionally, section 44.1(8) of the UCA specifies that the BCUC must consider certain other factors when assessing a long-term resource plan. Table 2 specifies where in this CRP each of the elements have been considered.

Table 2: Elements of Section 44.1(8) of the UCA

Section 44.1(8) Requirement	Resource Plan Section
(a) the applicable of British Columbia's energy objectives,	Discussed in Section 1.3.2.
(b) the extent to which the plan is consistent with the applicable requirements under sections 6 and 19 of the *Clean Energy Act*,	Neither Section 6 nor Section 19 apply to PNG's resource planning process.
(c) whether the plan shows that the public utility intends to pursue adequate, cost-effective demand-side measures, and	Section 8 sets out PNG's current and long-term DSM Plan associated with its (ECI) portfolio.
(d) the interests of persons in British Columbia who receive or may receive service from the public utility.	PNG's CRP realistically forecasts demand with the objective of continuing to provide safe and reliable service. PNG's ECI program helps its customers implement cost effective measures that conserve natural gas and reduce GHG emissions.

1.3.2 Clean Energy Act

Section 44.1(8) of the UCA requires the BCUC to consider certain factors set out in the *Clean Energy Act* when reviewing a utility's long-term resource plan, set out in (a) and (b) of Table 2, above. Table 3 that follows lists the *Clean Energy Act* objectives which are provincial in nature, and applicable to PNG, and discusses how these are supported by its resource plan.

Table 3: Elements of Clean Energy Act

British Columbia's Energy Objectives	Resource Plan Section
(b) to take demand-side measures and to conserve energy, including the objective of the authority reducing its expected increase in demand for electricity by the year 2020 by at least 66%;	PNG's long term DSM Plan associated with its ECI portfolio, and its impact on forecast demand is presented in Section 8.

British Columbia's Energy Objectives	Resource Plan Section
(d) to use and foster the development in British Columbia of innovative technologies that support energy conservation and efficiency and the use of clean or renewable resources.	PNG's current ECI program offers incentives to residential and commercial customers to install dual-fuel (hybrid) heating systems. The ECI program has also established a pilot program to support deep energy retrofits (DERs) of residential and commercial buildings.
(g) to reduce BC greenhouse gas emissions: (i) by 2012 and for each subsequent calendar year to at least 6% less than the level of those emissions in 2007, (ii) by 2016 and for each subsequent calendar year to at least 18% less than the level of those emissions in 2007, (iii) by 2020 and for each subsequent calendar year to at least 33% less than the level of those emissions in 2007, (iv) by 2050 and for each subsequent calendar year to at least 80% less than the level of those emissions in 2007, and (v) by such other amounts as determined under the *Climate Change Accountability Act*.	PNG's current ECI program and long term ECI Plan included in this CRP have, as their fundamental objective, to help customers reduce their natural gas consumption and thereby reduce GHG emissions in the province. In addition, PNG's RNG program (Section 9) further reduces GHG emissions by displacing the GHG emissions associated with conventional natural gas through the production of RNG. The impact of both the ECI and RNG programs on the GHG emissions of PNG customers is presented in Section 10.
(h) to encourage the switching from one kind of energy source or use to another that decreases greenhouse gas emissions in British Columbia.	PNG's current ECI program offers incentives to residential and commercial customers to install dual-fuel (hybrid) heating systems.
(i) to encourage communities to reduce greenhouse gas emissions and use energy efficiently.	PNG has included in its portfolio of ECI programs, support to municipalities to promote the adoption by local builders of the BC Energy Step Code. Communities can also support the production of RNG by participating in PNG's voluntary RNG program.
(j) to reduce waste by encouraging the use of waste heat, biogas and biomass.	In Section 9 PNG describes its RNG program.

British Columbia's Energy Objectives	Resource Plan Section
(k) to encourage economic development and the creation and retention of jobs.	PNG continues to work with prospective customers on projects utilizing PNG's transmission assets, and to monitor for opportunities to provide service to other parties that may require service during the development stage of their projects to support economic development within the communities it serves.

1.3.3 BCUC Resource Planning Guidelines

In December 2003, the Commission issued the Resource Planning Guidelines to assist utilities with the preparation and submission of resource plans. The Resource Planning Guidelines in general may be said to be more applicable to integrated utilities that provide generation or integrated supply resources, transmission, and distribution services, rather than to utilities such as PNG that do not have integrated supply-side resources.

Consistent with the Resource Planning Guidelines, PNG has developed long–term (20 year) demand forecasts by sector (residential, commercial, and industrial) and region using an end-use model. The demand forecast begins by disaggregating PNG's data on consumption and number of customers into the end-use models. Three demand forecast scenarios were developed using inputs on several economic and policy variables – the Reference scenario as well as a Delayed Decarbonization scenario and Accelerated Decarbonization scenario. Sections 5 through 7 of this CRP summarize the expected demands on the system. A description of the 20-year planning model used to determine the annual demand forecasts is presented in Appendix A appended as PDF file Appendix A - PNG 2022 Residential End-use Study and Appendix B: Demand Forecasting End-Use Model, and a discussion of the forecasting assumptions is presented in Appendix C: Critical Driver Input Assumptions.

In order to support and improve PNG's residential demand forecasts and DSM evaluation framework, PNG commissioned the undertaking of a residential end-use survey (REUS) in 2022 that targeted a sample of residential customers from across all divisions. The REUS is presented in Appendix A: 2022 Residential End-use Study.

Table 4: Resource Planning Guidelines

Resource Planning Guideline	Resource Plan Section
Identify the planning context and objectives of a Resource Plan.	PNG continues to use the same set of planning objectives that were presented in its 2019 CRP to guide the development of this CRP. The planning objectives are discussed in more detail in Section 1.4 below. Section 2 below also discusses factors that impact the planning context for utilities in BC.
Develop a range of gross (i.e., that do not reflect the impact of Demand-Side Management programs) demand forecasts.	PNG's gross demand forecasts for each service area and on a consolidated basis are set out in Section 5. A sensitivity analysis presenting possible alternative forecast scenarios is presented in Section 6.

Resource Planning Guideline	Resource Plan Section
Identify supply and demand resources. Measure supply and demand resources against Resource Plan objectives. Develop a range of multiple-resource portfolios. Evaluate resource portfolios against Resource Plan objectives and select a portfolio. Develop an action plan to implement the selected portfolio.	PNG is not a vertically integrated utility and does not develop and compare multiple integrated resource portfolios. However, PNG does use the results of its long-term forecasts to determine whether it has sufficient pipeline capacity to serve the anticipated demand of its current and future customers. Options for mitigating any forecast constraints to deliverability consider alternatives to expansions of PNG's pipeline infrastructure which include providing demand-side solutions through PNG's ECI portfolio, as well as short- or medium-term LNG or CNG supply. PNG's gas contracting plans are reviewed and approved by way of a separate Annual Contracting Plan filed by PNG with the BCUC. Historically there have been no resource trade-offs to be considered. Today, PNG considers the Province's goal of reducing the GHG emissions associated with natural gas, and as a result is now also considering other low emission gases, such as RNG, in considering resource alternatives. PNG's RNG considerations are discussed in Section 9. A discussion of initiatives that improve the resiliency of PNG's energy delivery infrastructure is presented in Section 11.
Obtain stakeholder input during the planning process.	Since PNG is not forecasting load growth and therefore does not anticipate needing system additions, PNG has not consulted with stakeholders on this CRP. PNG will provide a copy of this filing to the interveners that participated in PNG's last CRP filing. A discussion of PNG ongoing communications and consultations activities is presented in Section 12.

Resource Planning Guideline	Resource Plan Section
Consider government policy and seek regulatory input during the Resource Plan preparation.	PNG's consideration of the legal and regulatory framework is discussed in this Section 1.2 and the policy framework is discussed in Section 2.1. PNG considers input from the BCUC and BCUC staff through its filings on individual projects and energy supply contracts as well as through previous resource plan filings.
Submit the Resource Plan for regulatory review.	The submission of the plan is included in this Application.

1.4 Long-term Resource Plan Objectives

The Resource Planning Guidelines state that "… a resource planning process that assesses multiple objectives and tradeoffs between alternative resource portfolios is key to the development of a cost-effective resource plan for meeting demand for a utility's service"[3]. PNG has identified six key resource planning objectives that form the basis for evaluating potential resources that might be considered in a resource plan, including major infrastructure projects, gas supply alternatives and demand side measures.

In this CRP, PNG maintains its planning objectives and benchmarks presented in the 2019 Consolidated Resource Plan. Table 5 that follows identifies the six resource planning objectives and the relative weighting given to them.

PNG is not a vertically integrated utility with its own natural gas supply, or storage resources. The concept of developing and comparing multiple integrated resource portfolios to address forecast supply or capacity shortfalls is therefore less relevant, especially in the current environment where, with some exceptions, PNG is not forecasting capacity constraints over the planning period of this CRP.[4]

However, PNG does consider planning objectives to be an important consideration in the

[3] British Columbia Utilities Commission *Resource Planning Guidelines*, December 2003, p. 2.

[4] A discussion of notable projects and initiatives that are being developed in order to ensure continued safe and reliable service to PNG's existing customers is provided in Section 11.

context of its efforts to reduce the GHG emissions associated with the use of natural gas delivered to its customers. Trade-offs between cost and the impact on rates, and the effectiveness of its ECI and RNG programs in meeting the Province's Energy Objectives must be considered when designing PNG's GHG reduction plans.

Table 5: Weightings Applied to Resource Planning Objectives

RESOURCE PLANNING OBJECTIVES		
Objective		Weighting
1	Safe, reliable service	30%
2	Least cost service	25%
3	Economic viability of the utility	10%
4	Stable Rates	10%
5	Environmental and socio-economic impacts	10%
6	Alignment with the B.C. Government's Energy Objectives	15%
		100%

The six resource planning objectives are discussed in detail in the following sections.

Objective 1) Provision of Safe, Reliable Service

PNG considers that the provision of safe, reliable service continues to be an important guiding principle in its decision-making processes. The regions that PNG operates in, particularly in PNG-West, provide challenges unique to PNG. Significant portions of the PNG-West transmission system lie in remote, mountainous, riverine, and coastal terrain. Dense vegetation, rugged terrain and lack of road access in many parts of the pipeline right-of-way, along with high snowpack and adverse weather conditions are challenges that PNG routinely and successfully operates under. In addition, the geography exhibits geotechnical and hydrological factors that PNG also monitors and evaluates closely as part of its integrity management program for its aging pipeline infrastructure.

PNG's planning decisions must be measured against the ability of PNG to continue to provide safe and reliable service to existing and future customers in a manner that balances other resource planning objectives such as the provision of service at least cost, the economic viability of the utility, rate stability, and the Province's Energy Objectives.

Options such as DSM programs, regional liquefied natural gas (LNG) storage facilities located close to load centres, additional sources of natural gas or RNG supply located downstream of system capacity constraints, and/or peaking agreements with large industrial transporters can delay the need for system capacity additions or reinforcements, and therefore may put less upward pressure on customers' rates over the near term.

Therefore, prior to undertaking system capacity additions or reinforcements, the utility must closely assess each of its options to ensure it makes the optimal decision with respect to all of its planning objectives by carefully assessing the risks and benefits associated with each option.

Objective 2) Provision of Least Cost Service

All stakeholders expect utilities to provide natural gas service efficiently, and at the lowest cost reasonably possible considering such trade-offs as system reliability and the economic viability of the utility. In considering resource options, such as RNG, as well as system investment to ensure ongoing safe and reliable service, PNG must also consider the rate impacts on its customers.

For PNG, the greatest opportunity to reduce the cost of service is through improving pipeline utilization by increasing the load factor of its existing compression and pipeline assets. Increasing the load factor lowers the unit cost of service to all customers as the fixed costs of the system are recovered over more units of throughput. PNG continues to look for opportunities to supply new large industrial loads using existing assets to help lower costs for all customers, especially for the PNG-West division.

PNG's need for new pipeline assets is generally limited to those assets needed to connect and supply new customers from PNG's existing system (such as for a distribution pipeline extension to a residential premise) or to address supply changes for the system (such as to construct a replacement interconnection pipeline to acquire sales gas when an existing pipeline is taken out of service). PNG considers the rate impacts of these asset additions, including alternatives assessment as applicable, to ensure costs are prudent.

Objective 3) Economic Viability of the Utility

In order to maintain its economic viability, PNG must plan to ensure it meets its financial obligations, earns its allowed return, and all at a cost that remains affordable for customers.

Objective 4) Rate Stability

Customers prefer stable rates over time, allowing them to budget with some predictability. PNG seeks to keep its rates stable over time. However, significant capital expenditures will result in upward pressure on delivery rates as has been seen in recent years as a result of the investment PNG has made in its aging infrastructure. PNG seeks to balance the impact on its rates of capital projects as against customer needs for rate stability. Capital projects are reviewed by the Commission through PNG's revenue requirements applications or through specific capital applications, as appropriate.

Objective 5) Environmental and Socio-economic Impacts

PNG considers environmental and socio-economic factors, including the impact on land use, emissions, the local economy, customer groups and First Nations when evaluating investments in its system, as appropriate.

Objective 6) Alignment with the B.C. Government's Energy Objectives

PNG has described how PNG's CRP aligns with the British Columbia Energy Objectives set out in the *Clean Energy Act* in Section 1.3.2.

1.5 Status of Previous Resource Plan Directives

This CRP has addressed Commission directives issued in Decision and Order G-265-20 pertaining to the 2019 Consolidated Resource Plan and 2020 – 2022 ECI funding application. Table 6 describes each directive and how it has been addressed in this CRP.

Table 6: Directives in BCUC Decision and Order G-265-20

Directive	Status
The Panel directs PNG to update the REUS no later than 2023 and include the results of the updated REUS in the demand forecast in its next long-term resource plan. (page 11)	PNG completed a REUS in 2022 and used the results to inform the residential demand forecast presented in this CRP. A copy of the results of the 2022 REUS is attached as Appendix A - PNG 2022 Residential End-use Study

Directive	Status
The Panel directs PNG to include more extreme planning scenarios, including the gain or loss of a large commercial or industrial customer demand as directed in Order G-140-14 in its next long-term resource plan. (page 17)	Gain and loss of a large commercial or industrial customer is conducted as a sensitivity analysis on three distinct annual load forecast scenarios that reflect variations in the implementation of CleanBC related policies and divergent economic conditions. A discussion of the forecast scenarios is presented Sections 5 through 6.
PNG has failed to analyze the bill impact on other customer groups as previously directed by the BCUC, and the Panel finds that PNG has only partially fulfilled the directives in Order G-155-15. The Panel considers the missing information from Order G-155-15 is still relevant, and therefore directs PNG to include an analysis of bill and rate impacts relating to all customer groups in future DSM/ECI Plans. (page 24)	PNG presents the bill impact on all customer groups of two different levels of spending on its ECI portfolio in Section 8.2.3.
The Panel finds that PNG has not fulfilled this directive in Order G140-14 and directs PNG to file an update on all gas supply options and an examination of the merits of these options by December 31, 2022. The Panel directs PNG in its next long-term resource plan to provide further analysis of its resiliency plan, including supply risks and its back-up plan in the event of a pipeline rupture, loss of supplier, or similar disruption, for the PNG-West and PNG (N.E.) systems. (page 27)	PNG provided an update on all gas supply options to the BCUC on March 31, 2023 that was subsequently acknowledged by the BCUC on August 3, 2023. BCUC staff reviewed the filing and confirmed that no further action by PNG was required. PNG discusses its gas supply strategies and how it seeks to provide reliable and cost-effective supply in Section 11.
The Panel directs PNG to file a set of principles regarding the development of RNG supply infrastructure no later than the filing of its next long-term resource plan and ECI application in 2023. (page 36)	PNG's view on its development of a set of principles related to the development of RNG supply infrastructure is presented in Section 9.3.

Directive	Status
The Panel therefore directs PNG to file its next long-term resource plan no later than December 31, 2023. (page 40)	On December 6, 2023, PNG submitted a request for extension to the originally specified filing date of December 31, 2023, stating as a reason the uncertainty around the Cedar LNG decision to proceed with construction. PNG submitted that a positive decision on the project would have a material impact on PNG and that the timing of the anticipated decision to proceed presented significant uncertainty around the determination of the more likely demand forecast to underpin the CRP. The BCUC approved an extension to the earlier of within three months of the execution of the Cedar LNG Transportation Service Agreement (TSA), or by June 30, 2024 (G-356-23). No TSA between Cedar LNG and PNG was signed as of March 31, 2024, and PNG is therefore submitting this CRP in compliance with the June 30, 2024 date.

2 ENERGY MARKET OUTLOOK

2.1 Introduction

The purpose of the energy market outlook is to identify policies and regulations that are relevant to PNG's long-term forecast of natural gas demand. Section 4 provides an overview of how the demand forecasts presented in this CRP have been developed. More specifically, Section 4.2.1 identifies "Critical Drivers" that reflect many of these policies and regulations and that are accounted for in PNG's forecasts.

2.2 Policy Environment and Outlook

2.2.1 Federal Policies and Programs

On December 9, 2016, the federal government released its Pan-Canadian Framework on Clean Growth and Climate Change[5] that outlined its plan to reduce GHG emissions from all sectors of the Canadian economy in order to meet Canada's commitments under the Paris Climate Agreement. Canada is a signatory to the Paris Climate Agreement that requires it to reduce GHG emissions by 205 Mt by 2030, equivalent to a 30 percent reduction from 2005 levels. Reductions of 86 Mt are expected to be achieved from a broad set of policies, regulations and standards targeting all sectors of the Canadian economy.

In December 2020, the federal government released a plan titled "A Healthy Environment and a Healthy Economy"[6] (2020 Plan) that built on the Pan-Canadian Framework and enabled a number of subsequent federal actions that targeted GHG emission reductions, including the release of the federal Hydrogen strategy, provision of a number of funding programs, establishment of carbon pricing commitments and building code changes.

In 2021, the Canadian *Net-Zero Emissions Accountability Act*[7] (Federal Net-Zero Act) was enacted. The Federal Net-Zero Act established a legally binding process to set five-year national emissions reduction targets for 2035, 2040 and 2045, with plans to achieve it.

[5] Pan-Canadian Framework on Clean Growth and Climate Change (2017), online at: Pan-Canadian Framework on Clean Growth and Climate Change : Canada's plan to address climate change and grow the economy.: En4-294/2016E-PDF - Government of Canada Publications - Canada.ca.

[6] A Healthy Environment and a Healthy Economy - Canada.ca

[7] S.C. 2021, c. 22, online at: https://laws-lois.justice.gc.ca/eng/acts/c-19.3/FullText.html.

This laid the groundwork for the 2030 Emissions Reduction Plan (ERP) that was published in March of 2022.[8] The ERP provides emission reduction targets by sector and a path to achieve a 40 percent reduction in GHG emissions from 2005 levels by 2030, and net-zero emissions by 2050.[9]

Key features of the ERP that have the potential to affect the demand for natural gas include:

1. A cap on emissions from the upstream oil and gas sector as well as reductions in methane emissions from this sector that go beyond current federal regulations. This cap may contribute to the electrification of the sector, reducing the demand for natural gas from PNG's natural gas producers in Fort St. John.[10]
2. Programs and incentives to reduce the use of fossil fuels in buildings and funding for a national green buildings strategy.
3. Promote clean electricity infrastructure investments including establishing a Smart Renewables and Electrification Pathways Program to support renewable electricity and grid modernization projects, and redevelopment work for large clean electricity projects, all of which have the potential to enable the electrification of space and process heat in PNG's service areas.
4. A bioenergy supply chain strategy to optimize use of Canadian bioenergy resources.
5. Advancement of the federal hydrogen strategy to increase the use of hydrogen in transportation, industrial and hard to decarbonize sectors.

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[8] "Canada's 2030 Emissions Reduction Plan." Government of Canada, online at 2030 emissions reduction plan : Canada's next steps to clean air and a strong economy.: En4-460/2022E-PDF - Government of Canada Publications - Canada.ca

[9] "Canada's 2030 Emissions Reduction Plan." Government of Canada. https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/emissions-reduction-2030/plan.html.

[10] On December 7, 2023, the Government of Canada published a Regulatory Framework for an Oil and Gas Sector Greenhouse Gas Emissions Cap to outline key design details of the proposed approach to setting a cap on emissions and seek public comment. The Government expects to publish draft regulations of the oil and gas emissions cap in mid-2024. See also: https://www.canada.ca/en/environment-climate-change/news/2023/12/canada-introduces-framework-to-cap-greenhouse-gas-pollution-from-oil-and-gas-sector.html.

While the rollout of the Province of BC's climate policies and regulations are generally more advanced than those of the Government of Canada, elements of the Pan-Canadian Framework, the 2020 Plan and the ERP provide a signal to provincial and municipal policy makers of the direction for energy efficiency standards, carbon pricing, and building codes. Important elements of these policies that are expected to have an impact on natural gas demand therefore influence PNG's planning environment, and are reflected in PNG long-range forecasting model, including:

- changes to the energy efficiency standards for electric and gas appliances and heating equipment;
- changes to the national model building code setting net-zero targets for new buildings, as well efficiency targets for building retrofits;
- federal funding programs that support the development of biomethane and hydrogen supply; and
- federal funding programs that provide grants for specific measures to enable homeowners to make their homes more efficient.

These elements are described in further detail below.

Appliances and Equipment Standards

The *Energy Efficiency Regulations* issued under the *Energy Efficiency Act* set minimum energy performance standards for energy-using products used in the residential, commercial, and industrial sectors, and for updating testing methodologies or labelling requirements. They are typically aligned with standards in other jurisdictions, like the U.S., unless there are unique Canadian circumstances. Natural Resources Canada (NRCan) amends the *Energy Efficiency Regulations* to prescribe new minimum energy performance standards. For example:

- Amendment 15 increased the minimum energy efficiency requirements of 12 product categories including: residential natural gas furnaces and gas boilers, gas fireplaces, and tankless water heaters, and commercial gas boilers and water heaters. Most notably, Amendment 15 increased the minimum efficiency of residential furnaces to 95 percent, effective December 3, 2019, and the minimum efficiency of natural gas fireplaces to 50 percent, effective January 1, 2020.[11]

- Amendment 17 changed the minimum efficiency standards of several energy using appliances, including gas-fired storage water heaters which affect units manufactured on or after July 1, 2023.[12]

The result of changes to the minimum energy performance standards is to reduce the demand for natural gas to serve the residential and commercial space and water heating load gradually over time as appliances reach their end of life and are replaced.

National Model Building Code

The federal government has stated an intention to work with provincial, and territorial governments to introduce energy labelling of buildings, and to develop and adopt increasingly stringent model building codes:

i. Requiring labelling of building energy use to provide consumers and businesses with transparent information on energy performance. As of October 2023, this has not been implemented.
ii. Adopt increasingly stringent model building codes applicable to new construction beginning in 2020, with the goal that provinces and territories adopt a "net-zero energy ready" model building code by 2030.

The latest National Building Code and National Energy Code for Buildings are from 2020.[13]

Currently, there is no federal retrofit code that has been drafted or proposed, however, there has been discussion about the implementation of retrofit codes, both at the provincial and at the federal level. The CleanBC roadmap outlined guidelines to implement an Existing Buildings Renewal Strategy by 2024 while the Government of Canada has committed to develop a retrofit code by the same year.

[11] Amendment 15 to the Energy Efficiency Regulations (canada.ca)

[12] Amendment 17 (canada.ca)

[13] https://nrc.canada.ca/en/certifications-evaluations-standards/codes-canada/new-latest-editions-national-model-codes-now-available.

Federal Funding Programs

The federal government has developed several funding programs to support its climate goals, including:

- Green Industrial Facilities and Manufacturing Program: Provides financial assistance to support the implementation of energy efficiency and energy management solutions [14].
- Net Zero Accelerator Initiative: Funds large projects in specific industrial sectors that will achieve GHG reductions. The program focuses on decarbonization of large emitters, transitioning industry to net-zero, and investing in clean technologies including hydrogen, carbon capture, utilization and storage, and batteries, all with the result of reducing the reliance on natural gas.[15]
- Clean Fuels Fund: Funds initiatives to increase the production and use of low-carbon fuels which include hydrogen and renewable natural gas.

2.2.2 B.C. Policies and Initiatives

Climate Change Accountability Act

In 2017, the provincial government enacted the *Climate Change Accountability Act* (CCAA)[16] which included targets for reducing GHG emissions in BC. The CCAA identified GHG reduction targets below 2007 levels as follows:

- 16 percent by 2025
- 40 percent by 2030
- 60 percent by 2040
- 80 percent by 2050

In March 2021, sectoral targets for 2030 were established as follows, expressed as a percentage reduction from 2007 sector emissions:

[14] https://natural-resources.canada.ca/energy-efficiency/energy-efficiency-for-industry/green-industrial-facilities-and-manufacturing-program/20413.

[15] "Net Zero Accelerator Initiative." Government of Canada. https://ised-isde.canada.ca/site/strategic-innovation-fund/en/net-zero-accelerator-initiative.

[16] S.B.C. 2007, c. 42, online at: https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/07042_01.

- Transportation – 27 to 32%
- Industry – 38 to 43%
- Oil and Gas – 33 to 38%
- Buildings and Communities – 59 to 64%[17]

The CCAA provides little detail on how various sectors are to achieve the targets. However, to the extent that they specifically target PNG or its customers, the targets would not only impact utility operations, but also customer demand for low emission gases to enable them to meet their GHG emission reduction targets also.

Clean Growth Strategy and CleanBC Roadmap to 2030

The B.C. Government released their Clean Growth Strategy ("CleanBC") in December 2018 and subsequently released the CleanBC 'Roadmap to 2030' ("the Roadmap") in 2021. The Roadmap builds on CleanBC and outlines measures to meet B.C.'s 2030 emission reduction target discussed above. CleanBC rests on electrification, energy conservation, and renewable fuels in order to achieve reductions in GHG emissions. CleanBC touches all sectors of the B.C. economy, with the initiatives that impact natural gas demand from space heating and industrial processes.

While the Roadmap provides important policy context in B.C., the details around how the emission reductions targets impact individual utilities are not clear at this time. Nonetheless, PNG strives to do its part to support the Province's achievement of these targets where it can within the planning objectives it has adopted.

The Roadmap also provides an indication of changes in how customers will use natural gas in future; assumptions to reflect the impact of these changes are embedded in PNG's CRP, both in its reference scenario as well as its scenarios considering whether decarbonization occurs more quickly or slowly than the reference forecast in response to these policies.

Examples of CleanBC and Roadmap policy statements that may affect the forecast of natural gas demand in PNG's service areas are identified in the following:

[17] Climate action legislation - Province of British Columbia (gov.bc.ca)

Homes and Buildings: CleanBC raised the expectations for energy efficiency standards for new construction and encouraged energy-saving improvements in existing homes and workplaces. CleanBC supports the provisions in the BC Energy Step Code which aims to make every new building constructed in B.C. be 40 percent more energy efficient by 2027, and 80 percent more energy efficient or “net-zero energy ready” by 2032. A carbon pollution standard is expected to be added to the BC Building Code to make all new buildings zero-carbon by 2030. The Roadmap sees every building being more efficient by improving the BC Building Code and increasing efficiency standards, providing incentives promoting energy efficiency retrofits to existing buildings, providing incentives for electric air source heat pumps, and upgrading public housing to make it more comfortable and energy efficient. By 2025, the intention is to set new energy efficiency standards for space heaters, water heaters and residential windows. After 2030, the intention is that all new space and water heating equipment sold and installed in B.C. will be at least 100% efficient.[18]

The plan sets as a goal, to retrofit 70,000 homes and 10 million m² of commercial building space to use electricity in space heating by 2030.

Industry: New electric transmission infrastructure is identified as being required to enable industrial processes to utilize or switch to electricity from natural gas or other carbon intensive fuels. The strategy is targeted particularly at the natural gas sector (upstream gas processing facilities and downstream liquefaction facilities), with the aim of making B.C.’s natural gas and LNG industries the lowest carbon-emitting in the world.

The Roadmap stipulates that all new large industrial facilities must have a plan to achieve net-zero emissions by 2050. New facilities will also have to show how they align with B.C.’s interim 2030 and 2040 targets.

The Roadmap also commits to a goal of zero emissions from methane in the industrial sector by 2035 and to reduce methane emissions in the oil and gas sector by 75% by 2030 (compared to 2014).

[18] “CleanBC Roadmap to 2030.” Government of British Columbia.

Low Emission Gases: CleanBC sets out a target of a 15 percent renewable content in natural gas (i.e. RNG) delivered to residential and industrial customers by 2030. The availability of biomass for increased RNG production was intended to be enhanced through increasing diversion of organic waste from municipal, industrial, and agricultural sources, with the goal of achieving 95 percent diversion by 2030. The Roadmap also sets out initiatives to accelerate the development of hydrogen production and the injection and blending of hydrogen into natural gas distribution systems.

Emissions cap for natural gas utilities: The Roadmap specifies an intended cap on GHG emissions associated with the combustion of natural gas delivered to utilities' customers (the "GHG Reduction Standard" or "GHGRS").

The intent of the GHGRS is to obligate natural gas utilities to reduce GHG emissions associated with natural gas delivered to, and consumed in, buildings and the industrial sector. As described in the Roadmap, "the cap will be set at approximately 6 Mt of CO2e per year for 2030, which is approximately 47 percent lower than 2007 levels" [19] which is consistent with the sectoral targets set for industry and the built environment under the CCAA which are the sectors linked to emissions from gas consumption."

Further details of how this intended cap will be implemented are not available at this time. It is expected that compliance pathways enabling the GHGRS will include increasing quantities of biomethane delivered through the natural gas pipeline network, deliveries of hydrogen and synthesis gas to serve demand normally served by natural gas, and expansions of demand side management programs.

2.2.3 B.C. Acts, Regulations & Standards

Acts and regulations directly influencing PNG's demand forecast and decarbonization strategies set out in this resource plan are described in the following subsections.

Carbon Tax Act

In 2008, the Province implemented the first consumer tax on carbon in North America, beginning at \$10 per tonne CO_2e, escalating to \$30 per tonne CO_2e by 2012. After a

[19] Roadmap to 2030, CleanBC, p. 29.

number of years without further increases, the Province initiated a series of annual increases to the BC Carbon Tax beginning in 2018, reaching $80/tonne on April 1, 2024, equivalent to approximately $4/GJ. The Roadmap set out that the BC Carbon Tax would align with the federal carbon price requirements, increasing to $170/tonne by 2030, equivalent to approximately $8.50/GJ.[20] This compares to PNG's current commodity price of natural gas at $2.35/GJ.

PNG anticipates that as the customer bill increases with increasing carbon taxes, it will reduce the demand for natural gas due to declining affordability. Escalation of the BC Carbon Tax is a Critical Driver (defined in Appendix C: Critical Driver Input Assumptions) that influences the forecast demand for natural gas in this CRP.

Related to the carbon tax, the BC Output Based Pricing System (OBPS) is an industrial carbon pricing system designed specifically for industry in B.C. and is mandatory for operations that emit over 10,000 tons of carbon dioxide equivalent (tCO2e) per year. The original program has been redesigned to align with the federal OBPS and came into effect on April 1, 2024. Industrial operations subject to the OBPS may reduce emissions by undertaking efficiency improvements that reduce their reliance on natural gas.

Greenhouse Gas Reduction (Clean Energy) Regulation

The BC *Clean Energy Act* (CEA) includes provincial objectives with respect to the reduction of GHG emissions as well as the use of waste heat, biogas and biomass. The CEA enables government to specify "prescribed undertakings" which utilities may choose to carry out to reduce GHG emissions and assures recovery of the costs of doing so in rates.

The Greenhouse Gas Reduction (Clean Energy) Regulation (GGRR) sets out the provincial "prescribed undertakings".[21] Among other things, the GGRR enables utilities to acquire quantities of renewable gas, green and waste hydrogen, synthesis gas and lignin up to 15% of their total annual deliveries to their customers for prices up to $31 per gigajoule in 2022 (increased annually with inflation) and to recover the costs of doing so

[20] "British Columbia's Carbon Tax" Government of British Columbia, https://www2.gov.bc.ca/gov/content/environment/climate-change/clean-economy/carbon-tax.

[21] Greenhouse Gas Reduction (Clean Energy) Regulation (gov.bc.ca).

in its rates.

For PNG, the GGRR has enabled it to contract for RNG supply as discussed in Section 9 of this CRP and, once delivered, to recover the costs of doing so in rates.

Demand Side Measures Regulation (DSM Regulation)

The UCA[22] expressly contemplates the need for utilities to undertake "adequate" and "cost effective" demand-side measures to enable customers to conserve energy or to promote energy efficiency so long as the action taken does not result in fuel switching that increases GHG emissions.[23]

In addition to impacting resource choices for integrated utilities, DSM enables customers to reduce consumption and for gas customers to reduce the GHG emissions associated with using natural gas.

The Clean Energy Act defines what measures constitute "demand-side measures" and the DSM Regulation specifies what constitutes an "adequate" DSM plan and what measures are considered "cost-effective". On June 27, 2023, the Province of BC, by way of Ministerial Order No. M193, made several major amendments to the DSM Regulation, B.C. Reg. 326/2008.[24] The amended DSM Regulation phased out incentives for conventional gas space and water heating measures that are less than 100% efficient (e.g., furnace, boiler, gas water heater), and mandated that cost-effectiveness be evaluated using the Utility Cost Test (UCT) and the avoided cost of renewable and low-carbon gas, instead of through Total Resource Cost (TRC) and avoided cost of conventional natural gas.

PNG's DSM Plan discussed in Section 8 shows that PNG is pursuing adequate demand-side measures as required by Section 44.1(8)(c) of the UCA and in accordance with the DSM Regulation.

BC Building Codes

The BC Energy Step Code is a performance-based standard aimed at helping to reduce

[22] Utilities Commission Act (gov.bc.ca)

[23] See the definition of "demand-side measure" in section 1 of the *Clean Energy Act*.

[24] https://www.bclaws.gov.bc.ca/civix/document/id/mo/mo/m0193_2023.

energy demand (and related emissions) in buildings. It establishes measurable requirements for energy efficiency in new construction. To demonstrate compliance, a builder must prove to local building officials that the building meets or exceeds a set of defined metrics for building envelopes, equipment and systems, and airtightness testing. Consisting of a sequence of five steps of increasing energy efficiency, Step One entails modelling energy performance and measuring airtightness to ensure that a building will meet or exceed the minimum energy-efficiency requirements in the base BC Building Code, while the highest step represents a “net-zero energy ready” standard.

In April 2017, the Province adopted the BC Energy Step Code in the BC Building Code. As of May 1, 2023, the BC Building Code requires 20%-better energy efficiency for most new buildings in B.C. This is equivalent to Step 3 of the BC Energy Step Code for Part 9 buildings (single family dwellings, rowhouses and small apartment buildings) and Step 2 of the BC Energy Step Code for Part 3 buildings (large multi-family residential, offices, retail).[25] Improvements to building envelopes, and the impact on space heating demand for natural gas, is a Critical Driver (defined in Appendix C: Critical Driver Input Assumptions) that influences the forecast demand for natural gas in this CRP.

BC has also set out a Zero Carbon Step Code which aims at eliminating operational emissions through the use of zero carbon energy sources

The Zero Carbon Step Code has four levels:

> Level 1: requires measurement of a building’s emissions without achieving any reductions;
>
> Level 2: generally requires electrification of either space heating or domestic hot water systems in order to meet this level;
>
> Level 3: generally requires electrification of both space heating and domestic hot water systems; and
>
> Level 4: in most cases, will require the full electrification of a building in order to meet a zero emission target.

[25] Information Bulletin B32-01, Building and Safety Standards Branch, “20%-Better Energy Efficiency & Zero Carbon Step Code British Columbia Building Code 2018 - Revision 5”.

While adherence to the BC Zero Carbon Step Code is voluntary at this time, the Province is expected to start to mandate different Zero Carbon Step Code Levels, and require zero carbon new construction by 2030.[26]

2.2.4 Municipal Policies

The BC Climate Action Charter is a voluntary agreement whereby municipal and local governments sign on to commit to take action on climate change through energy conservation and GHG reductions. The majority of municipal and local governments in BC have signed the BC Climate Action Charter.

This commitment sees municipal and local governments in PNG's service area issuing their own GHG reduction plans which necessitate them taking a variety of actions, from setting individual GHG reduction targets, to setting specific targets for municipal infrastructure, to developing policies for new buildings designed to encourage the use of electricity over gas.

2.3 Regional Economic Outlook

In developing its regional economic outlook for 2024 and beyond, PNG has relied on regional statistics, key indicators, and projections available through BC Stats, the central statistical agency of the Province of British Columbia. The PNG-West division serves the major urban centres of the North Coast and Nechako Development Regions, while the PNG (N.E.) division serves most of the municipalities of the Peace River North and Peace River South Local Health Areas (LHA's). BC Stats statistics and projections for these regions and LHA's are therefore relevant indicators of the demographics and economic growth expected to be experienced by PNG's customers.

2.3.1 PNG-West

Over the period since the last CRP (2019 to 2023), the municipalities and surrounding unincorporated regions served by PNG experienced a year-over-year increase in population of 1.3 percent. In 2023, the population in PNG's service area stood at 90 thousand (Table 7). Over the next 20 years, the population is forecast to grow at a similar

[26] Energy Step Code: https://energystepcode.ca/zero-carbon/.

annual rate of one percent.

BC Stats forecasts the number of households to increase 1.1 percent per year on average over the next 20 years, similar to the 1.2 percent experienced during the period from 2019 to 2023. Therefore, approximately 7,500 new living spaces are forecast to be needed in the region by 2040, with 2,500 of those constructed by 2030 (Table 7).

Table 7: Population and Household Formations Projections PNG-West[27]

	2023	2025	2030	2035	2040	Annual Growth
Population	90,244	92,744	95,235	99,497	106,304	1.0%
Households	38,167	39,334	40,709	42,648	45,698	1.1%

Of the 42,000 people currently employed in the region, approximately 70 percent work in the services sector, primarily in retail, transportation and logistics, health care, and public administration. The remaining 30 percent are currently employed in the forestry, fishing, mining and construction sectors.[28] In the next 10 years, the region is expected to have 15,300 job openings. About 31 percent of these jobs will come through economic growth, and the remaining 69 percent will come from replacing existing workers, mainly due to retirement. Employment demand is expected to grow at an average of 1.1 percent annually during the next decade, consistent with the projected net influx of people into the region. As a result of the balance between population growth and job growth, the overall employment participation rate is expected to increase from 63.4 percent in 2023 to 64.1 percent in 2033, the second highest in the province.[29]

2.3.2 PNG(N.E.)

Over the period from 2019 to 2023, the municipalities and surrounding unincorporated regions served by PNG(N.E.) experienced a year-over-year increase in population of 0.7

[27] BC Stats 2023: BC Population Estimates and Projections for Local Health Areas served by PNG (512, 514, 515, 517, 522, 523). BC Housing Estimates and Projections for municipalities and unincorporated areas served by PNG.

[28] Statistics Canada, Employment by Industry for the North Coast and Nechako economic regions.

[29] BC Labour Market Outlook, 2023 Edition, p. 34.

percent, just over half the growth rate of PNG-West. In 2023, the population in PNG(N.E.)'s service area stood at close to 65,000 (Table 8). Over the next 20 years, the population is forecast to grow at 1.1 percent.

The BC Stats forecast of household formations follows a similar trend. The number of households is expected to increase 1.4 percent per year on average over the next 20 years, up from 0.8 percent during the period from 2019 to 2023. Therefore 6,600 new living spaces are forecast to be needed in the region by 2040, with 2,500 of those constructed by 2030 (Table 8).

Table 8: Population and Household Formations Projections PNG(N.E.)[30]

	2023	2025	2030	2035	2040	Annual Growth
Population	64,669	66,742	69,624	73,234	78,242	1.1%
Households	24,185	25,070	26,699	28,603	30,824	1.4%

Of the 37,000 people currently employed in the region, approximately two-thirds work in the services sector, primarily in retail, health care, and accommodation and food services. The remaining third are employed working in the oil and gas and construction sectors.[31] In the next 10 years, the region is expected to have 10,400 job openings. About 15 percent of these jobs will come through economic growth, and the remaining 85 percent will come from replacing existing workers, mainly due to retirement. Employment demand is expected to grow at an average of 0.4 percent annually during the next decade, significantly lower than in PNG-West's service area. As a result of the forecast higher population growth compared to job growth, the overall employment participation rate is expected to decrease slightly from 69.4 percent in 2023 to 67.2 percent in 2033 and remain the highest in the province.[32]

[30] BC Stats 2023: BC Population Estimates and Projections for Community Health Service Areas served by PNG(N.E.) (5311,5313,5314,5321,5323). BC Housing Estimates and Projections for municipalities and unincorporated areas served by PNG(N.E.).

[31] Statistics Canada, Employment by Industry for the Northeast economic region.

[32] BC Labour Market Outlook, 2023 Edition, p. 35.

2.4 Commercial and Industrial Developments

Economic growth in the region, which is the main driver of increases to residential and commercial customer additions, 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.

2.4.1 PNG-West

Northwest BC's major project inventory fell by 25.2% compared to Q3 of last year, but still represents a third of the provincial total.[33] Ten major construction projects, representing over $39 billion in investment, are currently underway in PNG-West's service area. The largest of these, the LNG Canada Facility in Kitimat (accounting for the lion's share of investment), was more than 85% complete as of December 2023. Coastal GasLink, the natural gas transmission pipeline that will deliver feedstock to the LNG Canada facility, achieved mechanical completion in late 2023. Other notable projects include the Blackwater gold mine near Vanderhoof, an expansion of the Terrace hospital, and an expansion of the container port at Prince Rupert.[34]

An additional 22 projects, representing in the order of $50 billion in potential investment, are in various stages of preliminary development. For PNG, the most notable of these are the Cedar LNG project in Kitimat, the Ridley Island Energy Export Facility, an expansion of the Rio Tinto dock handling facilities, and the South Kaien Island Import Logistic facility. A variety of proposals for energy export terminals, biorefineries, run-of-river and geothermal power production, mines, and pipelines to serve proposed LNG production facilities on the North Coast round out the list.[35]

2.4.2 PNG(N.E.)

Natural resource projects continue to dominate Northeast BC's major project activity.

[33] Chartered Professional Accounts BC, BC Check-Up Invest 2024, p. 9.

[34] Major Projects Inventory Q3, 2023 https://www2.gov.bc.ca/gov/content/employment-business/economic-development/industry/bc-major-projects-inventory.

[35] Ibid.

Construction activity at BC Hydro's Site C project near Fort St. John is winding down with the reservoir filling expected to begin in August 2024.

The B.C. Major Projects Inventory identifies eleven proposed infrastructure projects, representing in the order of $3.0 billion of investment in the region. Proposed projects include coal mines in the Tumbler Ridge area and wind farms in Tumbler Ridge, Taylor and Fort St. John.

2.5 Supply Outlook

PNG contracts for firm transportation service on Enbridge's Westcoast pipeline system to move its gas supply to its load centres and pipeline transmission system. The Fort St. John and Dawson Creek systems source some of their gas supply from various points on the Enbridge Westcoast system, and the PNG-West system receives all of its gas supply through the Westcoast T-South pipeline. PNG anticipates significant changes to natural gas supply and demand dynamics that will affect the Enbridge T-North and T-South pipeline system between 2025 and 2030.These changes include the onset of LNG Canada Phase 1, expected to be completed in late 2025, and capacity additions to Westcoast Transportation North (T-North) and Transportation South (T-South). Further projects affecting natural gas demand on T-North and T-South include LNG Canada Phase 2, Cedar LNG, and Woodfibre LNG.[36] These projects will impose significant supply requirements that will alter the balance of supply and demand in the Western Canada Sedimentary Basin (WCSB), and the sequence of completing projects will result in changes to prices at both Station #2 and Sumas, and to the value of transportation on the Westcoast system and storage in the WCSB.

The start-up of LNG Canada's Phase 1 project may initially decrease the market value of T-South as some supply is pulled away from Station #2. PNG anticipates increased price volatility between AECO and Station #2 during the commissioning of LNG Canada. Conversely, the feedstock requirements of large, successive projects will be of such magnitude that daily variations in consumption, including potential outages, will materially impact the supply at AECO and Station #2. Although the T-South expansion does have

[36] https://www.lngcanada.ca/news/lng-canada-2023-year-end-update/.

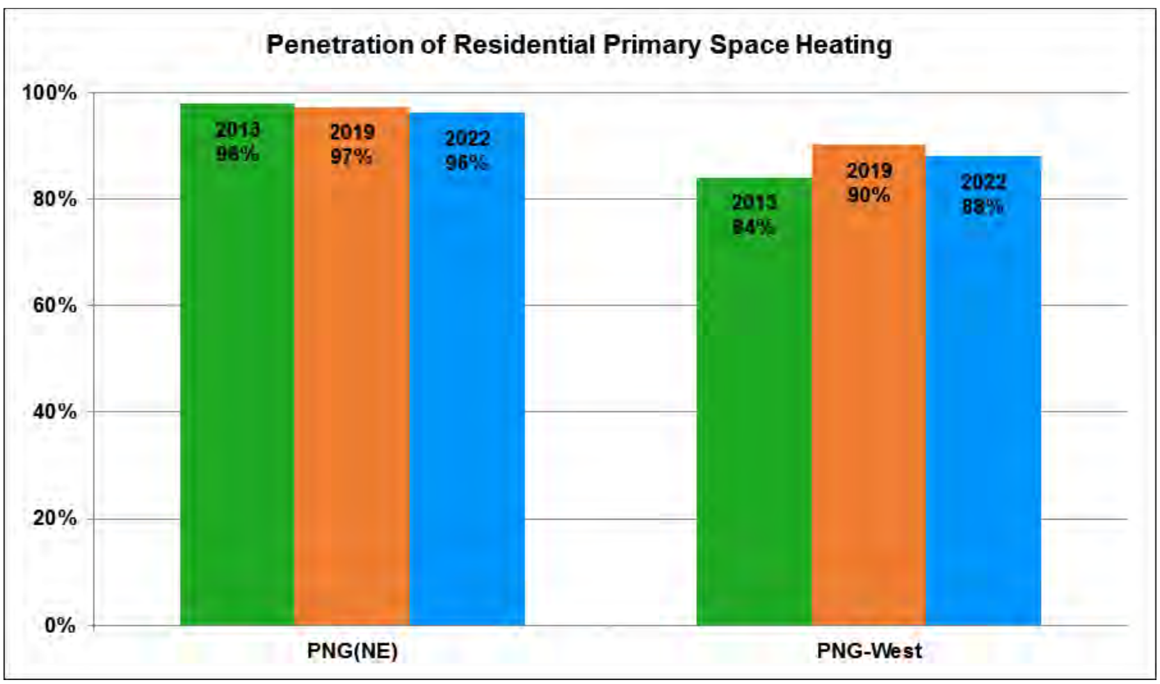
heightened risk of approval delay or rejection from its regulator, its successful implementation will essentially maintain the status quo for the supply/demand picture in the Pacific Northwest as the Woodfibre LNG project will consume the increased supply that the expansion will provide. As such, holding capacity on T-South will remain a valued resource for PNG.

Furthermore, as the current and proposed projects come on stream, PNG anticipates that volatility in supply will increase and the value of storage at Aitken Creek and storage connected to Sumas will rise. PNG expects that commencement of operations by Woodfibre LNG will initially create a significant imbalance in supply/demand in the Pacific Northwest as the Woodfibre project is currently targeted to be online approximately one year before the T-South expansion is in service. This should mean that storage capacity value will escalate or at least continue to be a critical asset.

2.6 Competitive Analysis of Space Heating Alternatives

Natural gas remains the predominant fuel of choice for both residential space and water heating requirements and its share of the space heating load in PNG's service areas has remained relatively constant over the past six years (Figure 6).

Figure 6: Penetration of Residential Natural Gas Space Heating



Environmental policies and regulations and customer perceptions all play a role in the continued acceptance of natural gas as a source of energy for PNG's customers. Half (50 percent) of the respondents in the 2022 REUS, agreed that heating a home with natural gas was cheaper than heating it with electricity, 11 percent disagreed, and the remaining 39 percent were neutral (neither agreed nor disagreed). Results are similar to those from the 2013 REUS (Table 9).

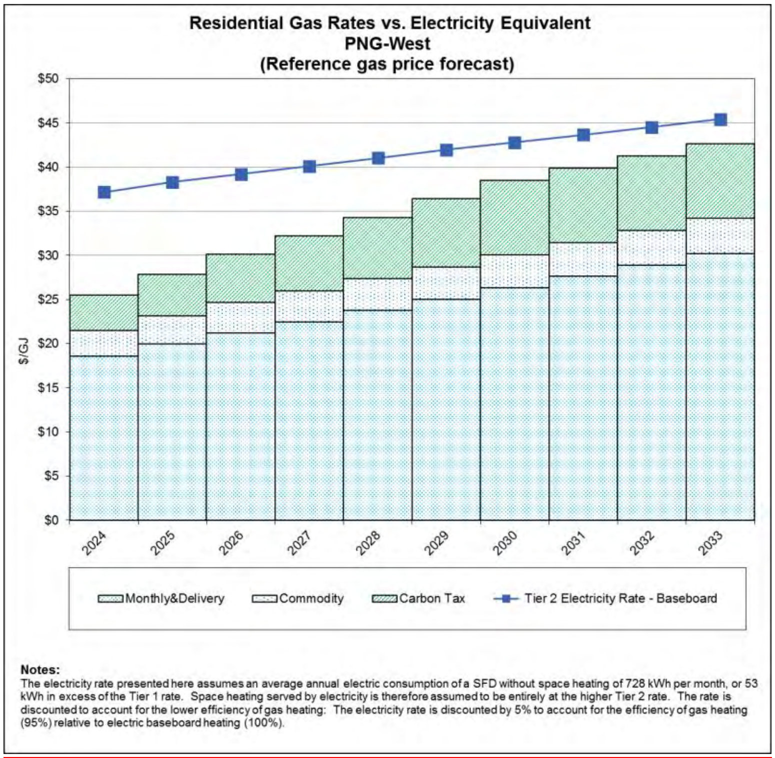
Table 9: Customer Perception on Cost of Natural Gas vs Electricity for Space Heating

It is cheaper to heat a home with natural gas than it is with electricity							
	Strongly Disagree (1)	**Disagree (2)**	**Neither Agree nor Disagree (3)**	**Agree (4)**	**Strongly Agree (5)**	**Disagree (1 or 2)**	**Agree (4 or 5)**
2022 REUS	5.0%	6.2%	39.1%	21.4%	28.2%	11.1%	49.6%
2013 REUS	5.8%	5.7%	41.7%	19.8%	27%	11.5%	46.8%

A number of factors are expected to significantly erode the affordability of natural gas over electricity for heating homes over the coming years (Figure 7 through Figure 9). The anticipated escalating price of the BC Carbon Tax to $170 per tonne in 2030, as well as PNG's cost pressures related to maintaining its aging infrastructure over a relatively static consumption base, and incorporating costs related to low carbon energy such as RNG, are forecast to significantly increase the delivery rates to PNG's customers. In contrast, residential electricity rate increases are expected to be limited to the rate of inflation until 2030.[37] The combination of these factors will narrow the gap between the delivered prices for natural gas and electricity.

[37] On February 15, 2024, the Province amended British Columbia's Energy Objectives to specify that BC Hydro's rate increases do not exceed cumulative inflation calculated as the percentage change in the Consumer Price Index for BC from 2017, to the current year up to 2030.

Figure 7: PNG-West Burner Tip vs. Electricity Costs



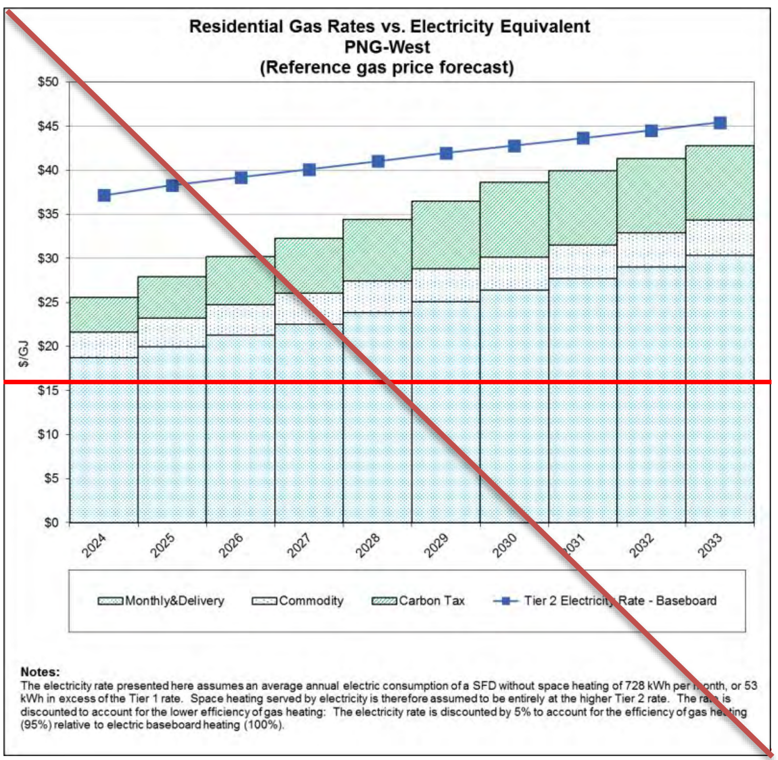
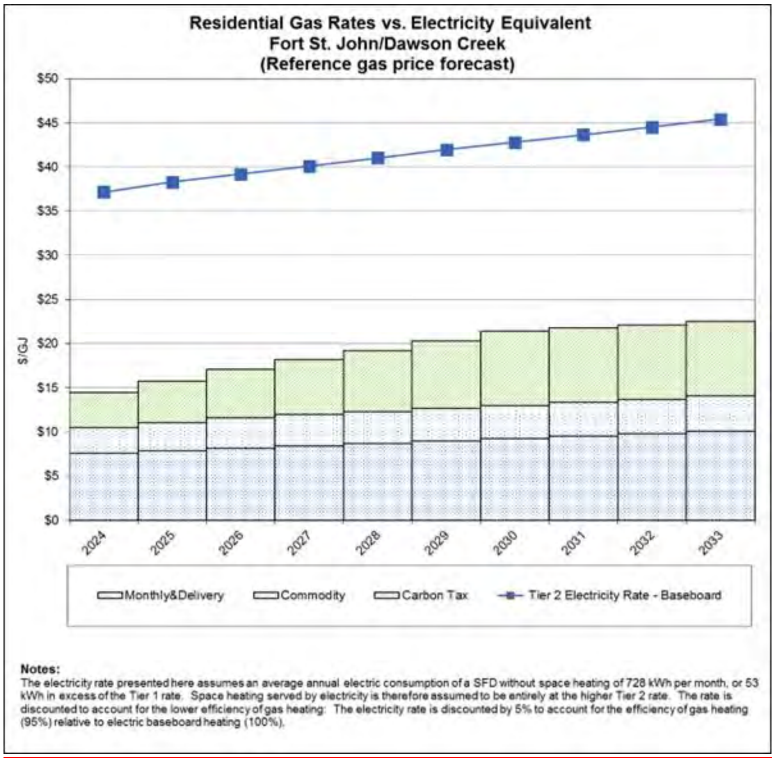


Figure 8: Fort St. John/Dawson Creek Burner Tip vs. Electricity Costs



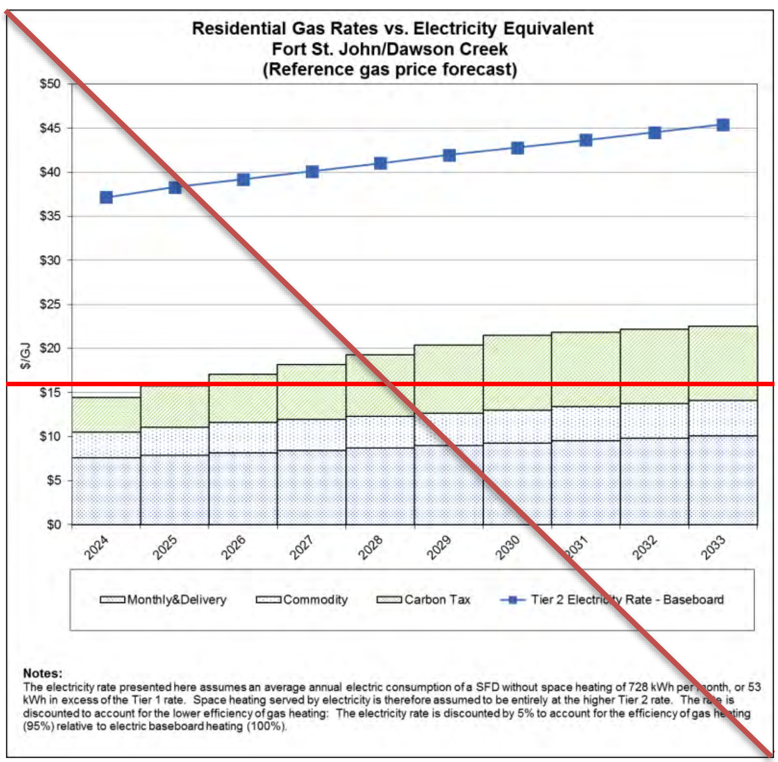
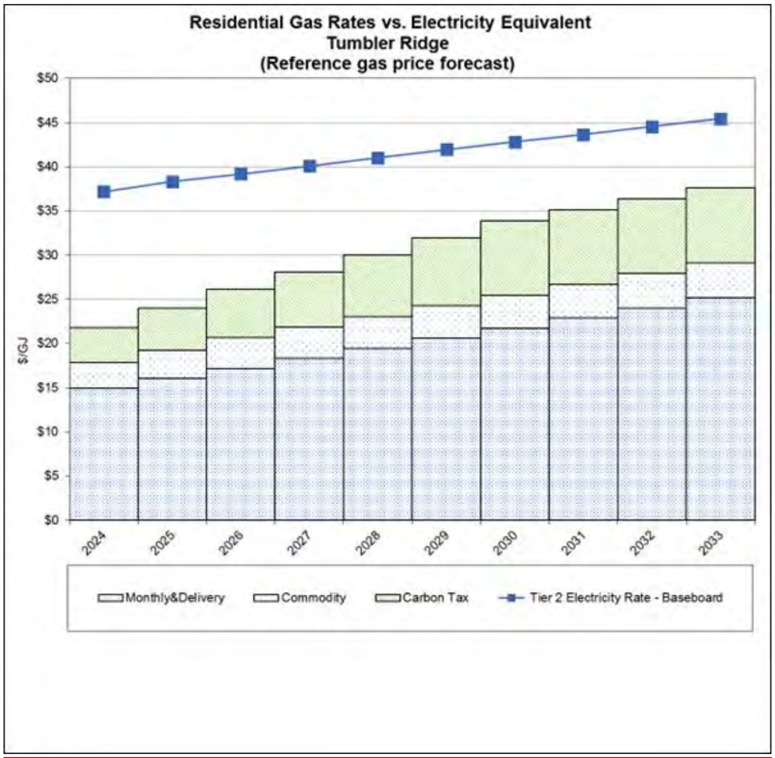
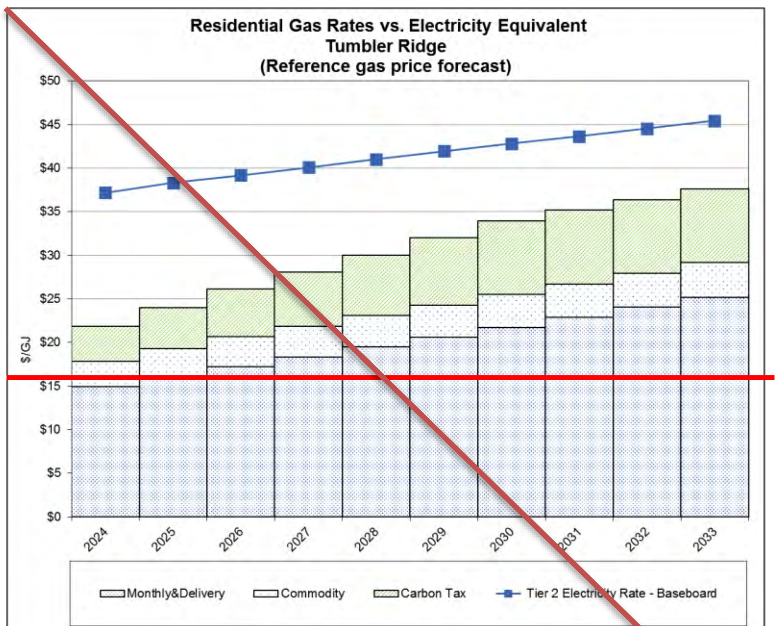


Figure 9: Tumbler Ridge Burner Tip vs. Electricity Costs

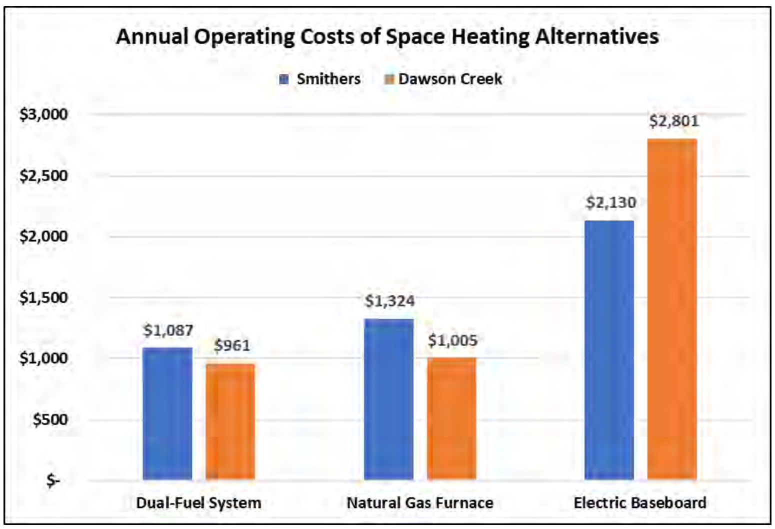




Notes:
The electricity rate presented here assumes an average annual electric consumption of a SFD without space heating of 728 kWh per month, or 53 kWh in excess of the Tier 1 rate. Space heating served by electricity is therefore assumed to be entirely at the higher Tier 2 rate. The rate is discounted to account for the lower efficiency of gas heating: The electricity rate is discounted by 5% to account for the efficiency of gas heating (95%) relative to electric baseboard heating (100%).

While all customers of PNG still currently experience a cost benefit associated with heating their homes with a natural gas furnace compared to heating with electric baseboards, the higher efficiency of electric air source heat pumps is anticipated to reduce that price advantage. While it remains unclear on whether electric air-source heat pumps can serve as a reliable replacement for natural gas furnaces as the sole source of space heating in the cold winter climates of PNG's service areas, a dual-fuel system (hybrid heating system) consisting of an electric air-source heat pump combined with a natural gas furnace may become a pragmatic alternative. Figure 10 shows a comparison of the annual operating cost of a natural gas furnace to an electric baseboard and to a dual-fuel system. Based on current rates for natural gas service from PNG (including the current level of the BC Carbon Tax of $80 per tonne) and current electricity rates, dual-fuel systems can offer a modest operating cost advantage over natural gas furnaces. This assessment does not consider the capital cost of installing an electric air-source heat pump.

Figure 10: Comparison of Annual Operating Costs of Space Heating Systems



The following subsections discuss the price assumptions used in the comparative analysis.

Forecast PNG Delivery Rates

PNG's fixed monthly and variable charges are forecast using PNG's long-range financial forecasting model that reflects known capital expenditures, and operating expenses over the next ten years, as well as for forecast changes in throughput. The fixed monthly charge is unitized to a per-gigajoule equivalent based on the forecast residential use per account.

Natural Gas Commodity Costs

PNG purchases almost all of its gas supply at Westcoast Station #2, with approximately half of the gas supply priced off of the AECO near month index, and the remainder at the daily price at Station #2. Over the long term, the prices at Station# 2 are expected to follow those at AECO. The long-range forecast of pricing at Station #2 provided by Sproule was used as a basis for forecasting PNG's commodity cost rate.

Carbon Tax on Natural Gas

The BC Carbon Tax, currently priced at $80 per tonne of CO_2 equivalent ($80 per tCO_2e), is expected to increase by $15 every year until reaching $170 per tonne in 2030, consistent with the current federal carbon tax regime. No further increases beyond 2030 have been reflected in the forecast.

Forecast Electricity Rates and Equivalent Efficiencies

On February 15, 2024 the Province amended the energy objectives specified under the *Clean Energy Act* through the Energy Objectives Regulation to specify that BC Hydro's rate increases should not exceed cumulative inflation calculated as the percentage change in the Consumer Price Index for BC from 2017, to the current year up to 2030.[38] While inflation has been significantly higher over the past few year, PNG has maintained a forecast rate of inflation of two percent, consistent with the Bank of Canada target, when forecasting electricity rates.

BC Hydro rates are currently 15.6% lower than the cumulative rate of inflation since 2017.[39] While this change could allow future increases in electricity rates that are higher than the annual rate of inflation, as long as the cumulative impact remains below the cumulative rate of inflation beginning in 2017, the electricity rate forecast presented here does not reflect such an outcome.

In making the comparison to natural gas rates, the BC Hydro Residential Step 1 and Step 2 rates are first converted from units of dollars per kilowatt-hour, to dollars per gigajoule. Then, in recognition of the different efficiencies in electric and natural gas heating equipment, the electricity rate is adjusted further. Table 10 shows the derivation of the equivalent electricity rate.

[38] Order in Council 60/2024 (British Columbia).

[39] News Release (Feb 15, 2024): Province updates act to prioritize affordability, clean energy, Ministry of Energy Mines and Low Carbon Innovation (https://news.gov.bc.ca/releases/2024EMLI0004-000210).

Table 10: Derivation of Equivalent Electricity Rate

BC Hydro Residential Rate (2024)		Tier 1	Tier 2	
Rate in kWh	a	$ 0.1097	$ 0.1408	per kWh
Conversion of energy units	b = a * 277.8 kWh per GJ	$ 30.47	$ 39.11	per GJ
Adjust for heating efficiency:				
Natural Gas Furnace (95%) to Electric Baseboard (100%)	c = b * 95%	**$ 28.95**	**$ 37.16**	per GJ

RNG and DSM

The impact of a continuation of the current level of approved spending on DSM programs has been reflected in the burner tip forecast. The impact of additional spending under an expansion of the scale and scope of the ECI programs is discussed in Section 8 and has not been reflected here.

The impact of PNG's current and expected quantities of RNG on the residential burner tip rates have not been reflected in the forecast. The anticipated impact of PNG's RNG program on customer rates is discussed in Section 9.

3 Residential Customer Characteristics

3.1 Introduction

In 2022, PNG conducted a Residential End Use Survey (2022 REUS) that collected information on factors influencing residential demand. The survey collected information about residential equipment used for space heating and domestic hot water, fireplaces, and other gas end uses. It also collected dwelling characteristics, household occupant characteristics, and activities influencing household natural gas consumption.

The following sections summarize the results of the survey and discusses trends in comparison to the 2013 REUS as well as to the 2019 Customer Attitudes Survey.[40] A detailed report of the survey results is attached as Appendix A: 2022 Residential End-use Study.

3.2 Residential End-Use Characteristics

As expected from PNG's operating experience, natural gas is the dominant fuel choice for space heating (Figure 11), averaging 92 percent across all services areas. Natural gas space heating has the highest penetration rate in PNG(N.E.)'s service areas, where 96 percent of dwellings use gas as the main fuel for heating. Penetration rates in the PNG-West service area are slightly lower at 88 percent. The penetration of natural gas space heating remains relatively unchanged, albeit slightly lower, from that reported in the 2019 Customer Attitudes Survey.

Natural gas is also the most common fuel used for domestic water heating, where 78 percent of all homes in PNG(N.E.)'s service areas have a natural gas water heater. Penetration rates in PNG-West service area range are lower at 62 percent (Figure 12). The prevalence of natural gas water heaters in PNG-West has declined notably over the past five years, when the 2019 Customer Attitudes Survey reported a penetration of 70 percent.

[40] The 2019 Customer Attitudes Survey targeted at both residential and commercial customers, that addressed a range of topics including: (i) Attitudes and beliefs about the environment, natural gas, and renewable energy; (ii) Satisfaction with customer service interactions; (iii) Interest in online services from PNG; (iv) Participation and interest in energy-efficiency initiatives, and (v) Willingness-to-support the production of bio-methane.

Figure 11: Penetration of Primary Space Heating

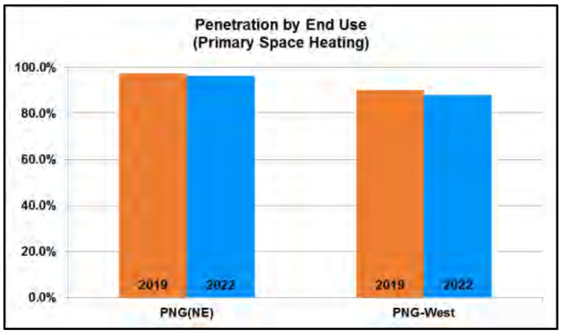
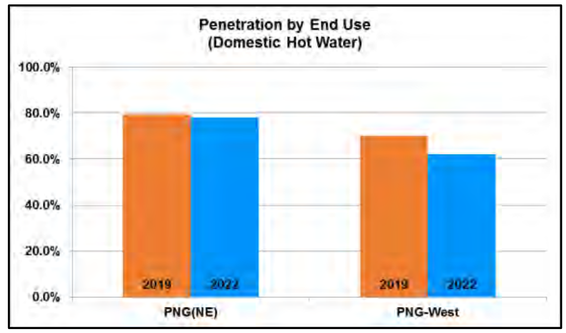


Figure 12: Penetration of Domestic Hot Water



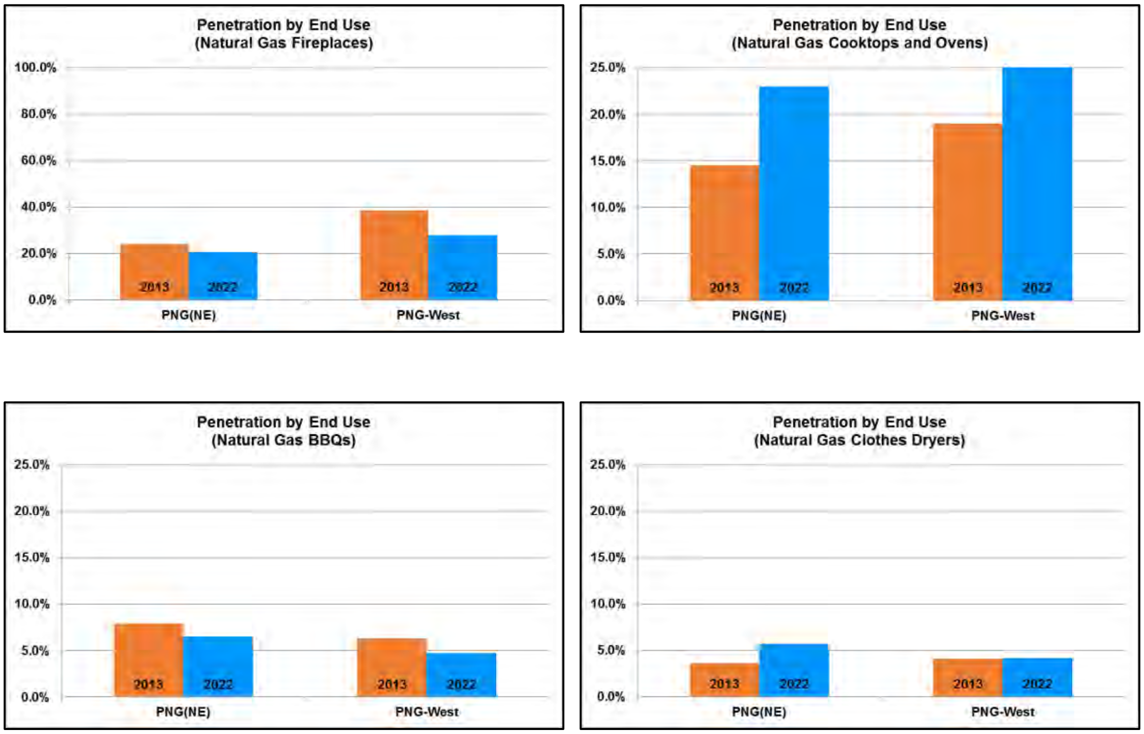
The penetration rates of other natural gas end-uses are shown in Figure 13, below. The penetration of natural gas fireplaces, decreased in both PNG-West and PNG(N.E.) over the past nine years, since the completion of the 2013 REUS.[41] Approximately 21 percent of homes in PNG(N.E.) have a natural gas fireplace, down from 24 percent in 2013. In PNG-West, the penetration is significantly higher at 28 percent, but still lower than in 2013 when it was 38 percent.

The penetration of natural gas cooktops, ranges and ovens increased in both PNG-West and PNG(N.E.) over the past nine years and are found in 23 percent of homes in PNG(N.E.) and in 25 percent of homes in PNG-West, up from 15 percent, and 19 percent in 2013, respectively.

The prevalence of natural gas barbeques dropped by approximately 1.5 percent in both service areas since 2013, and averages six percent. Natural gas clothes dryers are found in nearly five percent of homes, up from four percent in 2013. The increase coming almost exclusively from PNG(N.E.).

[41] The 2019 Customer Attitudes Survey did not gather information on ancillary natural gas end-uses.

Figure 13: Ancillary Natural Gas End-uses



3.3 Conditional Demand Analysis

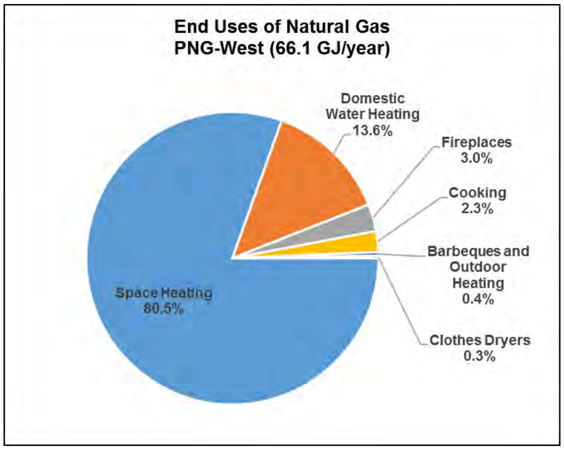
PNG's residential demand forecast is based on a residential end-use model that predicts the average residential use per account based on a number of influencing factors including dwelling type, construction, the numbers and types of natural gas appliances in the home, and the behaviour of residents.

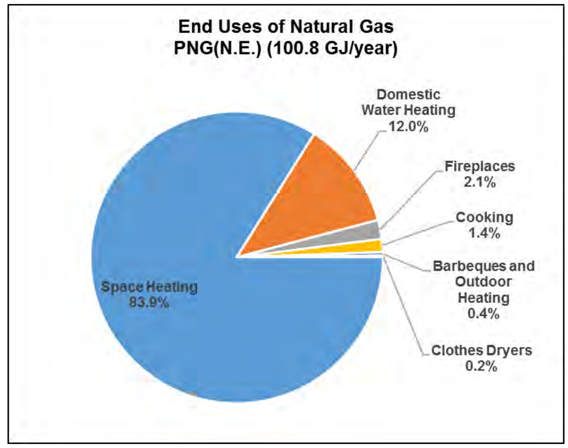
Data from the 2022 REUS survey, gas consumption records of survey respondents, and regional weather data were used to perform a conditional demand analysis (CDA), which produced estimates of weather-normalized unit energy consumption (UEC) for gas end uses.[42] A complete description of the CDA is found in Section 14 of the 2022 REUS (Appendix A: 2022 Residential End-use Study).

[42] Unit Energy Consumption, or UEC, refers to the expected average demand from each end-use application that includes, space heating, domestic hot water, cooking, and fireplaces.

Space heating and domestic hot water account for approximately 95 percent of the demand for natural gas by residential customers in all of PNG's service areas (Figure 14). Owing to the warmer climate, the portion attributed to space heating is slightly lower in PNG-West at 81 percent, than in PNG(N.E.) (84 percent).

Figure 14: End Uses of Natural Gas





4 Overview of Demand Forecasting Scenarios

4.1 Introduction

The two measures for forecasting customer's consumption patterns are annual and peak demand. The annual demand forecast predicts the consumption by a utility's customers over the course of a calendar year. This demand is typically presented as "weather normalized", which is the demand that would occur in response to an average annual temperature pattern. Its purposes are three-fold:

(i) to allow planning for securing an adequate supply of natural gas;

(ii) to provide an input into the determination of customer rates for revenue requirement applications as well as forecasts of rates made during CPCN applications; and

(iii) to provide a baseline for assessing the impact of DSM programs put into place during the forecast period.

On the other hand, the primary purpose of the design day demand forecast is to predict the delivery capacity required during extreme cold weather in order to plan for physical expansions to existing pipeline capacity. This is also known as the "design day" demand. The peak demand forecast of sales customers also guides the development of PNG's gas supply portfolio which is a mix of gas supply and storage resources that are sufficient to meet the design day demand of all of PNG's sales customers.

4.2 Demand Forecast Scenarios

PNG prepared three annual demand forecast scenarios for this CRP. The scenarios are designed to illustrate potential futures based on a variety of economic and policy conditions. These forecasts are not predictive, rather, they are forward-looking projections regarding energy system and end use performance, and customer behavior. The input data and assumptions reflect best-available information and reasonable professional judgement based on when the work was completed. These forward-looking results statements are, by their nature, subject to known and unknown risks, uncertainties and other factors which may cause the actual outcomes to be materially different. It is not expected that any of these scenarios will unfold as modelled, however it is expected that some outcomes may occur and that understanding the impact of changes to PNG's environment can support planning decisions.

The scenarios were designed to:

(i) meet the requirements of the BCUC Resource Planning Guidelines (December 2003);

(ii) address the BCUC directives in Decision and Order G-265-20 approving the 2019 CRP decision (see Section 1.5);

(iii) reflect changes to relevant federal, provincial, and municipal policies (as discussed in section 2.1); and,

(iv) incorporate potential changes in economic conditions that affect PNG's system and customers.

As described below, the Reference scenario reflects the continuation of many current energy consumption patterns while incorporating expected policies, while the other two scenarios model outcomes based on variations in the pace and magnitude of changes to consumption patterns in response to variations in policy and pricing environments.

The three scenarios are:

1. **Reference scenario:** reflects the continuation of current energy consumption patterns while incorporating known and expected future changes such as to building codes and equipment standards, DSM savings, and fuel choices. This scenario also considers how energy consumption changes in response to evolving standards and regulations that support government policy objectives, most notably the Roadmap.

2. **Decarbonization Delayed scenario:** presents a future where decarbonization is pursued but a combination of delayed policies and price signals delay emissions reductions. Electrification of space heating in buildings continues, and utilities continue to pursue RNG to lower the GHG intensity of the natural gas delivered through their systems, but these activities occur to a lesser extent relative to both the Reference and Decarbonization Accelerated scenarios.

3. **Decarbonization Accelerated scenario**: illustrates a future where decarbonization occurs faster relative to the Reference scenario. Policies and prices drive an acceleration in the electrification of buildings while natural gas commodity prices increase conservation.

Sections 4.2.1 provides an overview of the variables included in the forecasting model. A detailed description of the forecasting model used to develop the forecast scenarios is attached as PDF file Appendix A - PNG 2022 Residential End-use Study and Appendix B: Demand Forecasting End-Use Model.

4.2.1 Variables Influencing Annual Demand

The scenarios were developed by considering possible outcomes for variables that influence natural gas demand in PNG's service territory. These variables, called "Critical Drivers" (CDs), are exogenous variables that are expected to have a material impact on annual energy consumption and/or GHG emissions, and have sufficient data to model their effect. CDs may be driven by policy or economic conditions. Table 11 provides an overview of the CDs used to generate the demand forecast scenarios, how they are used in the model to impact demand and GHG emissions, and their applicability to specific sectors, regions, and end-uses.

Discrete trajectories of potential outcomes for each CD were defined and then combined under each of the three scenarios (Table 12). Appendix C: Critical Driver Input Assumptions provides details on the input assumptions and analysis, including the settings used in each scenario.

Table 11: Critical Drivers Influencing Demand

CD	Description	Modelling Approach	Applicability
Carbon Price	BC Carbon Tax applied to GHG emissions from stationary combustion of natural gas.	Used to estimate the change in annual consumption in response to changes in carbon tax. As prices change relative to the reference prices, customers decrease demand for gas and are assumed to switch to electricity when applicable equipment reaches the end of life. The fuel share for natural gas for these end uses declines.	All customers; variation by sector and region

CD	Description	Modelling Approach	Applicability
Burner tip Price	Price to PNG customers including the monthly fee, delivery, and commodity charge. Excludes carbon tax, price for RNG, biomethane credit, DSM and offsets as those prices are captured in other Critical Drivers. Projected commodity prices are used as a proxy to inform how prices to PNG customers may change.	Used to estimate the change in demand for gas in response to changes in prices that PNG customers may face. As prices change relative to the reference prices, customers decrease demand for gas and are assumed to switch to electricity when applicable equipment reaches end of life. The fuel share for natural gas for these end uses declines.	All customers; variation by sector and region
Blend percentage of RNG	Percent blend of annual consumption by volume of RNG.	The fuel share of natural gas is reduced and the fuel share for RNG is increased to meet the annual percent blend target. GHG emissions decline as natural gas is displaced by RNG.	All customers
Customer Accounts	Change in number of accounts by sector and region.	Residential sector account forecasts are based on household formation forecast and capture rates. Commercial sectors, account forecasts are based on population forecasts and capture rates. Industrial sector accounts were not varied. (Industrial demand is forecasted and adjusted by scenario)	Residential and Commercial sectors; variation by region
Large Customer Demand	Change in annual demand from large customers.	Demand by region within the industrial-sector model varies based on specific changes to large customers.	Industrial-sector customers by region and segment
Building Code – New Construction	As part of the Roadmap to 2030, the province adopted the B.C. Energy Step Code in the B.C. Building Code. The B.C. Energy Step Code is a five-step performance-based standard for new construction. As of May 1, 2023, new construction was mandated to attain Step 3 for Part 9 buildings and Step 2 for Part 3 buildings and will be increased so that new buildings are net-zero ready by 2032.See also Section 2.2.3.	More stringent building codes for new construction decreases space heating demand for natural gas.	• Residential and commercial sectors • New buildings • Hot water and space heating end uses

CD	Description	Modelling Approach	Applicability
Building Code - Retrofit	Currently, there is no federal retrofit code. However, there has been discussion about the implementation of retrofit codes, both at the provincial and at the federal level. The Roadmap outlined guidelines to implement an Existing Buildings Renewal Strategy by 2024 while the Government of Canada has committed to develop a retrofit code by the same year.	Retrofit code for existing buildings would require all retrofits to include energy efficiency upgrades, decreasing space heating and water heating natural gas consumption.	• Residential and commercial sectors • Existing buildings • Space heating end use
Appliance Standards	Federal and provincial minimum energy performance standards for energy-using appliances.	More stringent appliance standards increase energy efficiency thereby decreasing natural gas demand for applicable end uses.	• Residential and commercial sectors • Existing buildings • Space heating end use
Gas system GHG mitigation options	Reflects a bundle of options PNG may pursue to reduce emissions to meet the GHGRS, if implemented, applied to the gas utility sector as contemplated in in the Roadmap by the province. Due to uncertainty over future regulations and costs of various low-carbon gases, this CD could include various amounts of hydrogen, syngas and lignin, and other low-carbon gases needed to reduce emissions.	All other CDs are applied to the model first, and the resulting GHG emissions are reviewed to determine further abatement, if any, required to the meet the indicative GHG cap. A post-model calculation is conducted and the required amount of CO2e abatement is determined.	All sectors

Table 12 – Critical Driver Settings by Scenario

Critical Driver	Reference	Decarbonization Delayed	Decarbonization Accelerated
Carbon Price	Reference	Low	High
Burner tip Price	Reference	Low	High
RNG Blend	Reference	Low	High
Customer Accounts	Reference	High	Low
Large Customer Demand	Reference	High	Low
Building Codes – New Construction	Accelerated	Delayed	Accelerated
Building Codes – Retrofit	Reference	Reference	Retrofit Code
Appliance Standards	Reference	Reference	Higher stringency

The forecast of annual demand under the Reference scenario is presented in Section 5. The sensitivity analysis presenting forecasts under the alternative Decarbonization Accelerated and Decarbonization Delayed scenarios is found in Section 6. The design day demand forecasts under all three planning scenarios are found in Section 7.

5 Annual Demand Forecast Results: Reference Scenario

5.1 Overview

The following sections present the results of the Reference scenario. As the end-use model used to generate the load forecast scenarios is built at the sector level (residential, commercial, and industrial), the narrative explaining the results is often at the sector level.

The following results are presented:

(i) Annual demand;

(ii) Customer additions;

(iii) Annual Use per Account (UPA) derived from forecasted annual consumption and customer additions. UPA is provided for residential and small commercial customer types only.

5.2 Consolidated Demand Forecast

Annual demand is forecasted to decline slowly over the forecast period (Figure 15) driven primarily by:

- Increases in carbon price and burner tip prices, which drives an increased focus on conservation and fuel switching away from gas;
- Increasingly stringent building code and equipment standards, which lower the UECs for space and water heating end uses in residential and commercial dwellings; and
- Leveling off of load from existing industrial customers, based on the large customer demand forecasts.

The demand breakdown by region remains fairly consistent, with the majority of demand coming from PNG-West. In terms of end-use breakdown, nearly half of the demand is from residential and commercial customers, with the majority of that coming from space heating. While the space heating load is expected to decline due to increasingly stringent building codes and equipment standards, overall the demand from the residential and commercial customers, as a portion of overall demand is expected to remain fairly constant over the planning period as modest growth in customers offsets the decline in per-customer demand (Figure 16). Demand in all years is lower than that forecast in the previous CRP (Figure 17).

Figure 15: Annual Demand – Actual and Forecast by Region, Reference Scenario

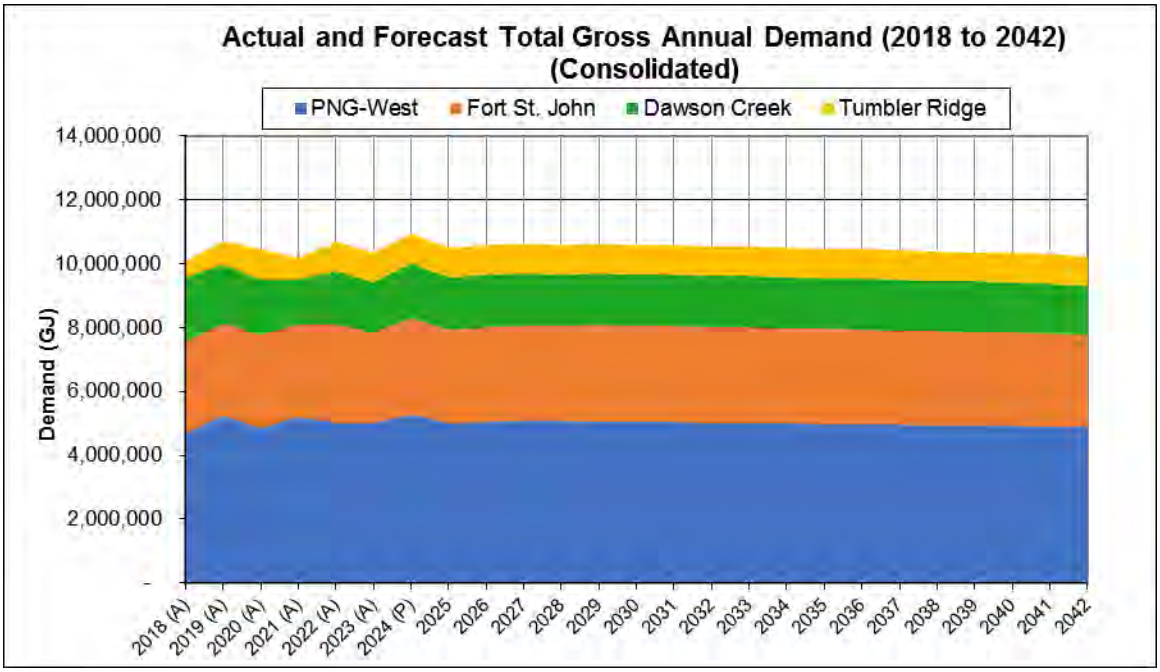


Figure 16: Annual Demand by Customer Class

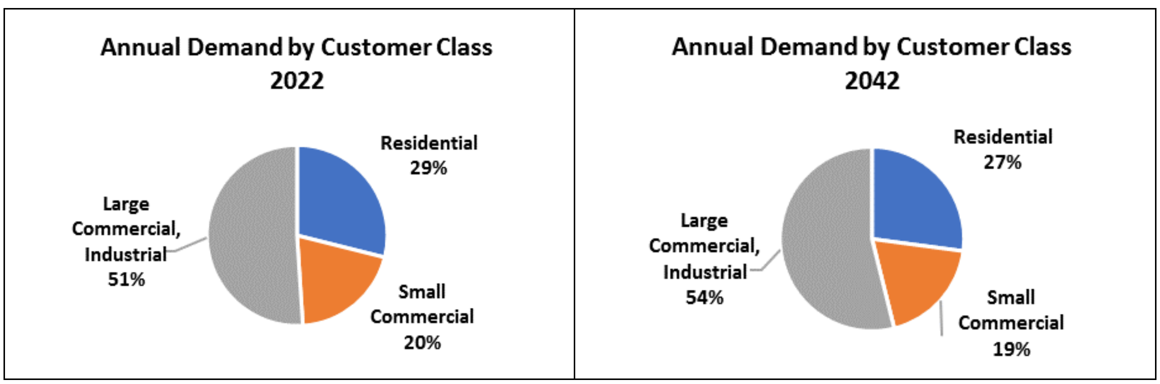
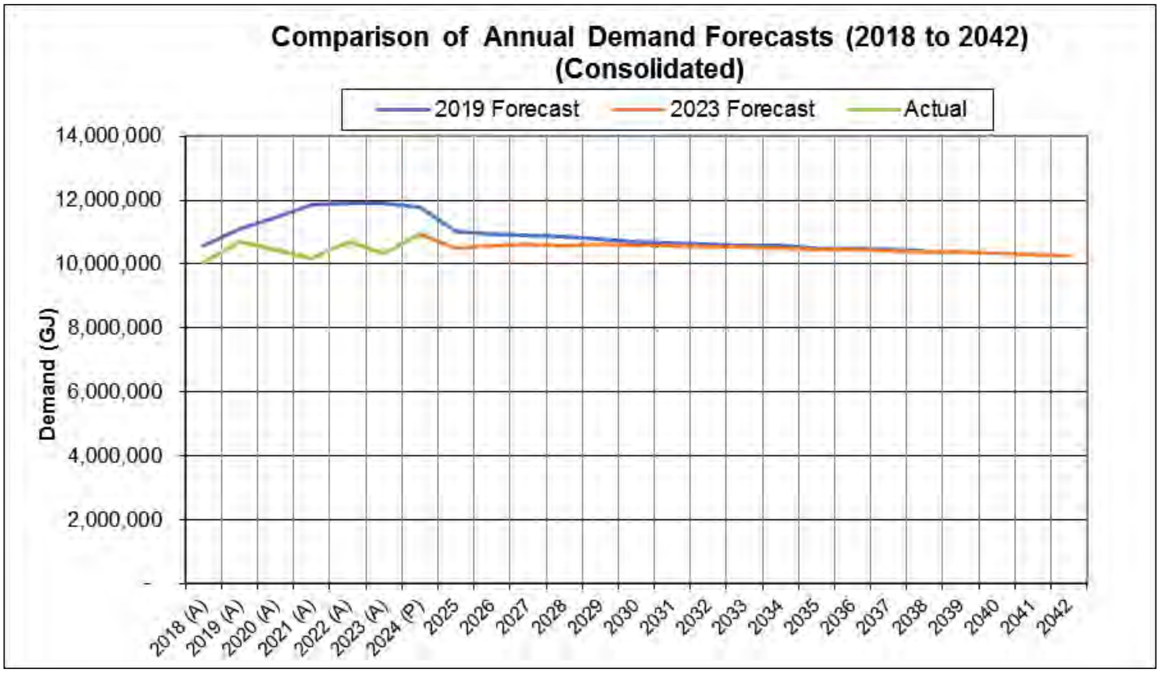


Figure 17: Comparison of Forecasts from the 2019 and 2024 CRPs

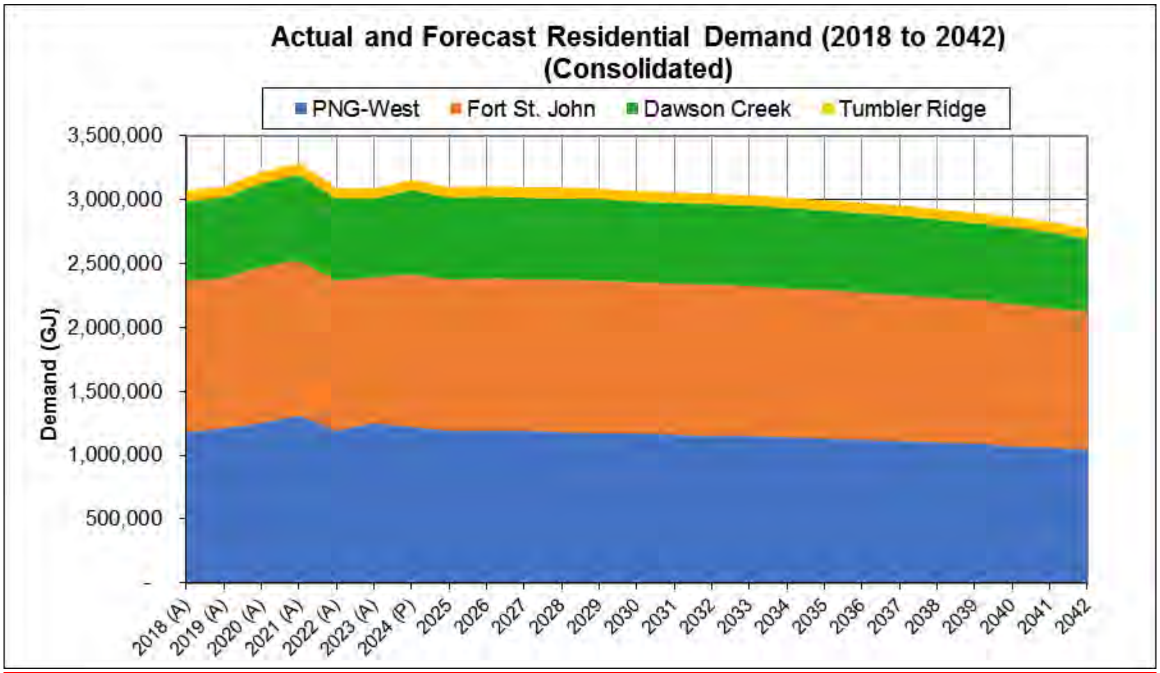


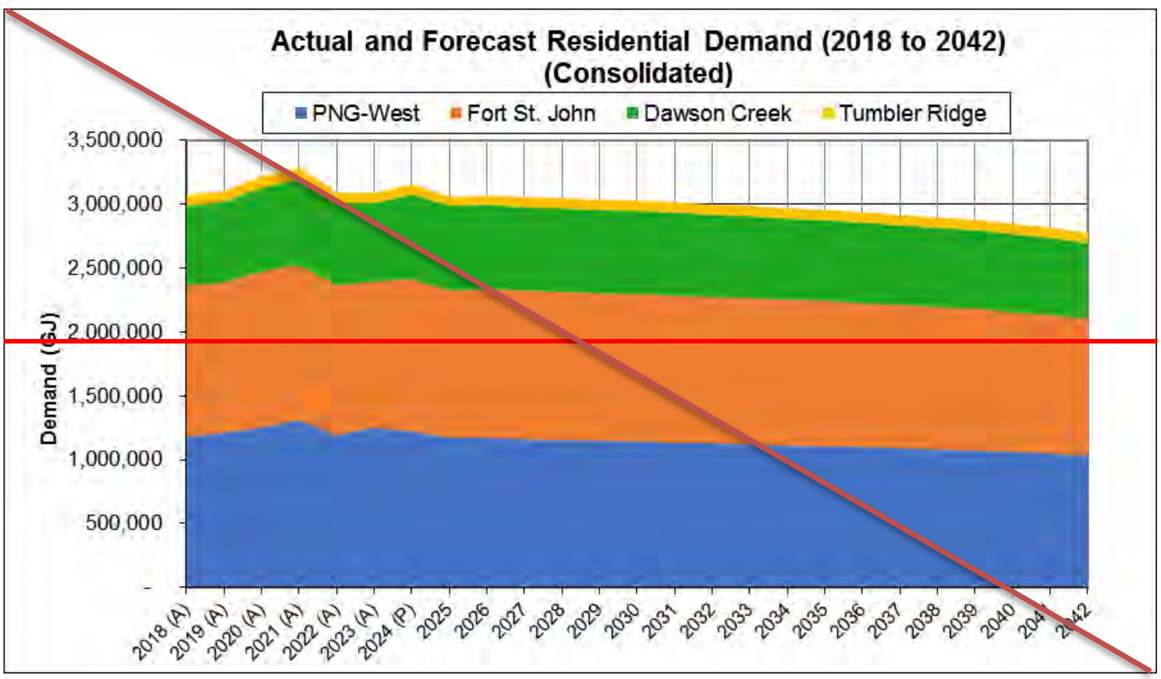
5.3 Residential Demand

Figure 18 presents the annual demand forecast results for the Reference scenario for residential customers by region. Annual demand is forecasted to decrease over the forecast period as the trend in declining UPA overtakes the modest increases in residential customers forecast for the region. The decline in UPA is due to several factors, mainly driven by provincial and federal climate change policies, including:

i. Carbon price and burner tip prices increase during the forecast period, contributing to increased conservation and some fuel switching away from gas;
ii. Increasingly stringent equipment standards reducing space heating load; and
iii. Updates to the BC Building Code improve the energy efficiency of new construction and reduced space heating load relative to existing dwellings.

Figure 18: Residential Annual Demand: Actual and Forecast by Region, Reference Scenario





The decline in demand is due to several factors, mainly driven by provincial and federal climate change policies, including:

iv. Carbon price and burner tip prices increase during the forecast period, contributing to increased conservation and some fuel switching away from gas;

v. Increasingly stringent equipment standards reducing space heating load; and

vi. Updates to the BC Building Code improve the energy efficiency of new construction and reduced space heating load relative to existing dwellings.

5.3.1 Customer Additions Forecast

The BC Stats household projection forecast underpins the growth in customer additions, along with a capture rate by region. Please see Appendix C: Critical Driver Input Assumptions for details on how the residential customer account forecasts were developed.

The following charts (Figure 19 to Figure 22) show actual and forecast customer additions over the period from 2018 to 2042. Over the period from 2018 to 2023, PNG-West exhibited a gain of 319 actual customer additions, compared to a forecast of 379 in the 2019 CRP. In the Fort St. John/Dawson Creek area, actual customer additions over this period were 607, compared to a forecast of 1,145. Tumbler Ridge exhibited a loss of 27 customers, compared to a forecast gain of 20. While PNG is unable to attribute any specific cause or causes to the lower than forecast customer additions, PNG does note that three of the five years of this historical period spanned the COVID-19 epidemic and the resulting economic disruption and uncertainty.

Figure 19: Historical and Forecast Residential Customer Additions – PNG-West

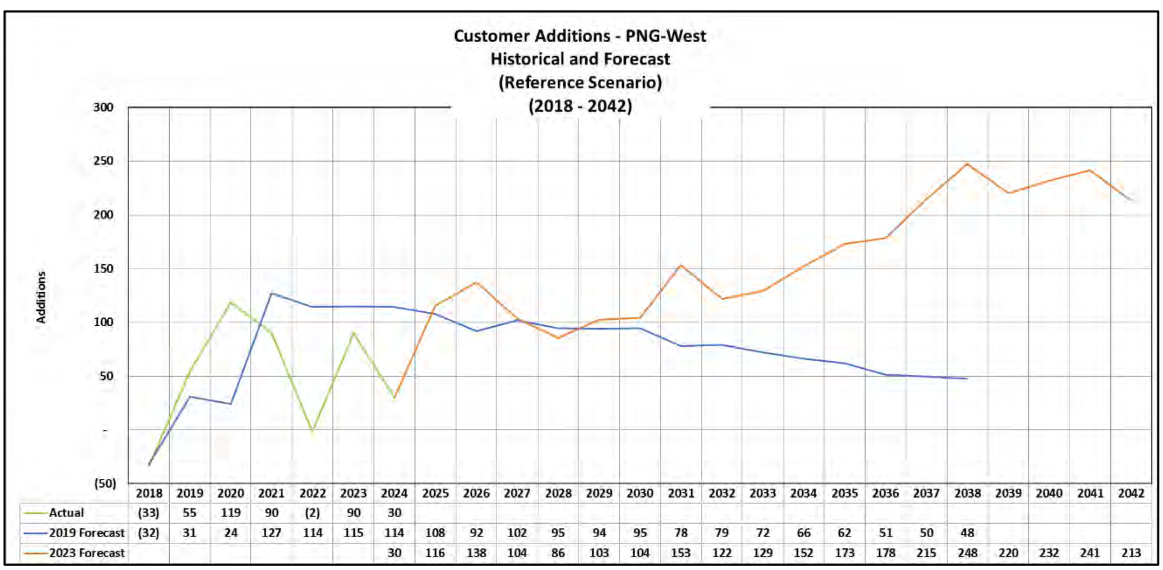
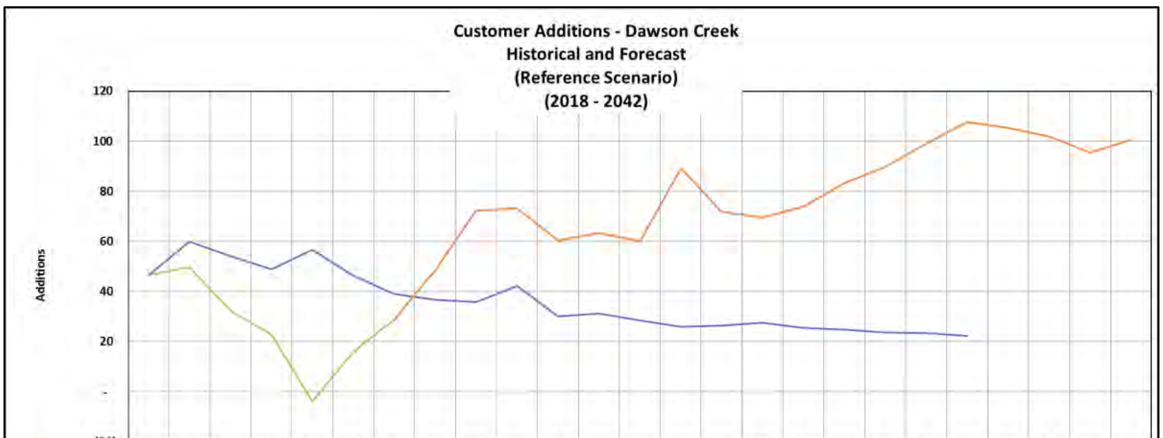


Figure 20: Historical and Forecast Residential Customer Additions – Fort St. John

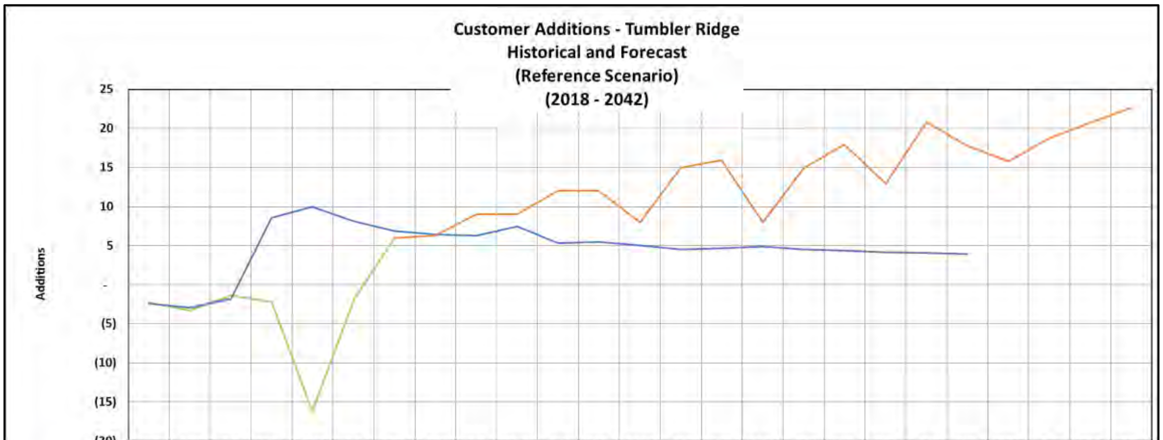
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	72	72	83	64	69	84	(3)																		
2019 Forecast	72	79	102	192	189	198	183	195	189	207	203	198	194	187	184	177	170	163	160	161	159				
2023 Forecast							(3)	85	183	169	174	167	163	201	160	173	177	173	192	189	196	203	188	194	188

Figure 21: Historical and Forecast Residential Customer additions – Dawson Creek



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	47	50	32	23	(4)	16	29																		
2019 Forecast	47	60	54	49	57	46	39	37	36	42	30	31	29	26	27	28	26	25	24	23	22				
2023 Forecast							29	48	72	73	60	63	60	89	72	70	74	83	90	99	108	105	102	95	101

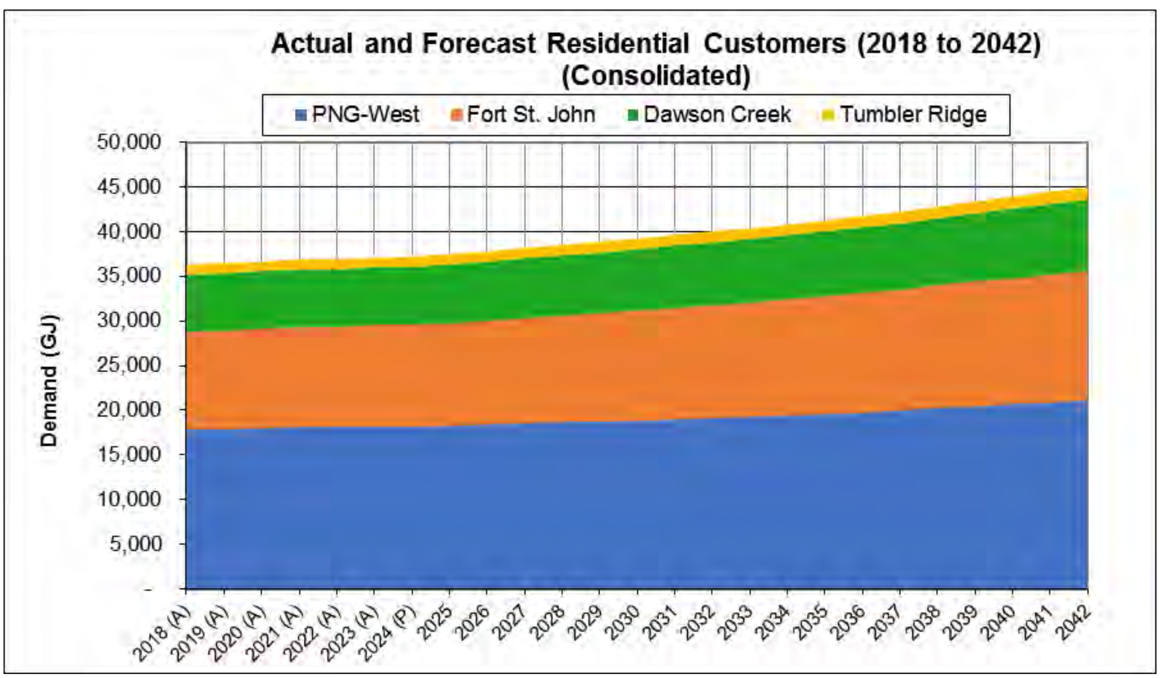
Figure 22: Historical and Forecast Residential Customer Additions – Tumbler Ridge



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	(2)	(3)	(1)	(2)	(16)	(2)	6																		
2019 Forecast	(2)	(3)	(2)	9	10	8	7	6	6	7	5	6	5	5	5	5	4	4	4	4	4				
2023 Forecast							6	6	9	9	12	12	8	15	16	8	15	18	13	21	18	16	19	21	23

Despite the variability in actual customer additions compared to the 2019 CRP forecast, PNG has forecast modest customer additions in all regions in this 2023 CRP forecast to reflect the anticipated population growth and assumptions on customer capture rates detailed in Appendix C: Critical Driver Input Assumptions. Figure 23 illustrates the residential customers count forecast for the Reference scenario by region.

Figure 23 - Residential Customers Forecast by Region - Reference Scenario

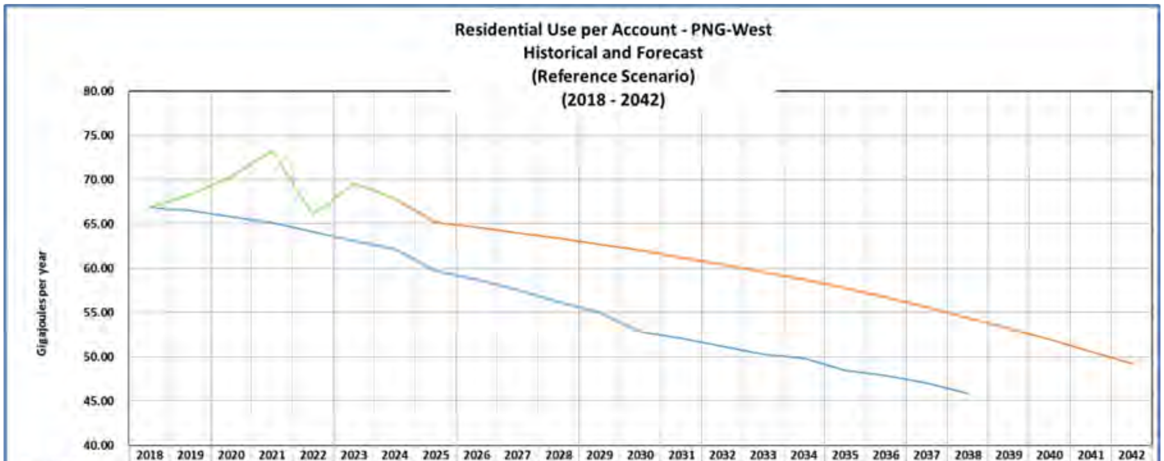


5.3.2 Use per Account Forecast

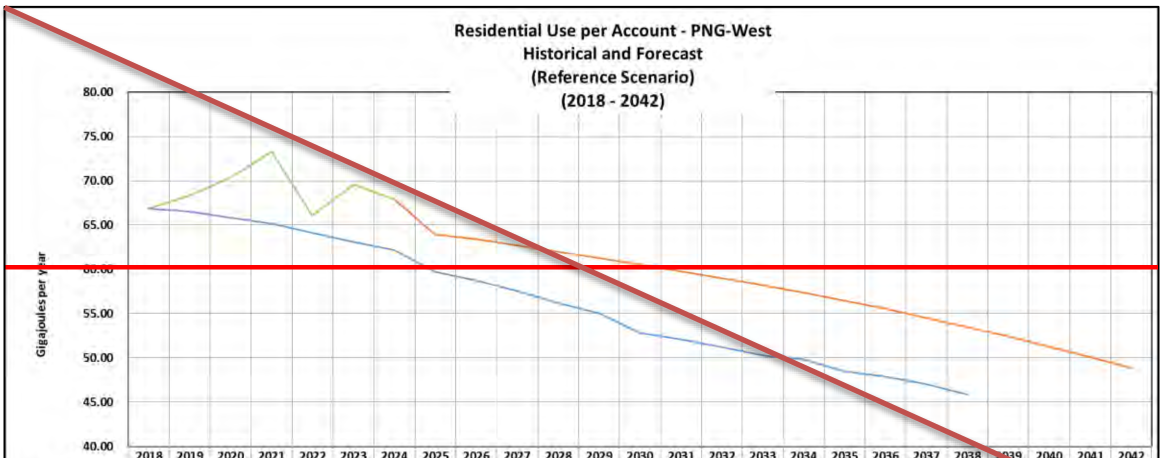
The following charts show actual and forecast customer UPA over the period from 2018 to 2042. Actual UPA in all systems over the period from 2018 to 2022 has been higher than forecast in the 2019 CRP. The current forecast continues the long-term decline exhibited by historical trends and is consistent with the trend forecast in the 2019 CRP.

Residential UPA for customers on PNG-West is projected to decrease by roughly 29 percent~~28 percent~~ over the forecast period (Figure 24), by roughly 25 percent~~30 percent~~ on the Fort St. John and Dawson Creek systems (Figure 25 and Figure 26), and by 18 percent~~20 percent~~ in Tumbler Ridge (Figure 27). The most important driver of this decline continues to be replacement natural gas heating appliances with higher efficiency models, as well as in the performance of building envelopes. The effect of the Energy Step Code requirements in the BC Building Code, and the installation of high efficiency heating appliances in new construction manifests itself in the lower UPA associated with customer additions, all of which are assumed to be associated with new construction. Because of this, the rate of customer additions also influences the trend in average UPA, with the UPA decreasing at a steeper rate as increasing numbers of new customers are added to each system.

Figure 24: Residential UPA Forecast – PNG-West



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	66.83	68.34	70.37	73.26	66.06	69.57	67.90																		
2019 Forecast	66.83	66.55	65.80	65.17	64.14	63.05	62.15	59.72	58.70	57.56	56.22	55.05	52.85	52.12	51.22	50.30	49.84	48.46	47.89	47.03	45.89				
2023 Forecast							67.90	65.16	64.64	64.00	63.38	62.71	62.02	61.20	60.42	59.60	58.70	57.73	56.71	55.59	54.40	53.22	51.97	50.64	49.27



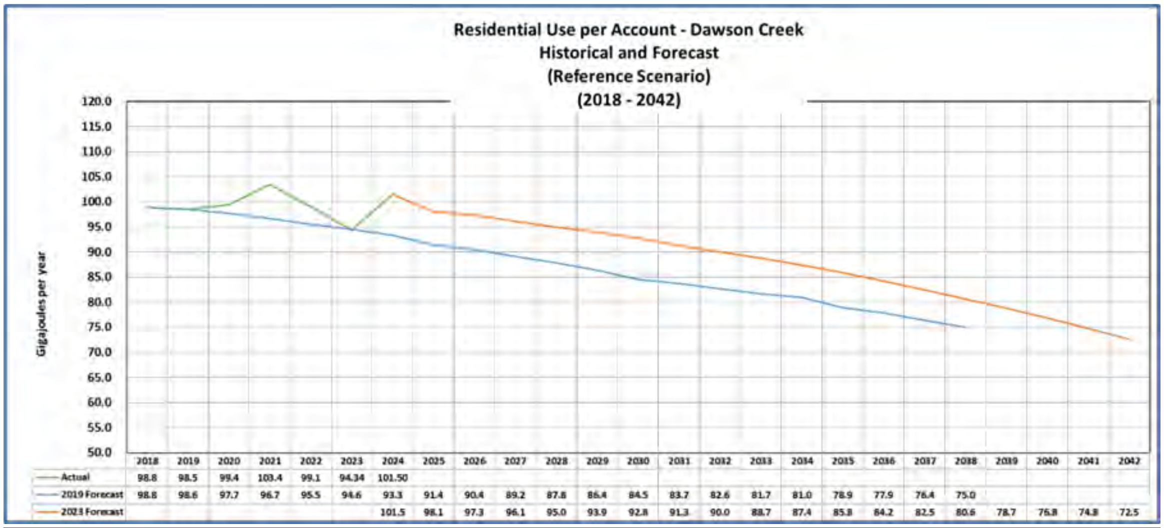
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	66.83	68.34	70.37	73.26	66.06	69.57	67.90																		
2019 Forecast	66.83	66.55	65.80	65.17	64.14	63.05	62.15	59.72	58.70	57.56	56.22	55.05	52.85	52.12	51.22	50.30	49.84	48.46	47.89	47.03	45.89				
2023 Forecast							67.90	63.93	63.42	62.66	61.96	61.25	60.54	59.74	58.98	58.19	57.35	56.46	55.53	54.53	53.46	52.40	51.28	50.09	[illegible]

Figure 25: Residential UPA Forecast – Fort St. John

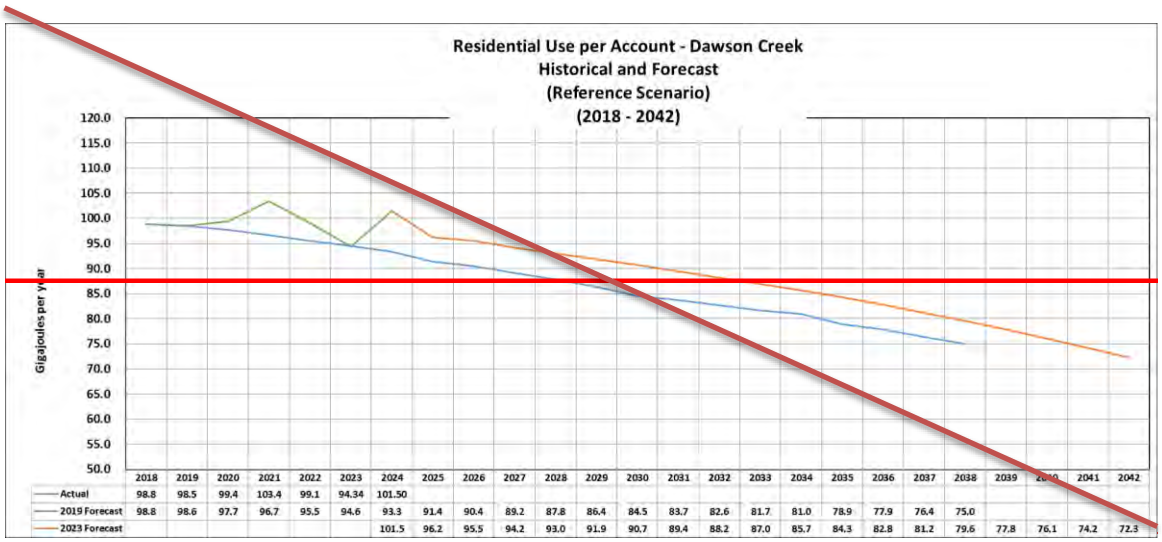
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	107.6	105.9	109.0	108.4	104.9	101.6	105.5																		
2019 Forecast	107.6	107.2	106.2	104.8	103.1	101.7	100.0	97.55	96.04	94.24	92.27	90.20	87.67	86.25	84.51	82.94	81.67	79.26	77.79	75.92	74.12				
2023 Forecast							105.5	103.6	102.6	101.1	99.55	98.03	96.53	94.81	93.31	91.71	90.06	88.40	86.59	84.75	82.87	80.88	78.85	76.68	74.39

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	107.6	105.9	109.0	108.4	104.9	101.6	105.5																		
2019 Forecast	107.6	107.2	106.2	104.8	103.1	101.7	100.0	97.55	96.04	94.24	92.27	90.20	87.67	86.25	84.51	82.94	81.67	79.26	77.79	75.92	74.12				
2023 Forecast							105.5	101.3	100.4	98.71	97.08	95.54	94.05	92.43	90.97	89.45	87.91	86.35	84.70	83.01	81.29	79.47	77.62	75.66	[illegible]

Figure 26: Residential UPA Forecast – Dawson Creek

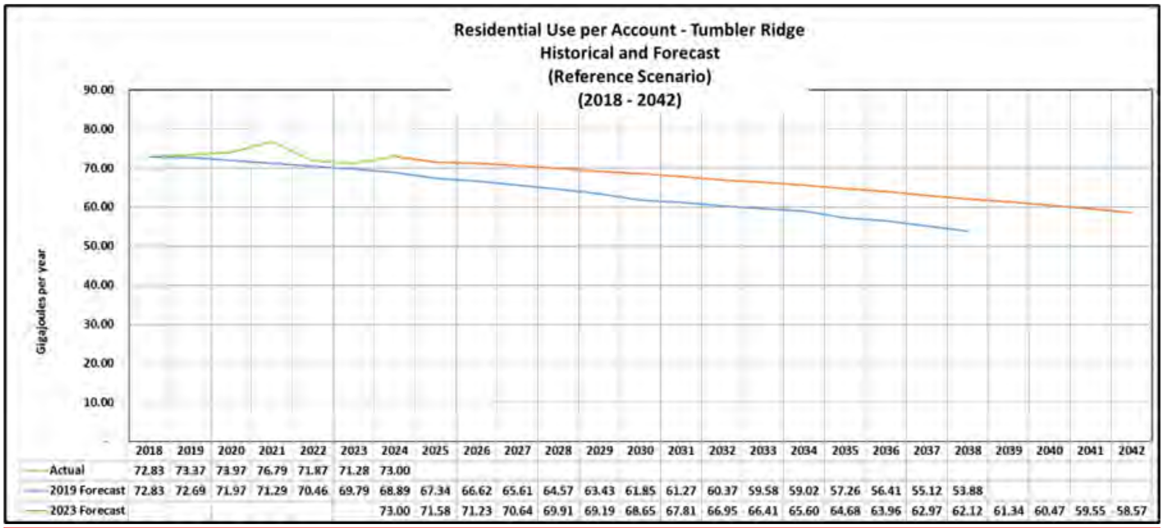


	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	98.8	98.5	99.4	103.4	99.1	94.34	101.50																		
2019 Forecast	98.8	98.6	97.7	96.7	95.5	94.6	93.3	91.4	90.4	89.2	87.8	86.4	84.5	83.7	82.6	81.7	81.0	78.9	77.9	76.4	75.0				
2023 Forecast							101.5	98.1	97.3	96.1	95.0	93.9	92.8	91.3	90.0	88.7	87.4	85.8	84.2	82.5	80.6	78.7	76.8	74.8	72.5

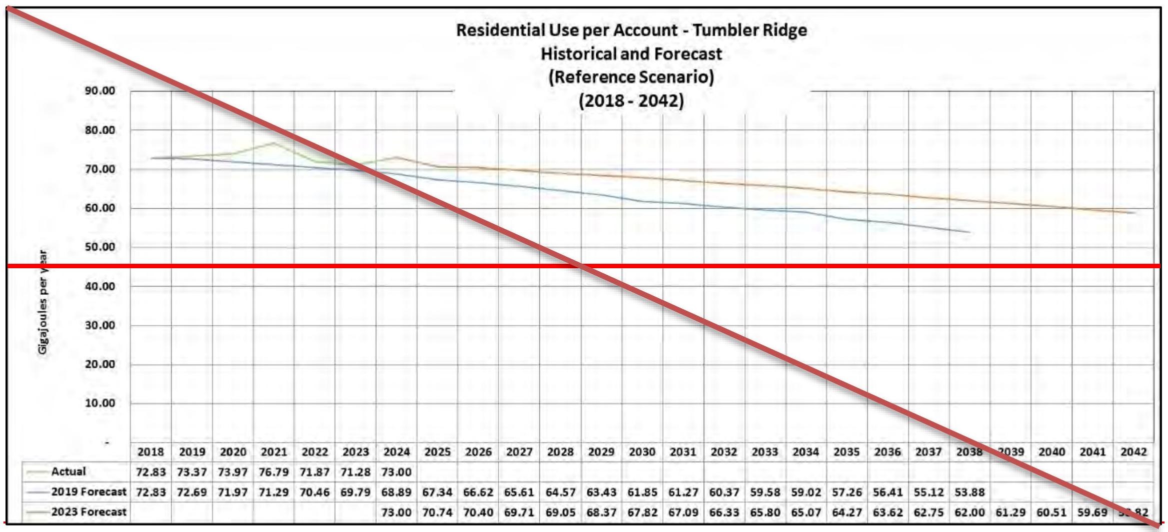


	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	[illegible]	2041	2042
Actual	98.8	98.5	99.4	103.4	99.1	94.34	101.50																		
2019 Forecast	98.8	98.6	97.7	96.7	95.5	94.6	93.3	91.4	90.4	89.2	87.8	86.4	84.5	83.7	82.6	81.7	81.0	78.9	77.9	76.4	75.0				
2023 Forecast							101.5	96.2	95.5	94.2	93.0	91.9	90.7	89.4	88.2	87.0	85.7	84.3	82.8	81.2	79.6	77.8	76.1	74.2	72.3

Figure 27: Residential UPA Forecast – Tumbler Ridge



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	72.83	73.37	73.97	76.79	71.87	71.28	73.00																		
2019 Forecast	72.83	72.69	71.97	71.29	70.46	69.79	68.89	67.34	66.62	65.61	64.57	63.43	61.85	61.27	60.37	59.58	59.02	57.26	56.41	55.12	53.88				
2023 Forecast							73.00	71.58	71.23	70.64	69.91	69.19	68.65	67.81	66.95	66.41	65.60	64.68	63.96	62.97	62.12	61.34	60.47	59.55	58.57



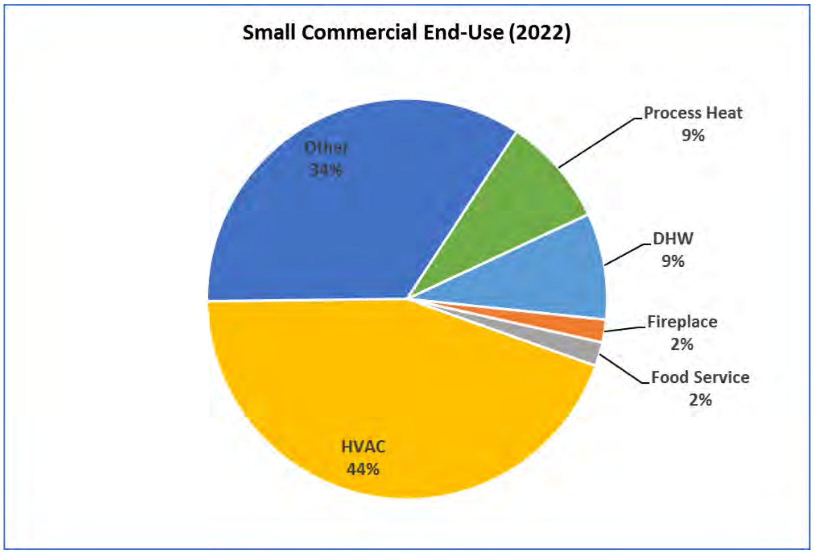
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	72.83	73.37	73.97	76.79	71.87	71.28	73.00																		
2019 Forecast	72.83	72.69	71.97	71.29	70.46	69.79	68.89	67.34	66.62	65.61	64.57	63.43	61.85	61.27	60.37	59.58	59.02	57.26	56.41	55.12	53.88				
2023 Forecast							73.00	70.74	70.40	69.71	69.05	68.37	67.82	67.09	66.33	65.80	65.07	64.27	63.62	62.75	62.00	61.29	60.51	59.69	[illegible]

5.4 Small Commercial Customers

The small commercial class of customers are defined in PNG's tariff as commercial customers consuming less than 5,500 GJ per year. Both small commercial sales and transportation service customers are incorporated as a sub-sector within the commercial sector end-use model. Customers include apartments, food retail, nursing homes, restaurants, schools, etc. Temperature sensitive space and water heating loads are the dominant end uses.

Similar to residential customers, the majority of annual demand from small commercial customers comes from space heating, as illustrated in Figure 28.

Figure 28: Small Commercial End-Uses

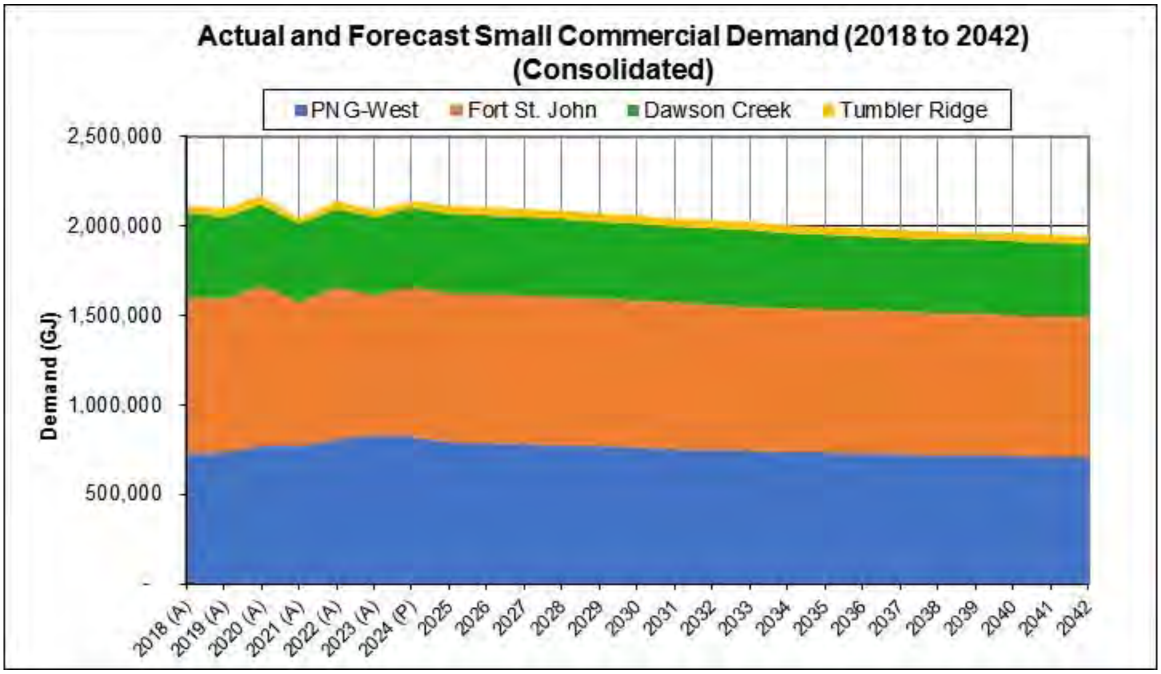


5.4.1 Annual Demand Forecast

Annual demand for small commercial customers is forecasted to increase slightly until 2023 when it then begins to decline slightly until 2042. The decline in forecast demand is due to increasingly stringent building code and equipment standards which decrease the UECs for space and water heating end uses, and the expectation of increasing grid electrification over the forecast period. While there is an increase in new small commercial customers over the forecast period, the energy demand intensity, as characterized by natural gas demand per square meter of building space, declines as a result of increasingly stringent building codes and equipment standards. This decline, combined with the reduction in consumption from existing customers as they upgrade to more efficient natural gas appliances, and improve the performance of their buildings, creates an overall decline in the small commercial demand.

Demand is mainly in the Fort St. John and PNG West regions, followed by Dawson Creek, and minimal demand in the Tumbler Ridge region. Figure 29 reflects the breakdown of small commercial demand by region.

Figure 29: Small Commercial Annual Demand: Actual and Forecast by Region, Reference Scenario

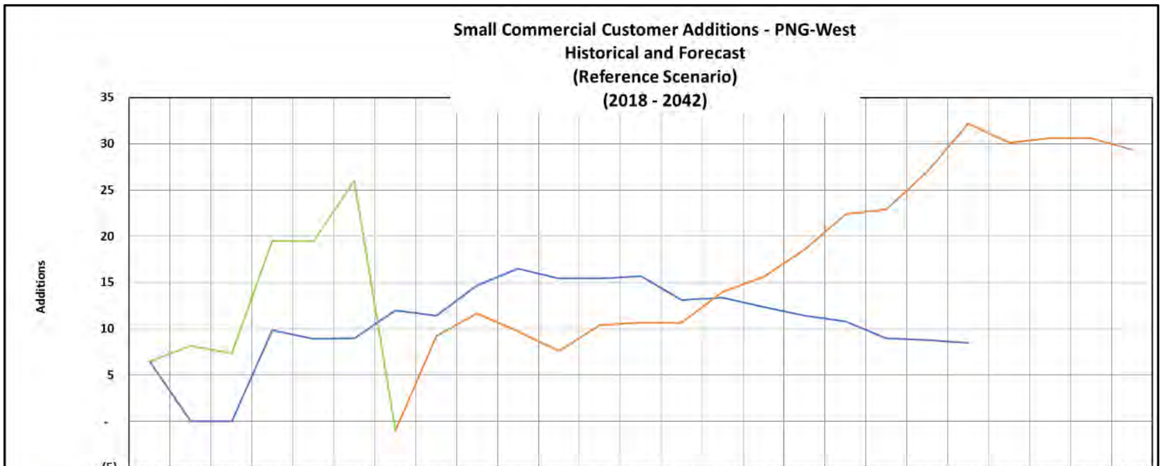


5.4.2 Customer Additions Forecast

Appendix C: Critical Driver Input Assumptions provides details on how the small commercial customer account input assumptions were developed.

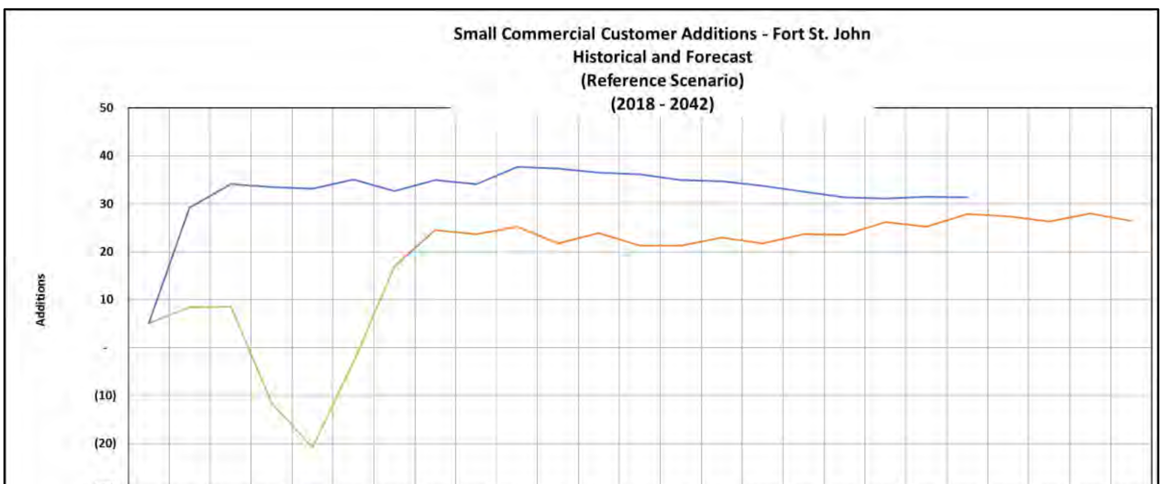
The following charts (Figure 30 to Figure 33) show actual and forecast customer additions over the period from 2018 to 2042. Over the period from 2018 to 2023, PNG-West exhibited an actual gain of 87 customers, compared to a forecast gain of 34 in the 2019 Resource Plan. The Fort St. John/Dawson Creek area experienced a loss of 14 customers over this period, compared to a forecast gain of 217. Tumbler Ridge exhibited a loss of 1 customer compared to a forecast gain of 6. While PNG is unable to attribute any specific cause or causes to the lower than forecast customer additions, PNG does note that three of the five years of this historical period spanned the COVID-19 epidemic and the resulting economic disruption and uncertainty.

Figure 30: Historical and Forecast Small Commercial Customer Additions – PNG-West



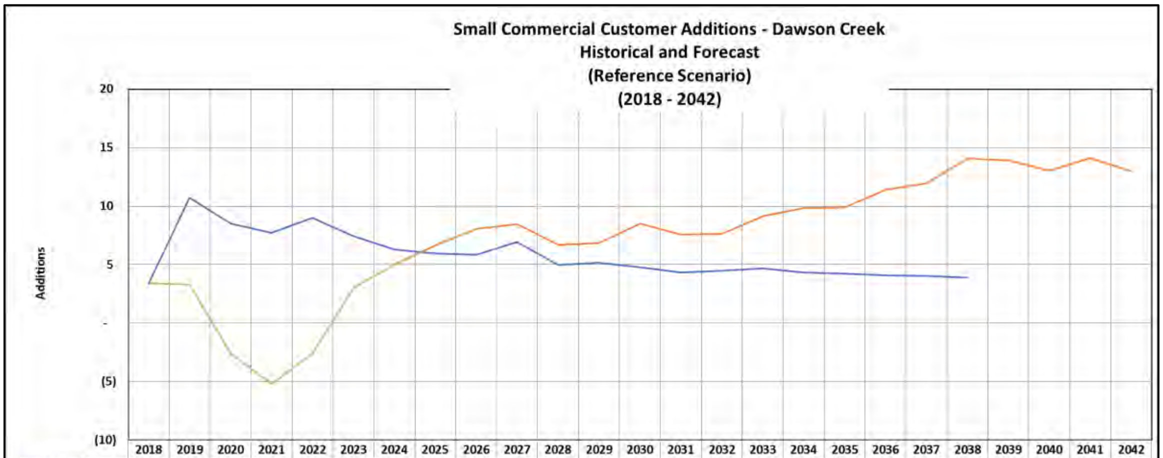
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	7	8	7	20	19	26	(1)																		
2019 Forecast	7	-	-	10	9	9	12	11	15	16	15	15	16	13	13	12	11	11	9	9	8				
2023 Forecast							(1)	9	12	10	8	10	11	11	14	16	19	22	23	27	32	30	31	31	29

Figure 31: Historical and Forecast Small Commercial Customer Additions – Fort St. John



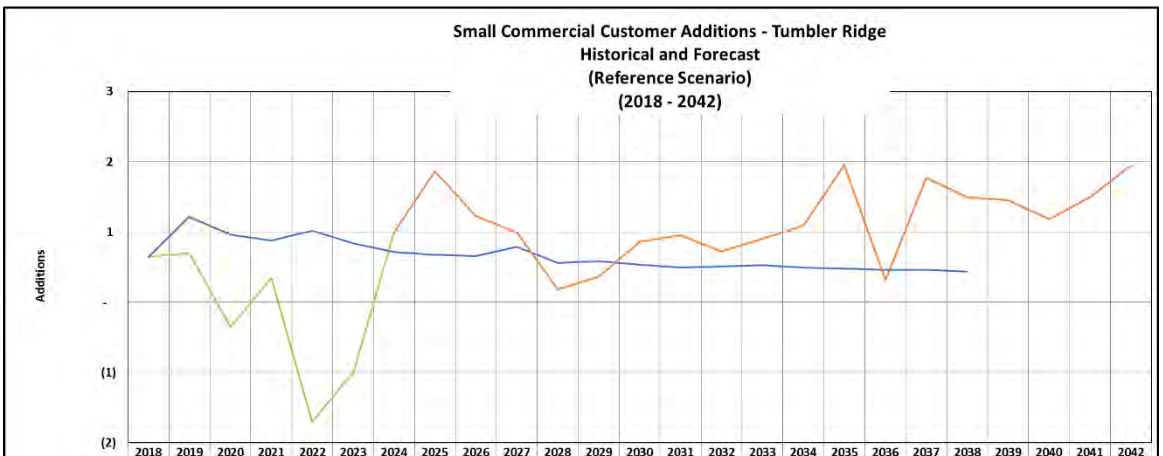
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	5	8	9	(12)	(21)	(3)	17																		
2019 Forecast	5	29	34	34	33	35	33	35	34	38	37	37	36	35	35	34	33	31	31	31	31				
2023 Forecast							17	25	24	25	22	24	21	21	23	22	24	24	26	25	28	27	26	28	26

Figure 32: Historical and Forecast Small Commercial Customer Additions – Dawson Creek



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	3	3	(3)	(5)	(3)	3	5																		
2019 Forecast	3	11	8	8	9	7	6	6	6	7	5	5	5	4	4	5	4	4	4	4	4				
2023 Forecast							5	7	8	8	7	7	9	8	8	9	10	10	11	12	14	14	13	14	13

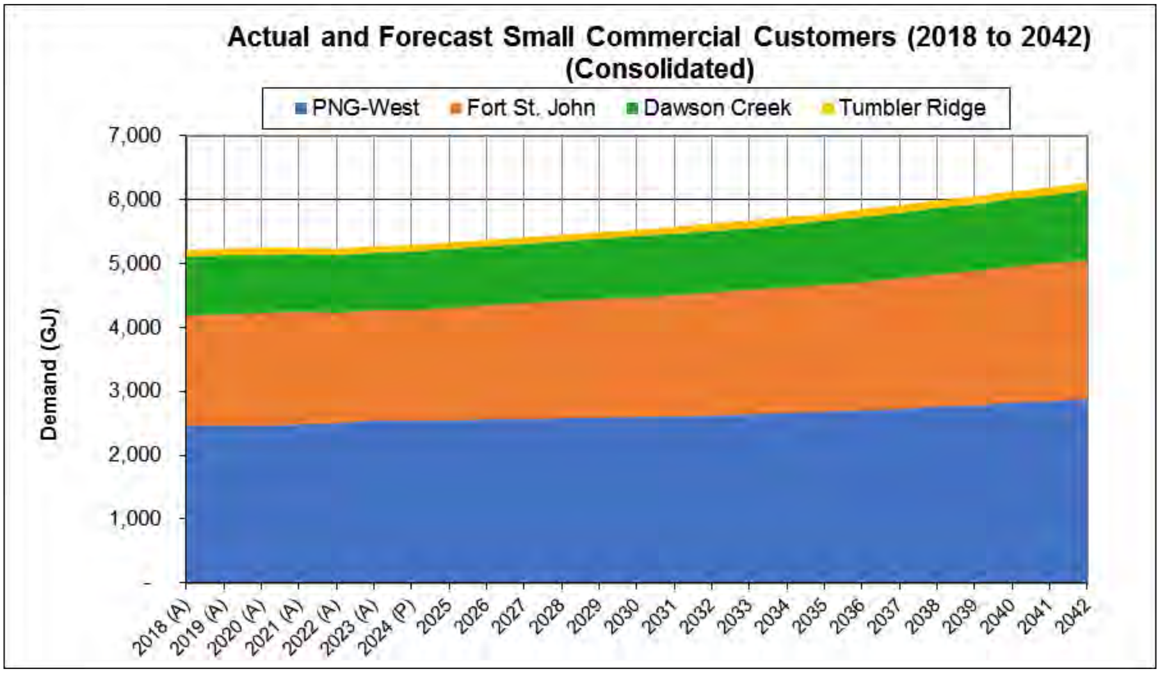
Figure 33: Historical and Forecast Small Commercial Customer Additions – Tumbler Ridge



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	1	1	(0)	0	(2)	(1)	1																		
2019 Forecast	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0				
2023 Forecast							1	2	1	1	0	0	1	1	1	1	1	2	0	2	1	1	1	1	2

Figure 34 illustrates the small commercial additions forecast for the Reference scenario by region. The BC Stats population forecast underpins the growth in customer additions, along with a capture rate by region. Forecast additions are small, averaging in the range of 55 additions per year across all regions, equivalent to a one percent rate of growth.

Figure 34: Small Commercial Customer Additions Forecast by Region, Reference Scenario

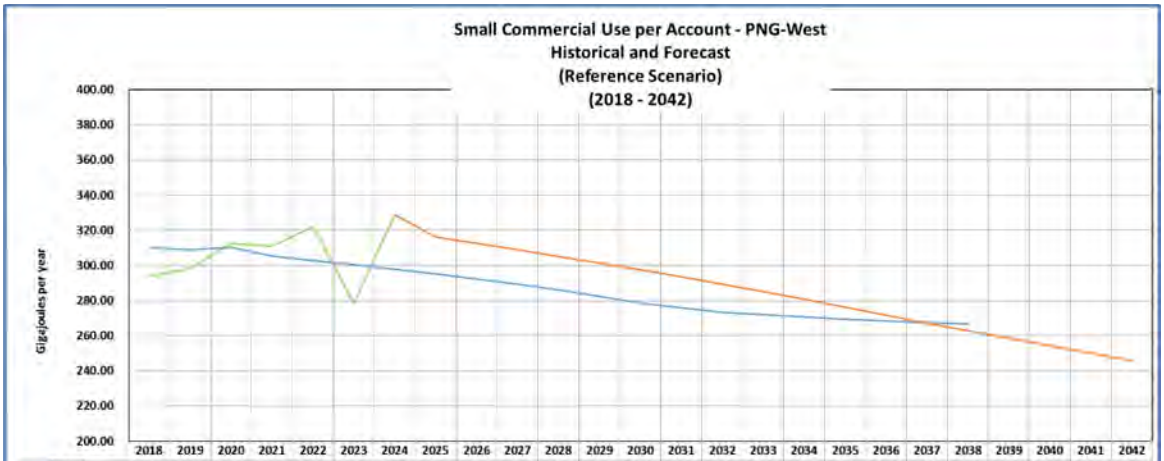


5.4.3 Use per Account Forecast

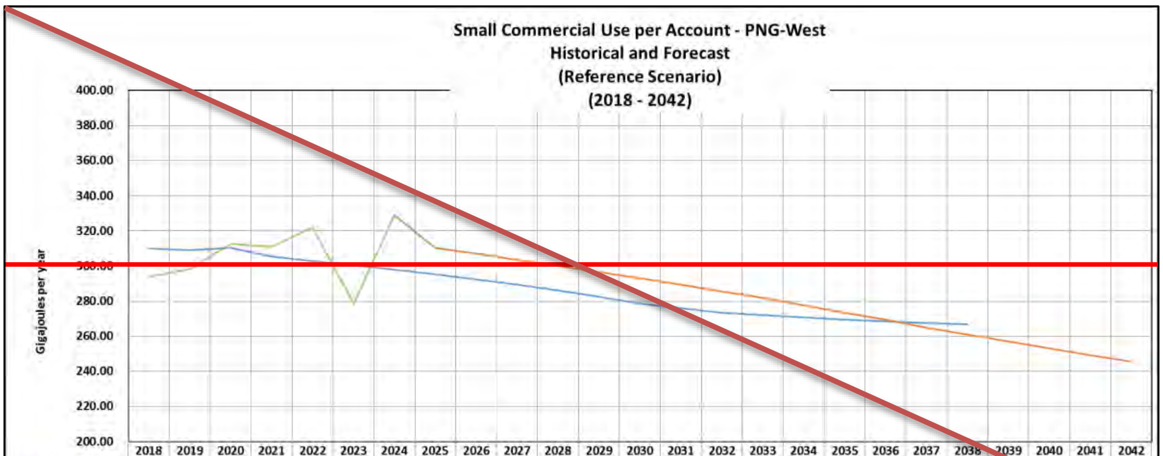
The following charts show actual and forecast customer UPA over the period from 2018 to 2042. Actual UPA in PNG-West and Fort St. John over the period from 2018 to 2023 has been consistent with that forecast in the 2019 CRP, with the trend in actual UPA following the 2019 forecast in Dawson Creek. The current forecast continues the long-term decline exhibited by historical trends and is consistent with the trend forecast in the 2019 CRP.

Small commercial UPA of customers on the PNG-West system is projected to decrease by 12 percent over the forecast period (Figure 35), by roughly 22 percent~~20 percent~~ on the Fort St. John and Dawson Creek systems (Figure 36 and Figure 37), and by five percent~~four percent~~ on the Tumbler Ridge system (Figure 38). The most important driver of this decline continues to be replacement of natural gas heating appliances with higher efficiency models, electrification of portions of the small commercial load, as well as improvements to the performance of building envelopes.

Figure 35: Small Commercial UPA Forecast – PNG-West

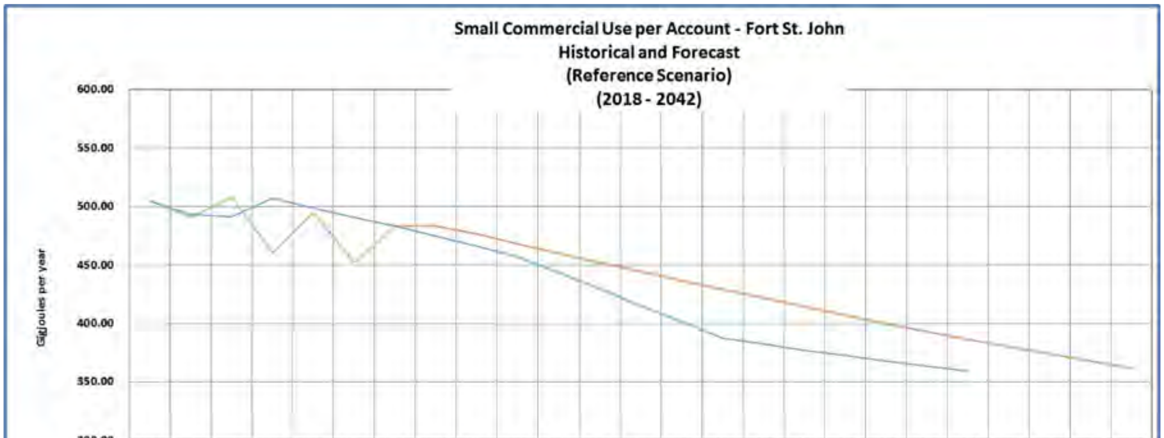


	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	294.0	298.2	312.5	310.8	322.0	278.4	328.9																		
2019 Forecast	309.9	309.1	310.3	305.3	302.8	300.3	297.8	295.2	292.4	289.5	286.1	282.4	278.5	275.9	273.1	271.8	270.6	269.5	268.5	267.6	266.7				
2023 Forecast							328.9	316.1	312.7	308.8	305.2	301.3	297.4	293.5	289.4	285.2	280.8	276.3	271.8	267.1	262.7	258.4	254.2	250.0	245.9

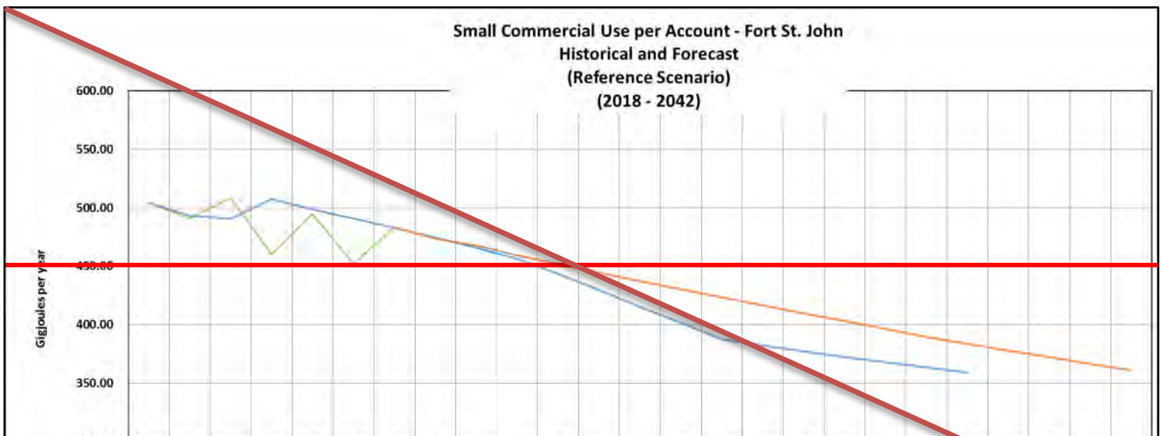


	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	294.0	298.2	312.5	310.8	322.0	278.4	328.9																		
2019 Forecast	309.9	309.1	310.3	305.3	302.8	300.3	297.8	295.2	292.4	289.5	286.1	282.4	278.5	275.9	273.1	271.8	270.6	269.5	268.5	267.6	266.7				
2023 Forecast							328.9	310.4	307.1	303.6	300.2	296.6	292.9	289.3	285.5	281.7	277.6	273.4	269.3	264.9	260.9	257.0	253.1	249.2	245.5

Figure 36: Small Commercial UPA Forecast – Fort St. John

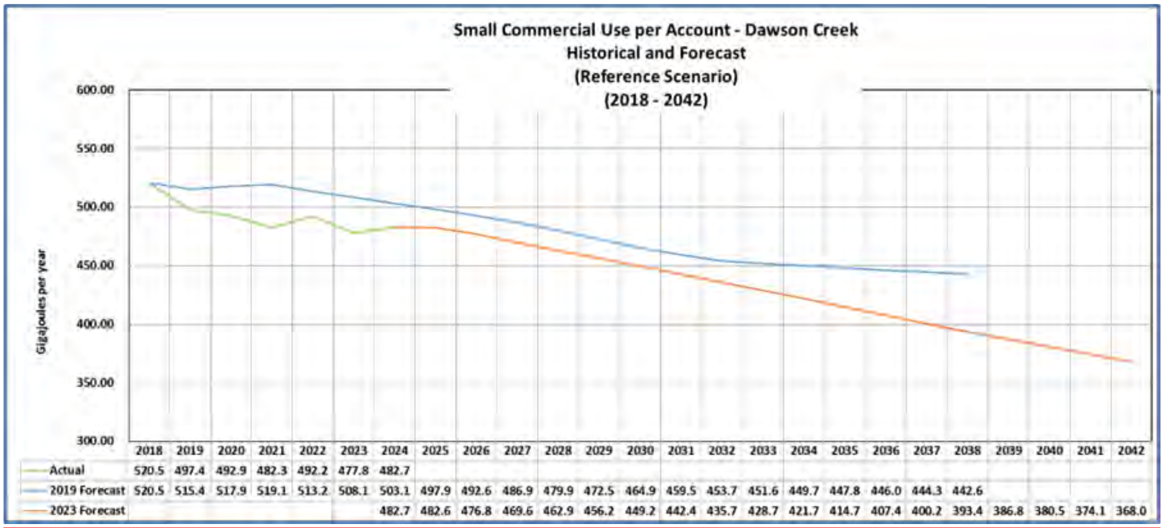


	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	504.8	490.7	508.4	460.3	494.9	452.2	483.4																		
2019 Forecast	504.8	493.2	491.0	507.5	498.6	490.9	483.0	474.6	465.9	456.6	443.6	429.8	415.1	401.7	387.6	382.2	377.1	372.4	367.9	363.4	359.1				
2023 Forecast							483.4	483.1	476.8	468.0	460.0	451.9	444.2	436.8	429.2	421.9	414.5	407.3	399.9	392.8	386.3	379.9	373.8	367.6	361.7

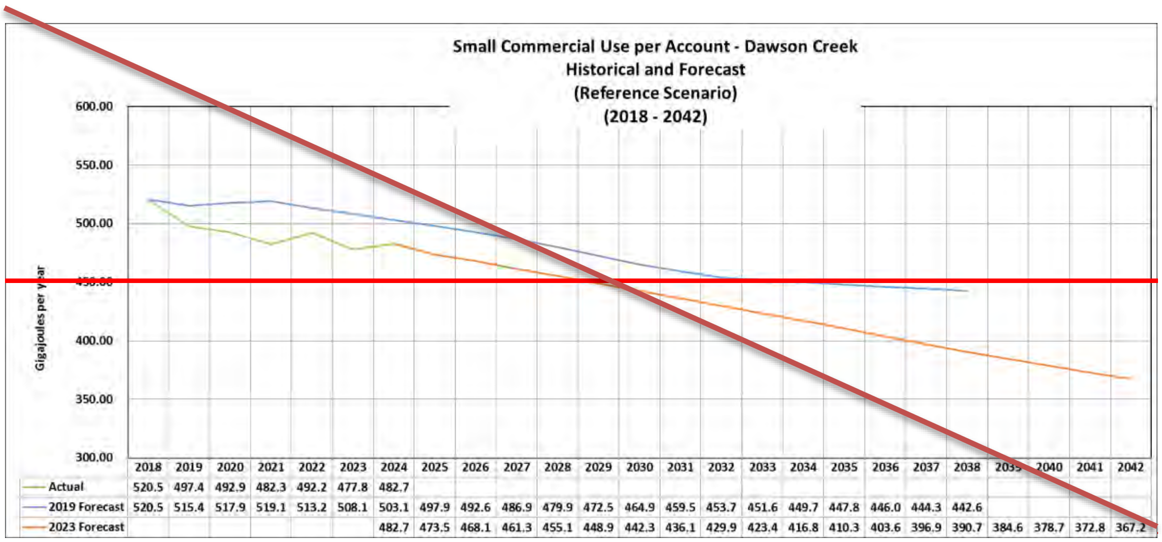


	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	504.8	490.7	508.4	460.3	494.9	452.2	483.4																		
2019 Forecast	504.8	493.2	491.0	507.5	498.6	490.9	483.0	474.6	465.9	456.6	443.6	429.8	415.1	401.7	387.6	382.2	377.1	372.4	367.9	363.4	359.1				
2023 Forecast							483.4	473.4	467.5	459.4	452.0	444.4	437.4	430.4	423.4	416.7	409.9	403.2	396.3	389.7	383.7	377.9	372.3	366.6	361.2

Figure 37: Small Commercial UPA Forecast – Dawson Creek

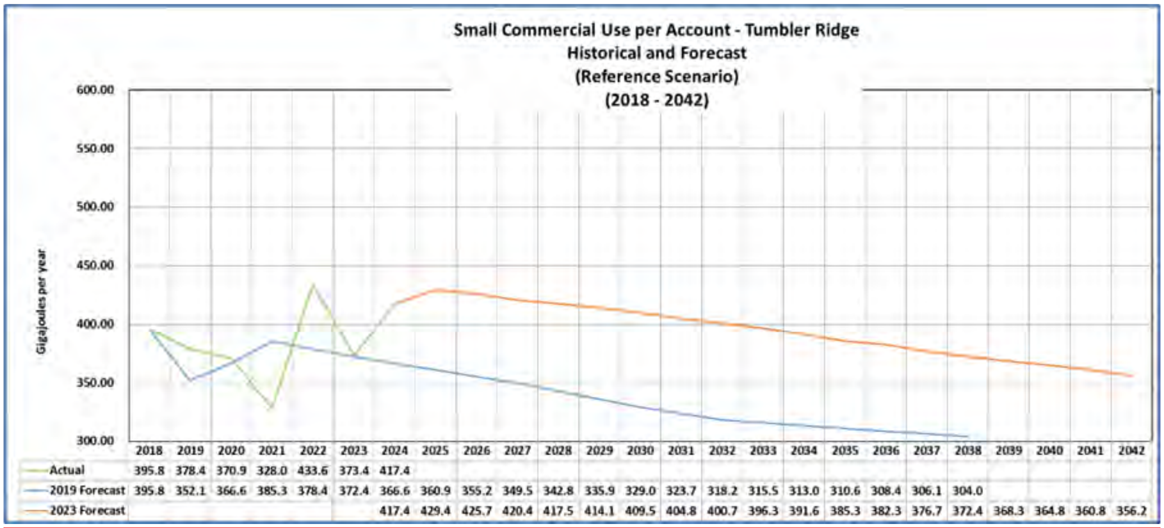


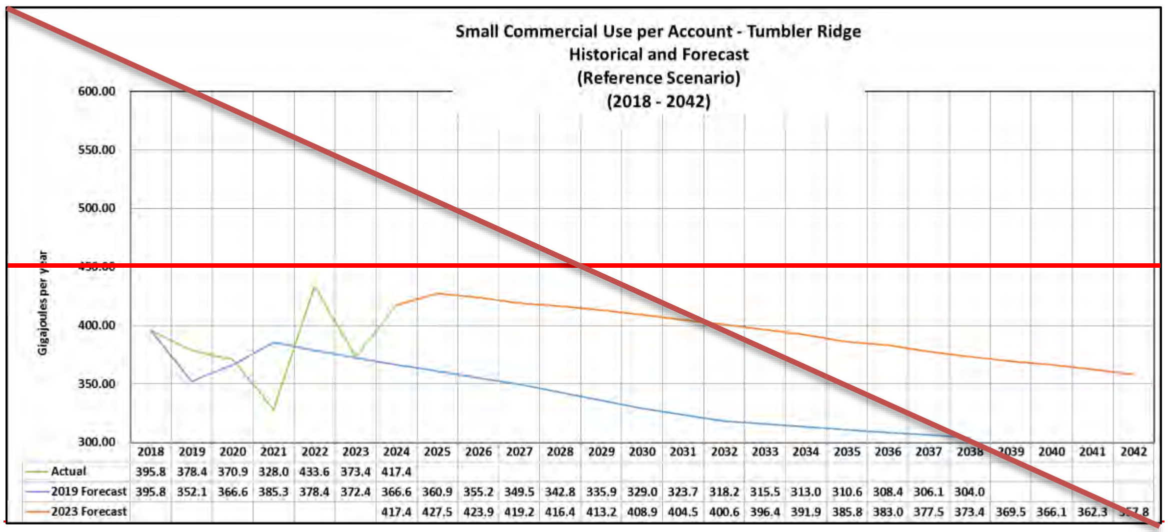
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	520.5	497.4	492.9	482.3	492.2	477.8	482.7																		
2019 Forecast	520.5	515.4	517.9	519.1	513.2	508.1	503.1	497.9	492.6	486.9	479.9	472.5	464.9	459.5	453.7	451.6	449.7	447.8	446.0	444.3	442.6				
2023 Forecast							482.7	482.6	476.8	469.6	462.9	456.2	449.2	442.4	435.7	428.7	421.7	414.7	407.4	400.2	393.4	386.8	380.5	374.1	368.0



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Actual	520.5	497.4	492.9	482.3	492.2	477.8	482.7																		
2019 Forecast	520.5	515.4	517.9	519.1	513.2	508.1	503.1	497.9	492.6	486.9	479.9	472.5	464.9	459.5	453.7	451.6	449.7	447.8	446.0	444.3	442.6				
2023 Forecast							482.7	473.5	468.1	461.3	455.1	448.9	442.3	436.1	429.9	423.4	416.8	410.3	403.6	396.9	390.7	384.6	378.7	372.8	367.2

Figure 38: Small Commercial UPA Forecast – Tumbler Ridge





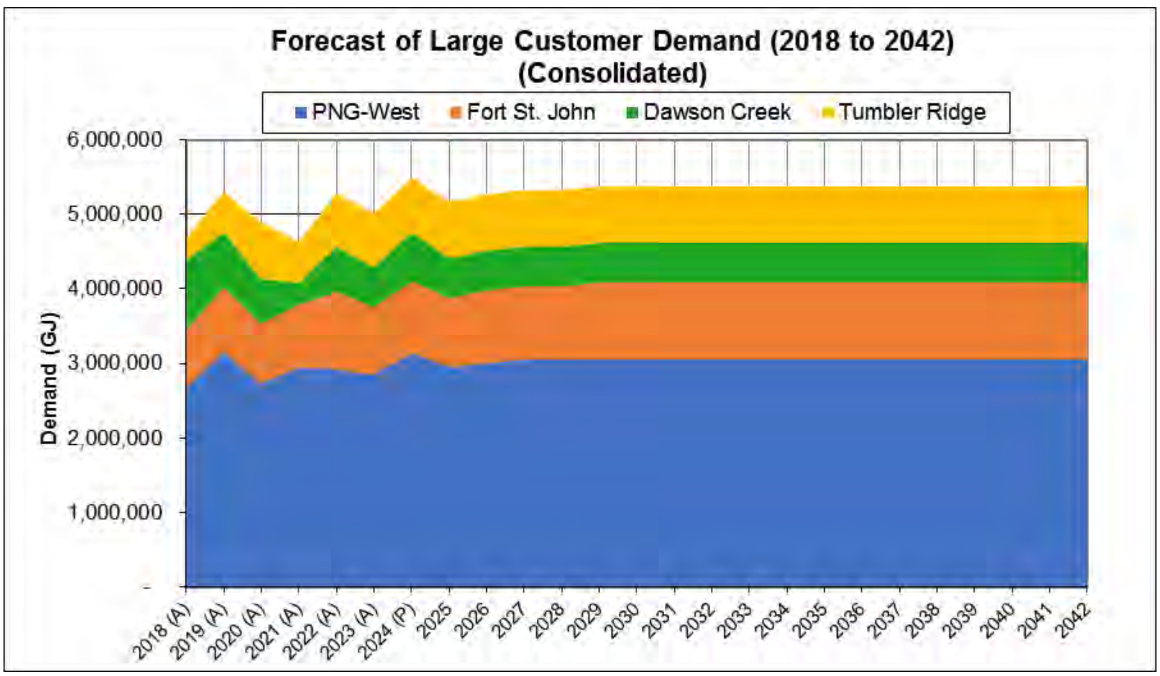
5.5 Large Customer Forecasts

Large customers - classified as either large commercial, industrial, or seasonal - account for approximately one half of the annual demand on the consolidated system. The majority of these customers provided a forecast of their 2023 and 2024 natural gas consumption to PNG during the summer of 2022 in preparation for the 2023-2024 revenue requirements application. In some cases, PNG adjusted the customer's forecast to align more closely with their historical operations. Unless identified specifically in the following sections, PNG has maintained the existing number and type of large customers over the planning period. PNG's practice is to not include prospective new loads in the forecast unless the load has been contracted. The forecasts of the large customers for selected years of the 20-year planning period are presented in Table 13, and the historical and forecast demand is presented in Figure 39. A discussion of the large commercial and industrial forecasts is presented in the sections that follow.

Table 13: Large Customer Sales and Transportation Forecast

Large Customer Forecast (GJ) Reference Scenario	2022 (A)	2023 (A)	2024 (P)	2025 (F)	2026 (F)	2027 (F)
PNG-West	2,915,315	2,850,952	3,132,702	2,954,419	3,004,419	3,054,419
Fort St. John	1,041,564	907,076	978,081	918,072	971,446	971,446
Dawson Creek	612,802	534,877	649,990	540,074	540,074	540,074
Tumbler Ridge	726,618	722,017	732,162	749,329	749,329	749,329
Total	**5,296,299**	**5,014,922**	**5,492,935**	**5,161,894**	**5,265,268**	**5,315,268**
Large Customer Forecast (GJ) Reference Scenario	**2028 (F)**	**2029 (F)**	**2030 (F)**	**2031 (F)**	**2032 (F)**	**2033+ (F)**
PNG-West	3,054,419	3,054,419	3,054,419	3,054,419	3,054,419	3,054,419
Fort St. John	971,446	1,024,820	1,024,820	1,024,820	1,024,820	1,024,820
Dawson Creek	540,074	540,074	540,074	540,074	540,074	540,074
Tumbler Ridge	749,329	749,329	749,329	749,329	749,329	749,329
Total	**5,315,268**	**5,368,643**	**5,368,643**	**5,368,643**	**5,368,643**	**5,368,643**

Figure 39: Large Customer Demand (2018-2042) - Consolidated



5.5.1 Large Commercial Demand

The large commercial customer class is defined as customers that consume more than 5,500 GJ per year. Large commercial customers include food retail, large offices, and schools. These customers mainly use natural gas for their space and water heating requirements; therefore, they exhibit a temperature sensitive load profile similar to residential and small commercial customers.

PNG-West

On the PNG-West system, deliveries to one customer with two facilities comprise approximately one third of the large commercial sector demand. This load is anticipated to continue, although the split between the facilities is expected to change. Overall, long-term demand from the large commercial customer sector is expected to be slightly lower than current demand.

Fort St. John and Dawson Creek

Deliveries to large commercial sales and commercial transportation service customers are expected to be lower over the forecast period. Load related to Site C construction is forecast to be eliminated by 2025 as the project is completed. This loss of demand is partially offset by demand from new customers in Wonowon and in the rural areas of Fort St. John.

Tumbler Ridge

In 2022, Conuma Resources acquired the Quintette metallurgical coal mine from Teck Resources with the intention of restarting operations in 2024. While not yet in operation, work on rehabilitating the mine has begun, along with a prospective increase in natural gas demand for building heat.

5.5.2 Industrial Demand

PNG's industrial customers include sawmills, pellet plants, oil and gas facilities, export terminals, a smelter, and a power generating plant. These facilities typically use natural gas for process heat and/or power generation and/or methane feedstock (such as for liquefaction). As such, gas demand is less affected by ambient air temperature (i.e., gas use does not follow a heating load profile, as it does for residential and commercial customers).

PNG-West

Rio Tinto Alcan's (RTA) Kitimat Aluminum smelter is currently the largest customer on the PNG-West system. Forecast demand from RTA is based on its historical demand.

The BC Hydro Rupert Generating Station (RPG) is a 46 MW natural gas-fired power plant that operates to provide short-term electricity to Prince Rupert during electricity transmission system interruptions (planned or unplanned). The plant is permitted to operate up to 300 days a year using natural gas as its primary fuel source. The plant is also configured to operate using a specialty blend of diesel. PNG's service to this plant is interruptible. PNG has included an estimate of demand based on 2022.

Skeena BioEnergy Ltd. operated a 75,000 tonne per year pellet plant located next to Skeena Sawmills in Terrace. In September 2023, the owners of the facility were placed into receivership with both the sawmill and pellet plant suspending operations, resulting in a loss of over 300 TJ of industrial load, compared to 2022. Subsequently, the sawmill and pellet plant facilities, and associated assets, were acquired by Kitsumkalum First Nation on April 16, 2024. Kitsumkalum First Nation has not advised any plans to restart the sawmill or pellet plant.

Offsetting a portion of these losses is anticipated demand from the newly reconstructed Fort St. James Forest Products sawmill which is slowly ramping up production.

Royal Vopak and AltaGas Ltd. have formed a new 50/50 joint venture that recently made a final investment decision to move forward with the development of the Ridley Island Energy Export Facility (REEF), a large-scale liquefied petroleum gas (LPG) and bulk liquids terminal and marine berthing and loading facility on Ridley Island at the Port of Prince Rupert. Anticipated demand from this facility is projected to come online by 2027.

Fort St. John and Dawson Creek

Industrial demand on the Fort St. John system is primarily comprised of fuel gas demand from natural gas production facilities and from oil and gas services. Fuel gas in oil and gas field operations is typically consumed by compressors, line heaters and space heating. Since 2018, demand from the oil and gas sector has increased by 50 percent due primarily to increased demand for fuel gas from producers increasing their production in the Montney region. PNG anticipates a continuation of this increasing trend, albeit at a slower pace as producers consider the alternative to grid connect new compressors, or to convert a portion of their field compressors to electric drive units, where grid electricity is available and/or economic. Under the Reference scenario, PNG forecasts an increase in demand from upstream oil and gas operations by 2027 of about 20 percent or an additional 100 TJ.

Industrial demand on the Dawson Creek system is dominated by a natural gas liquefaction facility which accounted for roughly 80 percent of Dawson Creek industrial throughput in 2022. Forecast energy volumes for this facility are based on historical volumes. No significant changes in demand on the Dawson Creek system over the forecast period are anticipated under the Reference scenario.

Tumbler Ridge

In Tumbler Ridge, over 80 percent of the annual gas demand is delivered back to CNRL to supply its fuel gas load, consisting of line heaters, well site heaters, compression, dehydrators, and office heat, at its Murray River operations.

PNG considers that opportunities for CNRL to electrify its Murray River fuel gas loads are limited by the lack of proximity to the BC Hydro grid. Accordingly, PNG has maintained a forecast demand from CNRL Murray River over the planning period that is consistent with the average of the actual demand in 2022 and 2023.

5.6 Annual Demand Summary

A gross demand forecast is comprised of the aggregation of the forecast demands developed for the sales and transportation customer classes as well as for company use gas. The forecast for each customer class and for each year of the planning period is presented in Figure 40 to Figure 43 and in tabular form in Appendix E: Annual Demand Tables.

The stable demand forecast for the large customer sectors is offset by the forecast gradual loss of residential and small commercial market demand over the planning period due to decreases in the residential and small commercial use per accounts that are not offset by the modest growth in customer additions from these sectors.

Figure 40: Forecast of Total Gross Annual Demand (PNG-West)

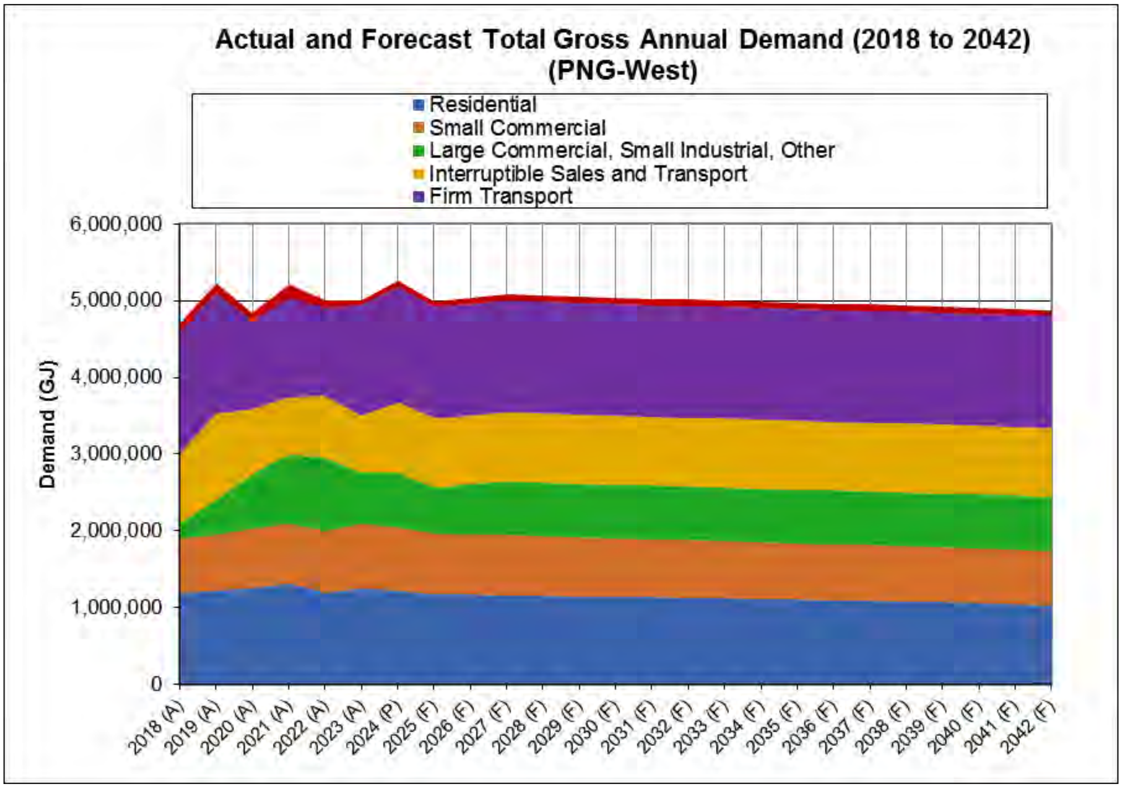


Figure 41: Forecast of Total Gross Annual Demand (Fort St. John)

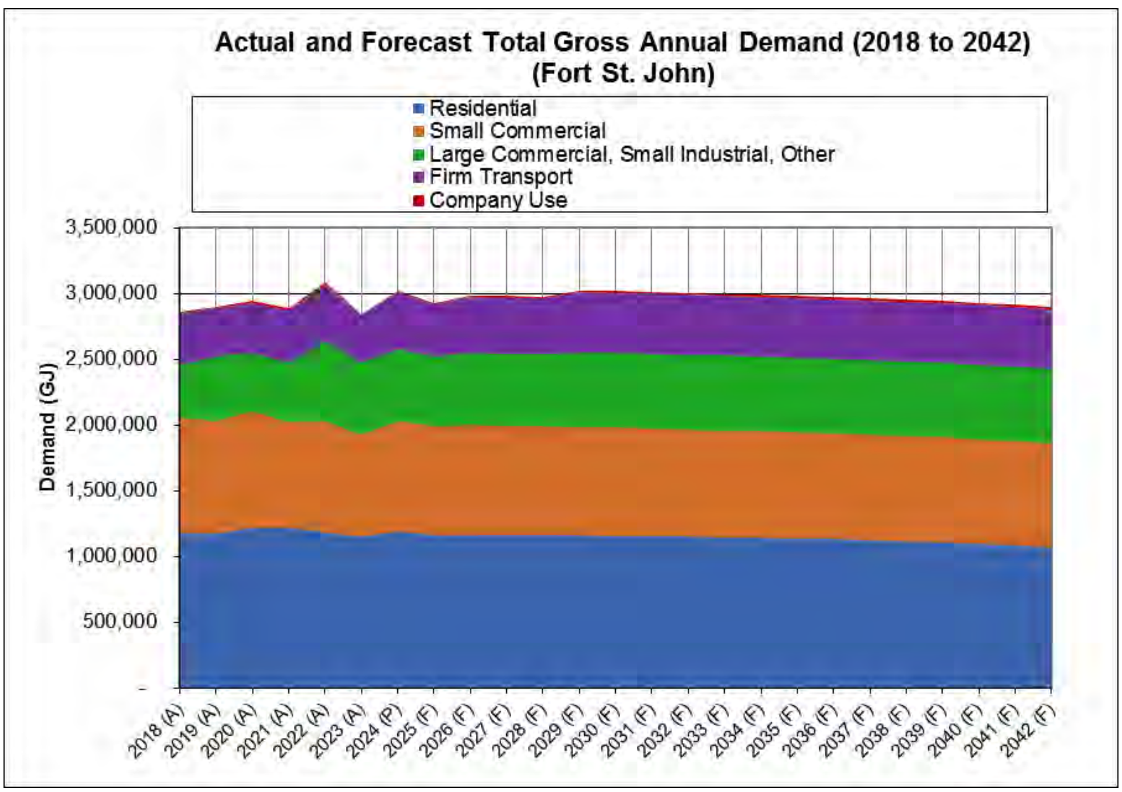


Figure 42: Forecast of Total Gross Annual Demand (Dawson Creek)

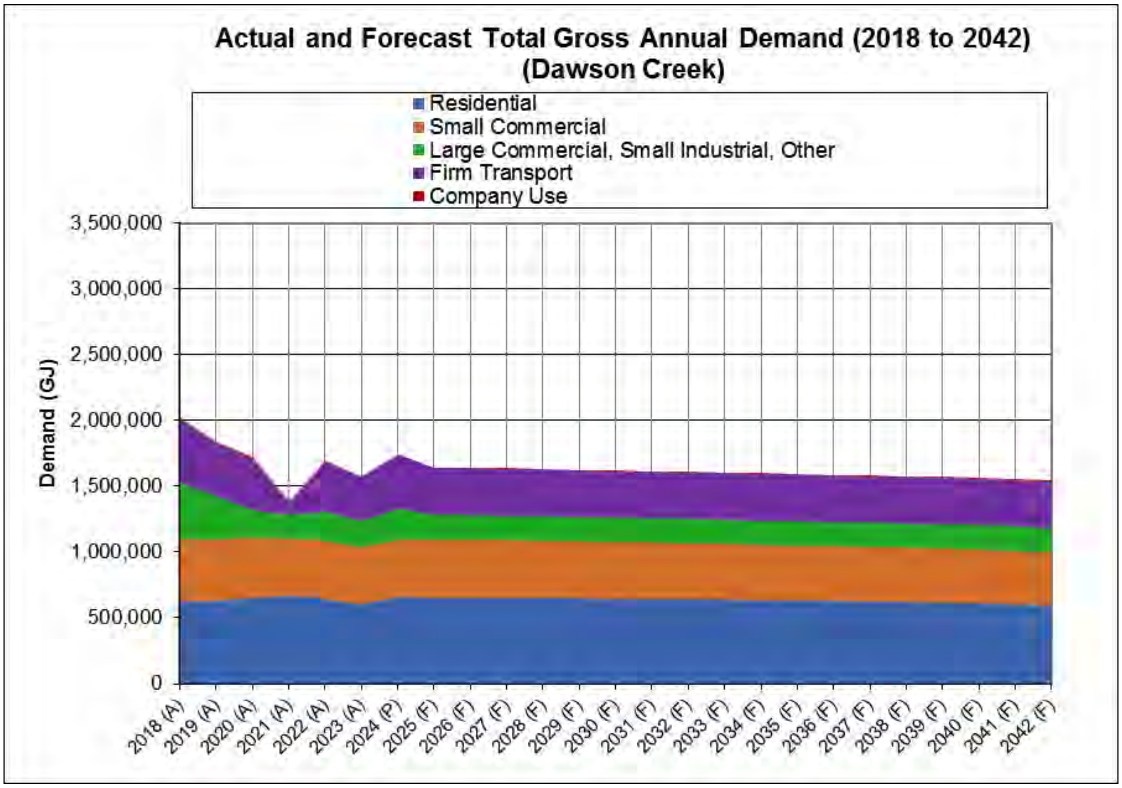
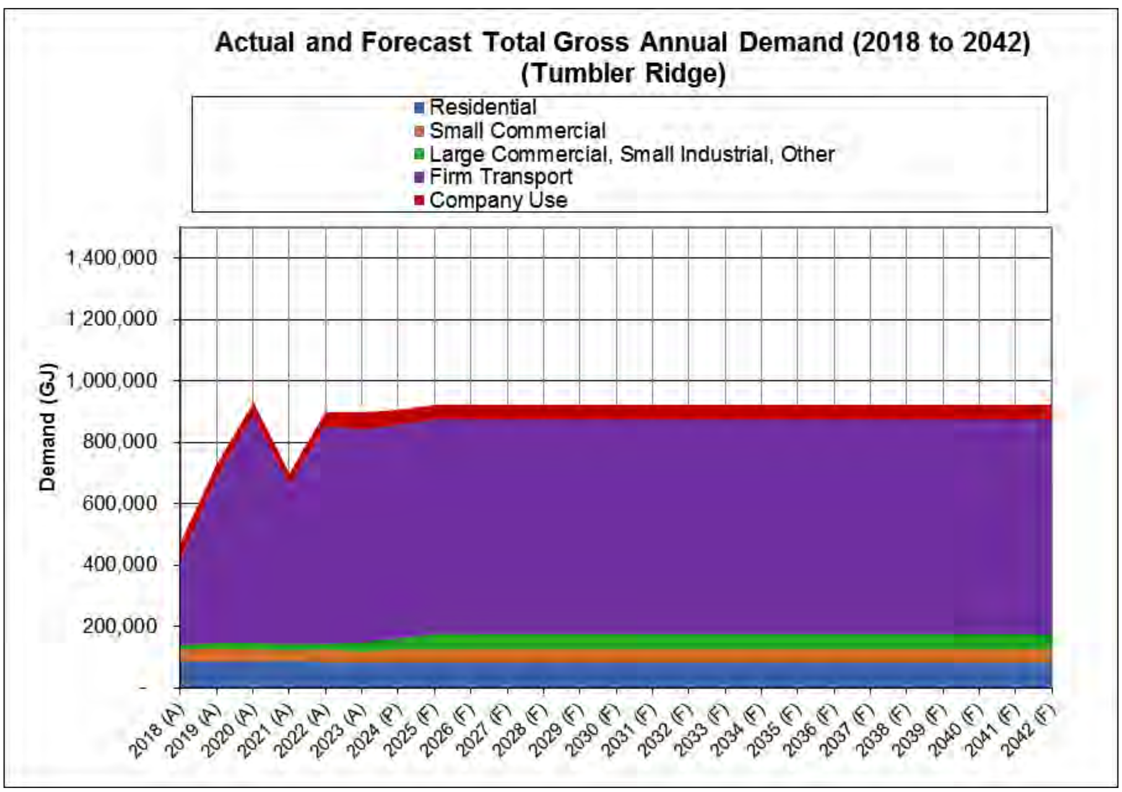


Figure 43: Forecast of Total Gross Annual Demand (Tumbler Ridge)



6 Sensitivity Analysis

6.1 Overview

In addition to results for the Reference scenario presented in the previous section, alternative demand scenarios were developed in order to provide some indication of the sensitivity of the demand forecasts to changes in the assumptions made under the Reference scenario. These scenarios are referred to as the "Decarbonization Accelerated" and "Decarbonization Delayed" scenarios.

The "Decarbonization Accelerated" scenario illustrates a future where decarbonization occurs faster relative to the Reference scenario. Policies and prices drive an acceleration in grid electrification and higher blending of RNG. Conversely, the "Decarbonization Delayed" scenario illustrates a future where decarbonization is pursued, but a combination of delayed policies and price signals delay emissions reductions. Some fuel-switching electrification occurs and the GHG intensity of the gas system is reduced, but to a lesser extent than in the Reference and Decarbonization Accelerated scenarios.

In addition to these two alternative scenarios, and in response to a directive in BCUC Order G-265-20, PNG also presents the impact of the addition or removal of a large customer on each of PNG's systems.

Table 12 summarizes the settings of the Critical Drivers applied to each scenario, while detailed descriptions of all of the planning assumptions for each scenario are presented in Appendix C: Critical Driver Input Assumptions.

A description of the additional sensitivity analyses of varying the large customer demand, is found in Appendix D: Sensitivity Analysis Variables.

6.1.1 Decarbonization Accelerated scenario

The "Decarbonization Accelerated" scenario illustrates a future where decarbonization occurs faster relative to the Reference scenario. Policies and prices drive an acceleration in electrification and higher blending of low carbon energy such as RNG and hydrogen.

Policies that relate to decarbonization of the natural gas system are accelerated and impact the cost-competitiveness of natural gas compared to grid electricity in many applications. Indicative policy outcomes under this scenario include:

- Increased blending levels of RNG and hydrogen increases the cost of natural gas service.
- Accelerated adoption of the BC Energy Step Code.
- Increases to the BC Carbon Tax beyond current known federal levels past 2030.

The Decarbonization Accelerated scenario assumes a lower capture rate for residential and small commercial customers, resulting in fewer customer additions.

Although the space heating demand decreases due to the introduction of new and more stringent building codes, most of the demand from residential and commercial customers is still from space heating end use. Under the Decarbonization Accelerated scenario annual demand from the residential and small commercial customers declines at a higher rate than under the Reference scenario, primarily due to:

- higher burner tip prices relative to the Reference scenario, resulting in more fuel switching away from gas; and
- increasingly stringent building code and equipment standards which lower UECs for space and water heating end uses in residential and commercial dwellings.

The variation in the demand from Large Commercial customers under this scenario is limited to:

- Lower than expected demand from one customer on the PNG-West system (17 TJ per year, rather than 52 TJ under the Reference scenario); and
- No incremental demand from Large Commercial customers in the Tumbler Ridge system.

The variation in the demand from the Industrial sector customers under this scenario is limited to:

- For the PNG-West system, new load that is contracted but not yet in service does not materialize;
- The increased rate of electrification of the upstream oil and gas sector results in slower growth in demand for fuel gas in the Fort St. John system through 2027, with a contraction of that load in 2028 and beyond;
- Lower demand, as compared to the Reference scenario, for one industrial customer facility in Dawson Creek; and
- Lower demand from one industrial customer in Tumbler Ridge.

6.1.2 Decarbonization Delayed Scenario

The "Decarbonization Delayed" scenario illustrates a future where decarbonization is pursued, but a combination of delayed policies and price signals delay and reduce the impact on natural gas demand from PNG's customers. Some electrification occurs and the GHG intensity of the gas system lowers, but to a lesser extent during the forecast period relative to both the Reference and the Decarbonization Accelerated scenarios.

Policies that seek decarbonization are abandoned or delayed (more specifically, the BC Carbon Tax remains at current levels throughout the planning period) and the resulting lower burner-tip prices, compared to the Reference scenario, reduce the potential for conservation. This narrative is reflected in the following assumptions:

- BC Energy Step Code: delayed adoption;
- BC Carbon Tax: maintained at 2024 level; and
- DSM: incentives provided that align with current DSM Regulations.

The Decarbonization Delayed scenario assumes a higher capture rate for residential and small commercial customers, resulting in more customer additions.

As with the Reference and Decarbonization Accelerated scenarios, the space heating end use in residential and commercial dwellings is the primary contributor to the annual demand. Annual demand in residential and small commercial customers is expected to increase in this scenario, compared to the Reference scenario, due to:

- A deviation from the planned escalation of the federal and BC Carbon Tax, resulting in the BC Carbon Tax being held at $80 per tonne with no further increases over the planning period. Carbon prices are expected to remain constant thereafter, reducing the potential for fuel switching; and
- Delayed or lack of adoption of more stringent building code and equipment standards, including policies that seek to prohibit the sale of natural gas appliances; and
- An increased rate in residential and small commercial customer additions via higher capture rates, which dampens the effects of the lowered UECs for space and water heating end uses from building code and equipment standards.

The variation in the demand from Large Commercial customers under this scenario is limited to:

- For the PNG-West system, one Large Commercial customer proceeds with an expansion of its facilities; and
- For the Tumbler Ridge system, one Large Commercial customer proceeds to restart operations and demand levels are consistent with historical operations.

The variation in demand from Industrial sector customers under this scenario includes:

- Higher demand from a prospective new contracted load on the PNG-West system, compared to the Reference scenario;
- Resumption of operations of certain sawmill and pellet plant facilities in 2027;
- No electrification of the upstream oil and gas sector results in higher demand for fuel gas in the Fort St. John system as compared to the Reference scenario;
- Higher demand, as compared to the Reference scenario, from one industrial customer facility in Dawson Creek (based on higher plant capacity utilization) beginning in 2027; and
- Higher demand from one industrial customer in Tumbler Ridge.

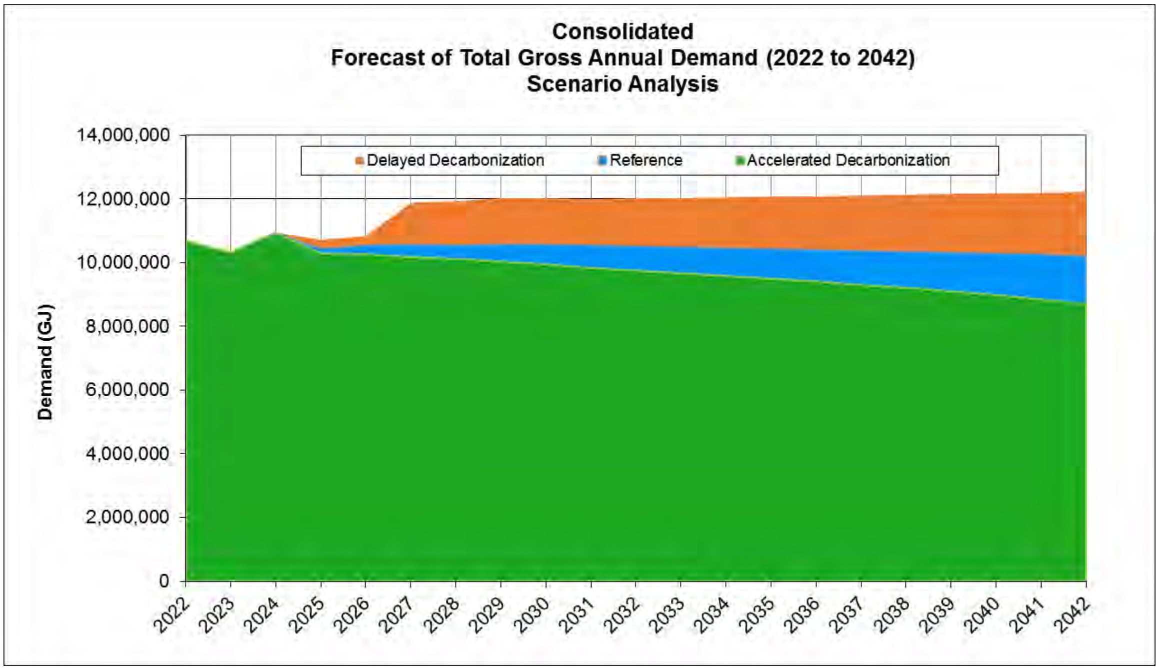
6.2 Comparison of Scenarios

The forecast of gross demand under all three planning scenarios, consolidated across all four of PNG's delivery systems is shown in Figure 44. In all scenarios, annual demand fluctuates in the first few years of the forecast period due to changing large customer demand. In the Decarbonization Accelerated scenario, annual demand begins to decline after 2024, with demand four percent lower in 2030 than in 2023. In contrast, by 2030, demand under the Reference and Decarbonization Delayed scenarios is two percent and 16 percent higher than in 2023, respectively, primarily as a result of additional demand from new and existing large commercial and industrial customers.

The Reference scenario forecasts a reduction in demand of approximately one percent by 2042, compared to the Decarbonization Accelerated scenario (reduction of 15 percent~~16 percent~~), and the Decarbonization Delayed scenario (increase of 18 percent). The differences are largely driven by the differences in expected demand from large customers as described in Section 6.1.

The following sections compare the key results of the three annual demand forecast scenarios. Detailed demand forecasts for each service area are provided in Appendix E: Annual Demand Tables.

Figure 44: Demand Forecast Scenarios – Consolidated



6.2.1 Residential and Small Commercial Use per Account

Residential UPA is forecast to decline under all scenarios over the planning period (Figure 45). In Fort St. John and Tumbler Ridge the historical trend of declining UPA continues under the Reference scenario, with the rate of decline either greater, or lower under the alternative scenarios. In PNG-West and Dawson Creek, where the trend in residential UPA has remained more or less flat over the past 10 years, the forecasts reflect an increased impact of the adoption of stricter building codes and equipment standards, as well as the extent to which fuel switching away from gas occurs.

The forecasts of small commercial UPA mirror those of the residential customers, with historical trend of declining UPA continuing in Fort St. John and Dawson Creek. In PNG-West and Tumbler Ridge, where the trend in small commercial UPA has remained more or less flat over the past 10 years, the forecasts reflect an increased impact of the adoption of stricter building codes and equipment standards, as well as the extent to which fuel switching away from gas occurs (Figure 46).

Figure 45: Change in Residential UPA under All Scenarios

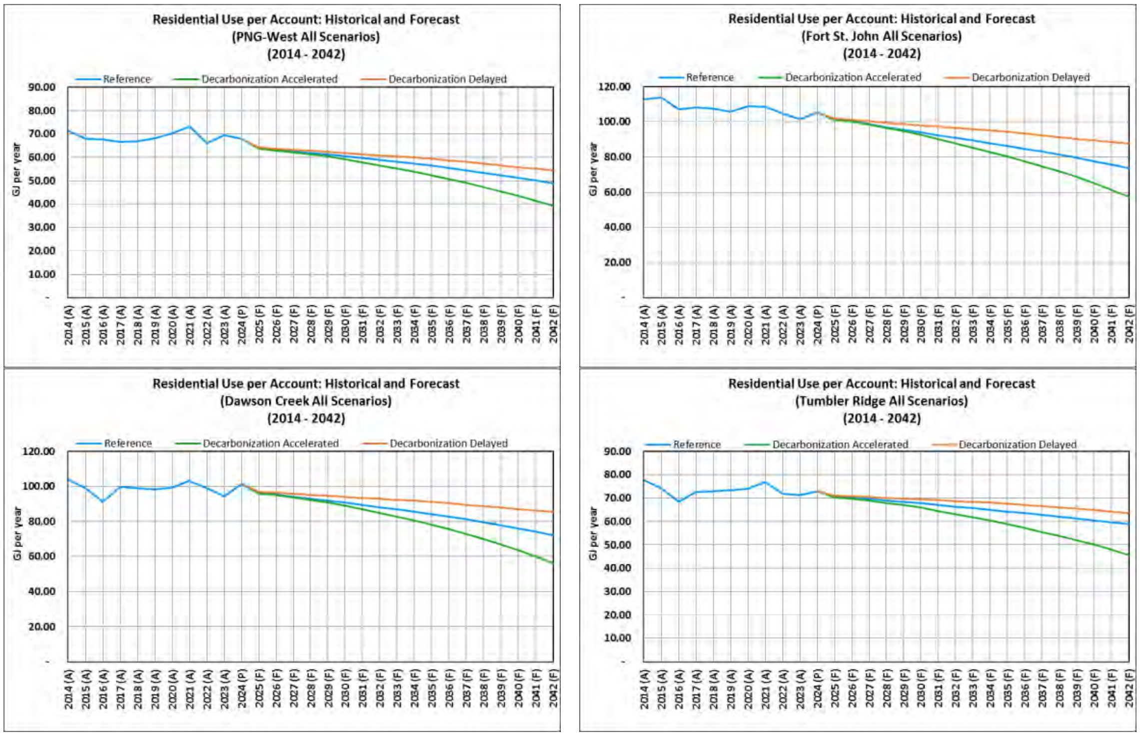
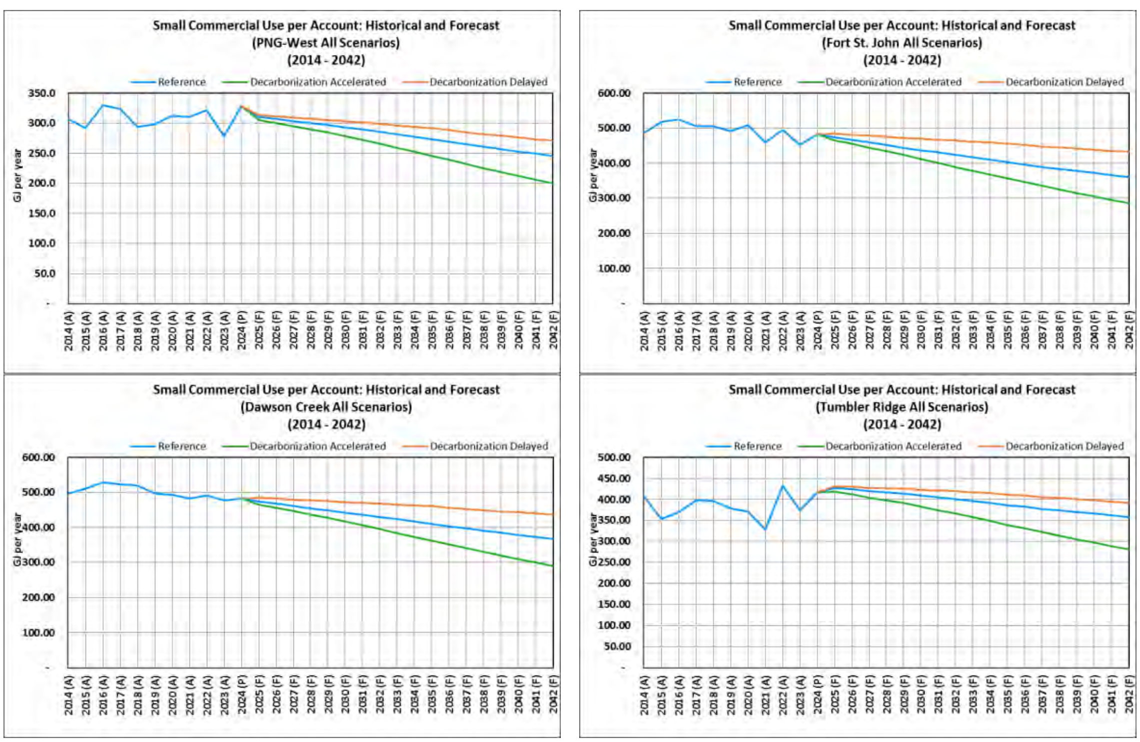


Figure 46: Change in Small Commercial UPA under All Scenarios



The following sections describe the trends in total annual demand under all three scenarios.

6.2.2 Total Demand

PNG-West

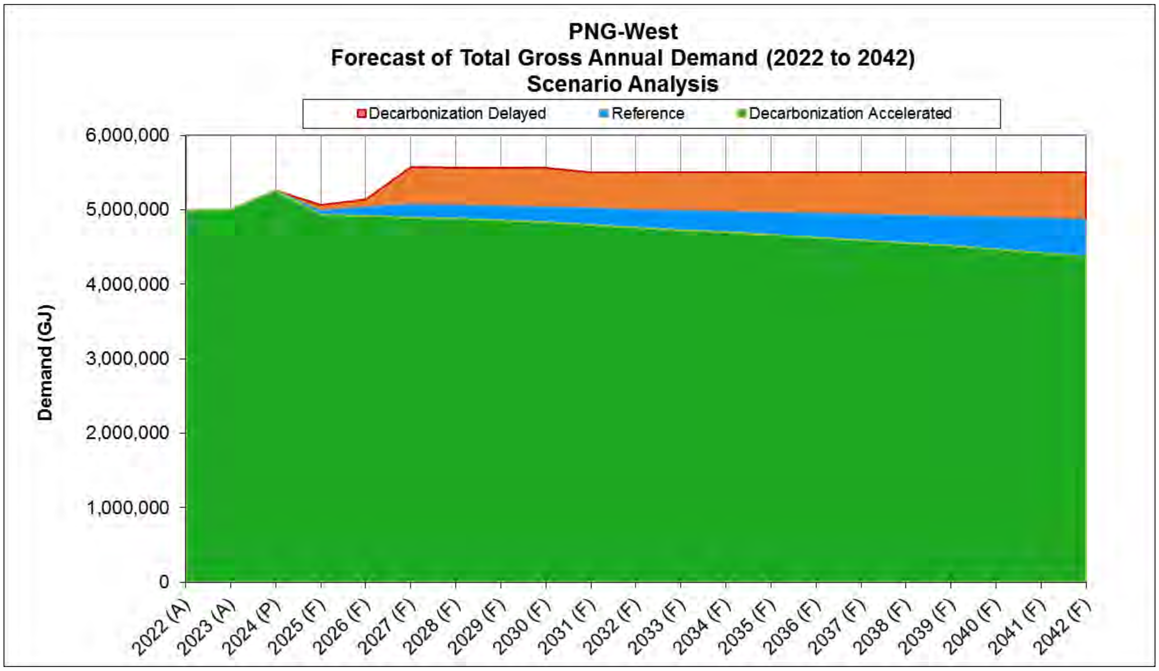
Demand from residential and small commercial customers comprises 40 percent of the throughput on the PNG-West system. Differences in throughput between all three scenarios from 2023 to 2042 are due primarily to differences in the forecast UPA and customer additions (Table 14). The significantly increased demand under the Decarbonization Delayed scenario from 2027 onwards is due to increased industrial demand from existing and prospective new large commercial and industrial customers (Figure 47).

Table 14: Cumulative and Average Change in Demand (2023 – 2042) – PNG-West

	(2023 - 2042)		
	Reference	Decarbonization Delayed	Decarbonization Accelerated
Residential	-16.79% / -0.96%	-6.23% / -0.34%	-34.69% / -2.22%
Small Commercial	-15.34% / -0.87%	-5.05% / -0.27%	-32.11% / -2.02%
Total Demand	-2.15% / -0.11%	10.32% / 0.52%	-12.13% / -0.68%

	(2023 - 2042)		
	Reference	Decarbonization Delayed	Decarbonization Accelerated
~~Residential~~	~~-17.48% / -1.01%~~	~~-6.12% / -0.33%~~	~~-35.19% / -2.26%~~
Small Commercial	-15.49% / -0.88%	-5.22% / -0.28%	-32.19% / -2.02%
Total Demand	-2.55% / -0.14%	10.11% / 0.51%	-12.47% / -0.70%

Figure 47: Demand Forecast Scenarios – PNG-West



Fort St. John

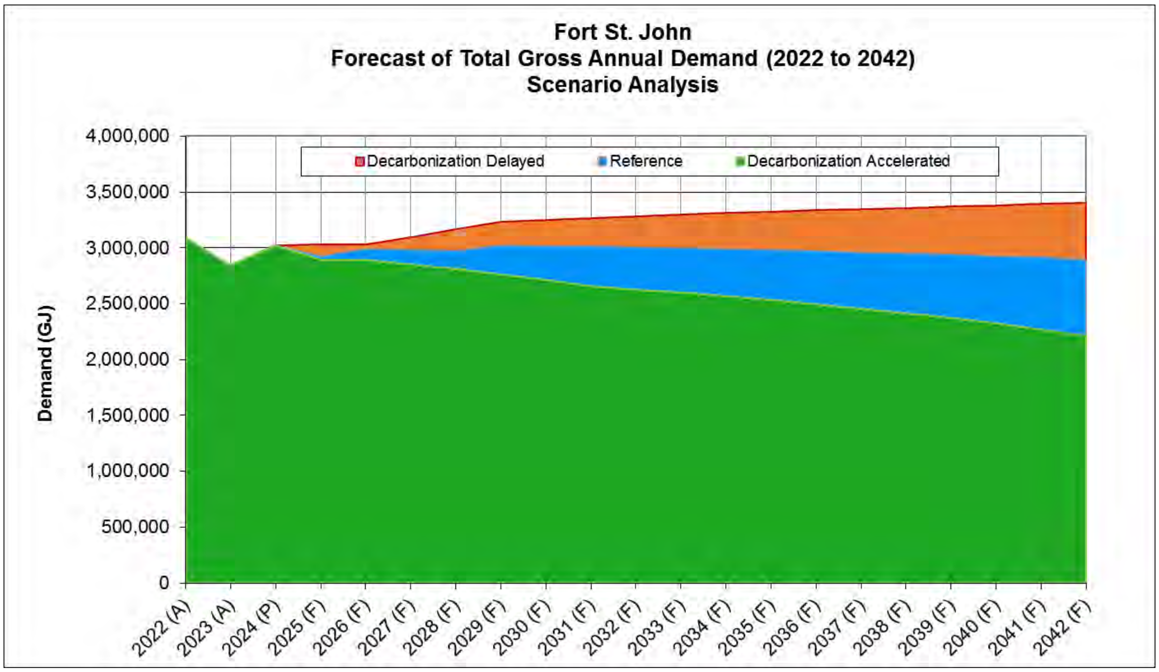
Approximately 70 percent of the difference in throughput between the three scenarios is due to differences in the forecast residential and small commercial demand. Variations in the forecast deliveries to the upstream oil and gas sector, determined by assumptions of the degree of electrification of this sector, account for the remaining difference.

Table 15: Cumulative and Average Change in Demand (2023 – 2042) – Fort St. John

	(2023 - 2042)		
	Reference	Decarbonization Delayed	Decarbonization Accelerated
Residential	-5.98% / -0.32%	14.69% / 0.72%	-29.14% / -1.80%
Small Commercial	1.13% / 0.06%	21.29% / 1.02%	-21.72% / -1.28%
Total Demand	2.22% / 0.12%	19.90% / 0.96%	-21.95% / -1.30%

	(2023 - 2042)		
	Reference	Decarbonization Delayed	Decarbonization Accelerated
~~Residential~~	~~-6.99% / -0.36%~~	~~14.30% / 0.71%~~	~~-29.83% / -1.85%~~
Small Commercial	0.99% / 0.05%	21.04% / 1.01%	-21.75% / -1.28%
Total Demand	1.78% / 0.09%	19.68% / 0.95%	-22.24% / -1.32%

Figure 48: Demand Forecast Scenarios – Fort St. John



<u>Dawson Creek</u>

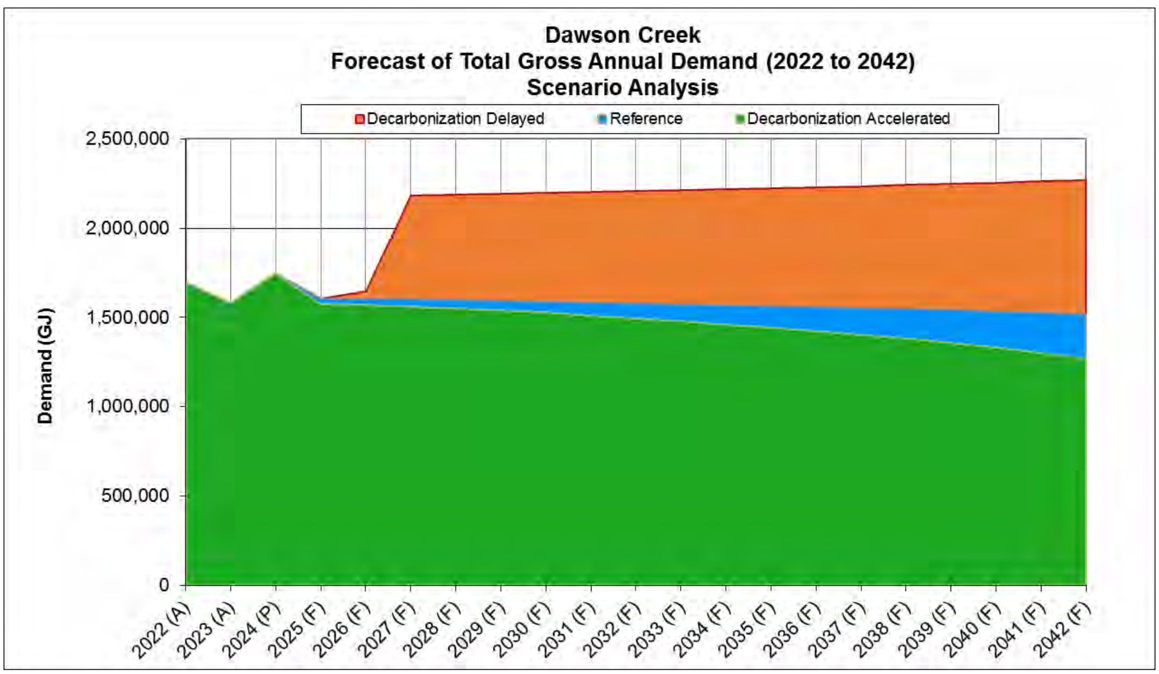
Residential and small commercial customers account for over 65 percent of the demand on the Dawson Creek system and are responsible for approximately 45 percent of the difference in demand, in 2042, between the scenarios. The assumption of significantly higher demand from the Regional LNG facility beginning in 2027, under the Decarbonization Delayed scenario, accounts for the increase of over 500 TJ per year (Figure 49).

Table 16: Cumulative and Average Change in Demand (2022 – 2042) – Dawson Creek

	(2023 - 2042)		
	Reference	Decarbonization Delayed	Decarbonization Accelerated
Residential	-5.14% / -0.28%	14.24% / 0.70%	-28.33% / -1.74%
Small Commercial	-7.07% / -0.39%	10.67% / 0.53%	-27.96% / -1.71%
Total Demand	-3.60% / -0.19%	43.48% / 1.92%	-19.39% / -1.13%

	(2023 - 2042)		
	Reference	Decarbonization Delayed	Decarbonization Accelerated
~~Residential~~	~~-5.52% / -0.30%~~	~~14.79% / 0.73%~~	~~-28.57% / -1.76%~~
Small Commercial	-7.26% / -0.40%	10.41% / 0.52%	-28.05% / -1.72%
Total Demand	-3.80% / -0.20%	43.63% / 1.92%	-19.51% / -1.14%

Figure 49: Demand Forecast Scenarios – Dawson Creek



Tumbler Ridge

Differences between the scenarios are almost entirely due to different forecasts for demand from the Quintette mine. Minor variations in fuel gas demand from CNRL's Murray

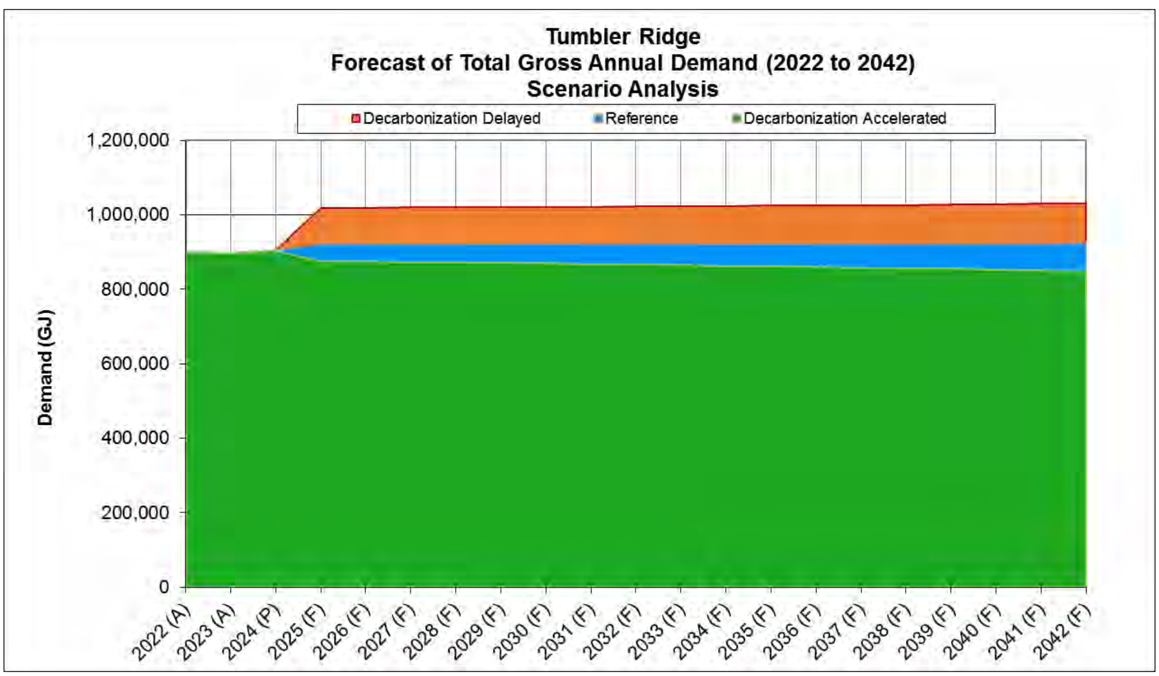
River operations, and different demand trajectories for the residential and small commercial customers account for the remaining differences (Figure 50).

Table 17: Cumulative and Average Change in Demand (2022 – 2042) – Tumbler Ridge

	(2023 - 2042)		
	Reference	**Decarbonization Delayed**	**Decarbonization Accelerated**
Residential	1.60% / 0.08%	11.83% / 0.59%	-23.18% / -1.38%
Small Commercial	15.57% / 0.76%	26.70% / 1.25%	-10.91% / -0.61%
Total Demand	2.79% / 0.14%	14.75% / 0.73%	-5.60% / -0.30%

	(2023 - 2042)		
	Reference	**Decarbonization Delayed**	**Decarbonization Accelerated**
~~Residential~~	~~2.03% / 0.11%~~	~~13.23% / 0.66%~~	~~-22.80% / -1.35%~~
Small Commercial	16.11% / 0.79%	27.18% / 1.27%	-10.53% / -0.58%
Total Demand	2.85% / 0.15%	14.90% / 0.73%	-5.55% / -0.30%

Figure 50: Demand Forecast Scenarios – Tumbler Ridge



6.3 Additional Sensitivities: Entry or Exit of a Large Customer

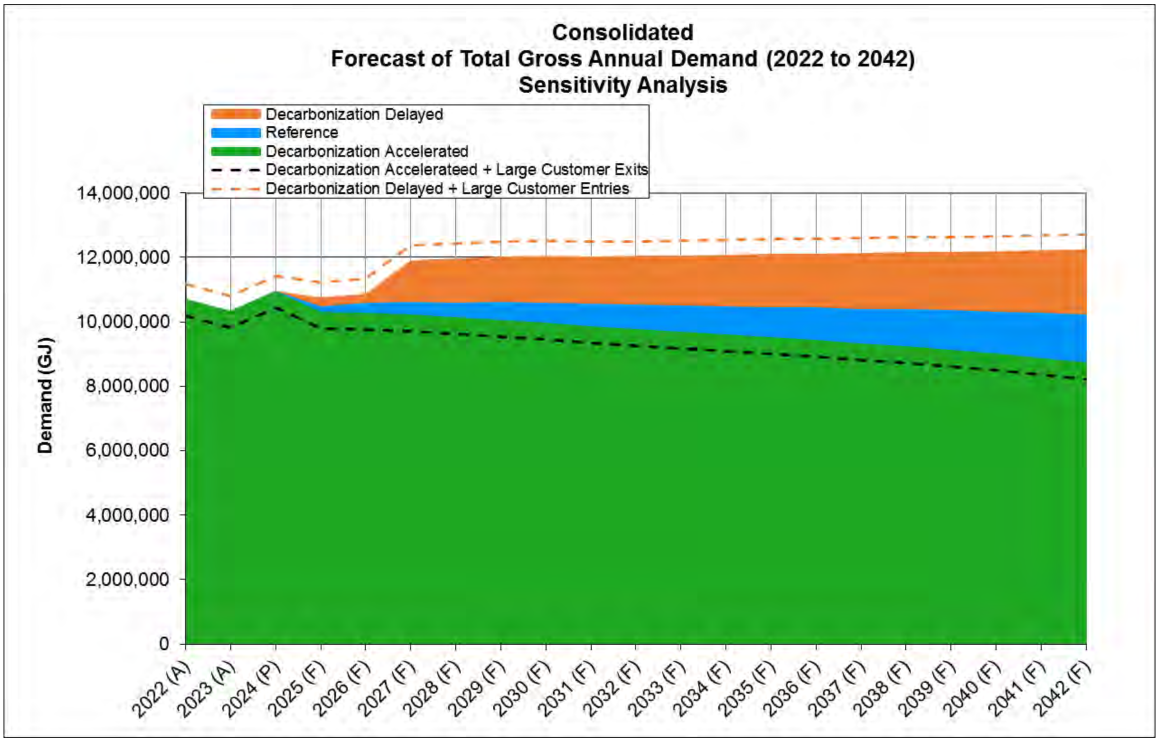
In response to a directive in BCUC Order G-265-20, an additional analysis was conducted on the scenarios to assess the impact on forecasted annual and peak demand, of adding or removing a large customer in each of PNG's service areas.

For the purpose of this analysis, PNG defines a large customer specific to each of its service areas (Table 18). On the PNG-West system, the large customer load is consistent with that from a pellet plant (~330,000 GJ/yr), whereas on the Fort St. John system, an upstream oil and gas fuel load (~100,000 GJ/yr) is representative of a typical large customer load. Large customers on the Dawson Creek and Tumbler Ridge systems are modelled as an oil and gas services company (~50,000 GJ/yr), and a recreation centre (~10,000 GJ/yr), respectively. The results of the analysis on the annual demand forecasts for the addition or exit of a single large customer are presented in a consolidated basis in Figure 51.

Table 18: Demand Impact of Entry of Exit of Large Customer

		PNG-West	Fort St. John	Dawson Creek	Tumbler Ridge	Total
Large Customer Additions	(GJ/y)	330,000	100,000	50,000	10,000	490,000
Large Customer Exits	(GJ/y)	(330,000)	(100,000)	(50,000)	(10,000)	(490,000)
Load Factor		90.0%	76.6%	65.0%	29.4%	na
Design Day Impact	GJ/d	1,005	358	211	93	1,666

Figure 51: Demand Forecast Scenario – Impact of Entry of Exit of Large Customer



7 Design Day Demand Forecast

Comparing the capacity of the system to the forecast demand provides an indication of when, and to what extent, additional pipeline capacity may be required. Understanding and monitoring the amount of forecast excess capacity allows PNG to plan future capacity enhancements in a timely manner to ensure that it is always able to offer a highly reliable service during times of peak demand that is coincident with the coldest day that is forecast to occur.

The design day demand is the maximum demand that the system is expected to serve. It is determined based on a "perfect storm" of maximum firm industrial demand and temperature sensitive space heating demand from the residential and commercial market segments during the coldest day or peak demand day that can be expected. Estimates of the peak demand are important for capacity and gas supply planning purposes.

Design day weather conditions are estimated using a statistical technique known as Extreme Value Analysis (EVA) that is used to infer the occurrence of maximum values over a particular period, based on historical data. For example, EVA was used in this case to infer the lowest daily temperature that could be expected to occur once every 50 years, based on 10 years of temperature data from Environment Canada weather monitoring stations located in several municipalities in the PNG-West and PNG(N.E.) service areas.

PNG has used a 50-year return period in determining the design day demand under the reference scenario. The design day temperatures, expressed as the heating degrees below 18 C, are shown below (Table 19).

Table 19: Design Day Heating Degree Days

System	Design Day Temperature	
	C	HDD
PNG-West	-25.2	43.2
Fort St. John	-45.3	63.3
Daw son Creek	-47.8	65.8
Tumbler Ridge	-45.9	63.9

PNG estimates the design day demand using the same method developed for determining peak day gas supply requirements for purposes of developing its annual firm gas supply contracting strategy. The design day demand for each of its customer segments is determined based on a mathematical relationship between ambient air temperature and gas consumption that has been determined empirically from historical weather and billed consumption data. The design day demand of residential customers was calculated using the residential end-use model and multiplied by the number of customers forecast. In the case of small and large commercial, and small industrial customers, their portion of the peak day demand is determined from third- and first-order linear regressions, respectively, of their historical billing and weather data. Seasonal customers taking service under RS6 do not take gas during the winter when a design day may be expected to occur, and their demand has not been included.

The results of the analysis described above determine the design day load factor applied to the residential and commercial customers, and to each large customer individually, to ultimately determine the design day peak demand. Load factors aggregated to each of the customer classes are shown in Table 20

Table 20: Load Factors for Customer Classes

	PNG-West	FSJ	DC	TR
Residential	21.3%	23.3%	23.6%	21.1%
Small Commercial	24.4%	27.2%	26.7%	29.8%
Large Commercial Small Industrial Sales and Other	46.3%	35.5%	33.6%	22.9%
Interruptible Sales and Transport	21.3%	na	na	na
Firm Transport	52.7%	56.7%	36.4%	100.0%

7.1 Results

A design day demand forecast is developed in the same way as the annual demand forecast: as an aggregation of the forecast design day demands of each of the customer classes. The design day demand under the Reference, Decarbonization Delayed and Decarbonization Accelerated scenarios is shown below (Table 21). The forecast for each customer class and for each year of the planning period is presented in tabular form in Appendix F: Design Day Demand Tables. The impact on design day demand, of adding a large customer in each service area is presented in Table 22. This is derived from the design day demand forecasts plus the design day demand of a hypothetical large customer that was presented in Table 18.

Under the Reference and Decarbonization Accelerated scenarios, the maximum design day demand on all systems, except Tumbler Ridge, is reached on or before 2026. The maximum design day demand on PNG-West is forecast to be reached on or before 2027 under all three planning scenarios.

With the exception of Tumbler Ridge all of PNG's delivery systems are expected to have sufficient capacity to serve current and future firm demand under all scenarios.[43] Under the Decarbonization Delayed scenario, Tumbler Ridge is forecast to experience a constraint in its ability to serve the design day demand by as early as 2024~~2025~~.

Table 21: Forecast Design Day Demand

	Design Day Demand (Note 3) vs. Current System Capacity (GJ/D)						
	Reference		Decarbonization Delayed		Decarbonization Accelerated		System Capacity
	GJ/D	Year of Maximum	GJ/D	Year of Maximum	GJ/D	Year of Maximum	
PNG-West (Note 1)	37,426	2024	40,410	2027	37,426	2024	46,000
Fort St. John (Note 2)	29,354	2022	31,478	2042 +	29,354	2022	na*
Dawson Creek MS52	16,876	2024	17,293	2042 +	16,876	2024	27,597
Tumbler Ridge Plant	4,364	2026	5,934	2042 +	4,149	2024	3,249

Note 1: The winter takeaway capacity at Summit Lake is approximately 40 mmcfd, equivalent to 46,000 GJ per day based on a heat content of natural gas of 40.0 MJ/m3.
Note 2: The Fort St. John system is a distribution network supplied from nine receipt points

Note 3: Demand from firm sales and transportation customers only. PNG-West offers interruptible sales and transportation service, whose demand is not included here.

[43] Interruptible sales and transportation customers on PNG-West may contribute an additional 11,000 GJ/d of demand on a design day. PNG is under no obligation to serve interruptible customers and their service would be curtailed under any constraint of PNG to meet its firm demand obligations.

	Design Day Demand (Note 3) vs. Current System Capacity (GJ/D)						
	Reference		Decarbonization Delayed		Decarbonization Accelerated		System Capacity
	GJ/D	Year of Maximum	GJ/D	Year of Maximum	GJ/D	Year of Maximum	
PNG-West (Note 1)	37,426	2024	40,706	2027	37,426	2024	46,000
Fort St. John (Note 2)	29,354	2022	32,232	2042 +	29,354	2022	na*
~~Dawson Creek MS52~~	~~16,042~~	~~2026~~	~~17,[illegible]~~	~~2042 +~~	~~16,876~~	~~2024~~	~~27,597~~
Tumbler Ridge Plant	4,386	2042 +	5,979	2042 +	4,149	2024	3,249

Note 1: The winter takeaway capacity at Summit Lake is approximately 40 mmcfd, equivalent to 46,000 GJ per day based on a heat content of natural gas of 40.0 MJ/m3.
Note 2: The Fort St. John system is a distribution network supplied from nine receipt points

Note 3: Demand from firm sales and transportation customers only. PNG-West offers interruptible sales and transportation service, whose demand is not included here.

Table 22: Forecast Design Day Demand: With Large Customer Additions

		Design Day Demand (Note 3) vs. Current System Capacity (GJ/D)			
		Reference	Decarbonization Delayed	Decarbonization Accelerated	System Capacity
	Large Customer Addition (GJ/D)	GJ/D	GJ/D	GJ/D	
PNG-West (Note 1)	1,005	38,430	41,414	38,430	46,000
Fort St. John (Note 2)	358	29,711	31,836	29,711	na*
Dawson Creek MS52	211	17,086	17,504	17,086	27,597
Tumbler Ridge Plant	93	4,457	6,027	4,242	3,249

Note 1: The winter takeaway capacity at Summit Lake is approximately 40 mmcfd, equivalent to 46,000 GJ per day based on a heat content of natural gas of 40.0 MJ/m3.

Note 2: The Fort St. John system is a distribution network supplied from nine receipt points

Note 3: Demand from firm sales and transportation customers only. PNG-West offers interruptible sales and transportation service, whose demand is not included here.

	Large Customer Addition (GJ/D)	Design Day Demand (Note 3) vs. Current System Capacity (GJ/D)			
		Reference	Decarbonization Delayed	Decarbonization Accelerated	System Capacity
		GJ/D	GJ/D	GJ/D	
PNG-West (Note 1)	**1,005**	38,430	41,710	38,430	46,000
Fort St. John (Note 2)	**358**	29,711	32,590	29,711	na*
~~**Dawson Creek MS52**~~	~~**211**~~	~~17,153~~	~~17,879~~	~~17,086~~	~~27,597~~
Tumbler Ridge Plant	**93**	2,564	4,130	2,343	3,249

Note 1: The winter takeaway capacity at Summit Lake is approximately 40 mmcfd, equivalent to 46,000 GJ per day based on a heat content of natural gas of 40.0 MJ/m3.

Note 2: The Fort St. John system is a distribution network supplied from nine receipt points

Note 3: Demand from firm sales and transportation customers only. PNG-West offers interruptible sales and transportation service, whose demand is not included here.

8 DEMAND SIDE MANAGEMENT

8.1 Background

DSM refers to the utility's efforts to decrease, shift, or increase energy demand, and the way customers utilize energy. The purpose of DSM programs has traditionally been to increase the utilization of a utility's generation (in the case of electricity), transmission, and distribution infrastructure and at the same time avoid, or at least delay, the need for building additional capacity to serve the peak demand. The goal of DSM programs has therefore been to alter the demand curve of the utility either through peak shaving, valley filling, load building, or conservation initiatives.

Section 44.1(2) of the UCA states that a long-term resource plan needs to include a plan of how the public utility intends to reduce demand by taking cost-effective demand-side measures. Under section 44.1(8) of the UCA, the Commission must take into consideration whether the public utility intends to pursue adequate and cost-effective demand-side measures when determining whether to accept a utility's resource plan. PNG's proposed DSM plan meets the requirements of this legal framework as discussed in Section 8.2.4, below.

In its Decision and Order G-155-15 approving the 2015 Resource Plan, 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". The BCUC also directed PNG to include "average bill and rate impacts for each customer class".[44]

In the 2019 CRP, PNG presented different funding scenarios along with an analysis of average residential bill and rate impacts. In its Decision and Order G-265-20 approving PNG's 2019 CRP, the BCUC accepted PNG's approach in the 2019 CRP of presenting only reference and high DSM funding scenarios but noted that PNG failed to analyze the bill impact on other customer groups as previously directed, and further directed PNG to

[44] Decision attached to BCUC Order G-155-15, p. 10.

include an analysis of bill and rate impacts for all customer classes in future DSM plans.[45] Accordingly, PNG has undertaken the required bill and rate impact analysis and has carried its approach forward with respect to modelling only the reference and high DSM funding scenarios in this CRP.

PNG has prepared a long-term ECI (DSM) plan for the period 2025 to 2032 as required by section 44.1(2)(b) of the UCA. The development of the long-term 2025 – 2032 ECI plan is informed by the 2021 Conservation Potential Review (2021 CPR), the 2023 – 2024 ECI Schedule of Expenditures, and the 2022 REUS, all of which are summarized in the following subsections.

8.1.1 The 2021 Conservation Potential Review (CPR)

PNG prepared a CPR study to help inform the development of PNG's ECI plan in 2023 and beyond. The CPR reviewed energy efficiency opportunities available among PNG's residential, commercial, and industrial natural gas customers across a 20-year planning horizon and determined that 85 percent of potential residential sector savings and 98 percent of the potential commercial sector savings arose from space and water heating measures. The CPR's medium market potential scenario for the year 2024 provided directional level guidance to PNG's expanded suite of programs included in its 2023 – 2024 ECI Schedule of Expenditures. A copy of the 2021 CPR is attached as Appendix G: 2021 Conservation Potential Review.

8.1.2 2023 – 2024 ECI Schedule of Expenditures

PNG's 2023 – 2024 ECI Schedule of Expenditures, approved by way of BCUC Order G-171-23, funds the continuation of PNG's current programs and initiatives, and significantly expands the range of programs offered to residential, commercial and industrial customers in 2023 and 2024.

The expansion focused on additional offerings to residential and commercial customers and included a new "income qualified" program area that encompassed existing as well as new programs. Notable new programs for residential customers include:

[45] Decision attached to BCUC Order G-265-20, p. 24.

- A dual-fuel ducted heat pump rebate that is harmonized with the CleanBC Dual Fuel Ducted Heat Pump Rebate program and provides an additional incentive for customers who install an electric air-source heat pump (ASHP) matched with a natural gas furnace;
- An income-qualified program for the replacement of low-efficiency natural gas furnaces;
- A water measures program that provides pipe wrap and insulated blankets for hot water tanks, low flow showerheads, faucet aerators and ENERGY STAR® certified clothes washers and dishwashers; and
- A building envelope program offers incentives to residential customers to add exterior wall cavity and/or attic insulation, and to replace existing windows and doors. This program is also harmonized with the CleanBC Windows and Doors Replacement program.

PNG also expanded the number of programs for commercial and industrial customers:

- A dual-fuel heat pump program for hybrid heating systems when a new ASHP is integrated with the customer's existing natural gas furnace or boiler. The incentive is intended to reduce the cost of integrating the ASHP with an existing natural gas furnace or boiler;
- A gas-fired heat pump program; and
- A commercial and industrial custom efficiency program that decreases the pay-back period for larger projects that improve the energy efficiency of existing heating systems or thermal processes and thereby improve the customers' return on investment for these types of projects.

A copy of the 2023 – 2024 ECI Plan is attached as Appendix H: 2023 – 2024 ECI Plan.

8.1.3 2022 REUS

The 2022 REUS provides useful insights into customers' perception of PNG's DSM programs, along with guidance on the design of new programs. Findings relevant to the design of the 2025 – 2032 ECI plan are:

- Residential customers are receptive to undertaking improvements that improve the energy efficiency of their homes. Nearly 75 percent of respondents indicated their household makes a "fair" to "great amount of" effort to conserve energy;

- There are substantial cost savings associated with conserving energy. Six-in-ten respondents believe there are many ways a person can save energy around the home, and these can add up to substantial dollar savings; and
- More than half (54 percent) of respondents would like to reduce their home's energy use further but can't justify the expense to do so.

The three program suggestions that garnered the most interest included a furnace tune-up program (45 percent of respondents interested), a program to replace existing windows with energy-efficient models (40 percent), and a program to replace exterior doors with energy-efficient insulated doors and a program to improve draft-proofing (36 percent each). PNG's current ECI plan includes rebates for furnace tune-ups, and for window and door replacements.

8.2 2025 – 2032 Long-Term ECI Plan

The long-term ECI plan presented here uses the filed Application for Approval of 2023 – 2024 ECI Portfolio Funding for 2023 and 2024 (Appendix H: 2023 – 2024 ECI Plan) as the starting point. Several measures were subsequently added or deleted, and the incentives for some measures were updated. The proposed amendments to existing ECI programs, and proposed new programs set out in this plan respond primarily to amendments made to the DSM Regulation on June 27, 2023.[46] The amendment phases out incentives for conventional gas space and water heating measures that are less than 100 percent efficient (e.g., furnace, boiler, gas water heater), and mandates the use of the Utility Cost Test (UCT) and the avoided cost of renewable and low-carbon gas for cost-effectiveness testing.

This long-term ECI plan serves as the "Reference DSM" setting for the CRP scenarios. The major changes that were made to the 2023 – 2024 ECI Portfolio in order to develop this plan are presented below.

Measures Removed:

The following measures were removed to align the ECI plan with the amended DSM Regulation that removes support for conventional gas equipment that is less than 100

[46] https://www.bclaws.gov.bc.ca/civix/document/id/mo/mo/m0193_2023.

percent efficient:

- Income Qualified Furnace Replacement program other than for housing owned or operated by an Indigenous governing body or located on reserve land
- Commercial Efficient Water Heater Replacement
- Commercial Efficient Boiler Replacement
- Commercial Efficient Boiler Replacement for Non-Profits other than for a public building owned or operated by an Indigenous governing body

Measures Added:

The addition of the following measures was informed or influenced by the 2021 CPR (where most of these measures were included and show as having savings potential) and by provincial trends and policies (in the case of dual-fuel heating systems and heat pump water heaters).

Residential:

- ~~Heat Pump Water Heaters~~
- Basement or Crawlspace Insulation
- ~~Comprehensive Air Sealing~~
- ~~Drain Water Heat Recovery~~

Income Qualified and First Nations:

- Home heating equipment early replacement for Income Qualified customers~~Customers~~ (Dual-fuel systems~~hybrid system~~)
- Home heating equipment early replacement for First Nations customers (natural gas boilers and furnaces)
- Domestic hot water heating equipment for Income Qualified and First Nations customers

Commercial and Industrial**:**

- Radiant Tube Heaters
- Commercial Deep Energy Retrofits
- ~~Heat Pump Water Heaters~~
- ~~A bundle of measures included under the Commercial and Industrial Custom Efficiency program:~~

- ~~Advanced Veneer Dryer~~
- ~~Combustion Testing~~
- ~~Heat Recovery Systems~~
- ~~Process Boiler Load Control~~
- ~~Advanced Thermostats~~

Energy Transformation

In Order and Decision G-171-23 accepting PNG's ECI Portfolio funding for 2023 – 2024, the BCUC rejected expenditures related to a hydrogen study and the related development of codes and standards that was the sole program that would have otherwise addressed the Adequacy requirement of s.3(1)(e) of the DSM Regulation.[47] The BCUC subsequently noted that: "The fact that one of the adequacy requirements is not met, however, is not critical to the Panel's overall determination on the Expenditure Schedule because the Panel is satisfied that PNG has addressed the remainder of the adequacy requirements. Nevertheless, the Panel encourages PNG to demonstrate in its next DSM expenditure schedule application that the proposed portfolio complies with all the DSM Regulation adequacy requirements." [48] In Section 8.2.2, PNG has included some indicative funding levels for programs that meet Adequacy requirement of s.3(1)(e).

8.2.1 Alternative DSM Scenario

In accordance with the direction in BCUC Order G-155-15 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", PNG has developed the "High DSM" scenario by using the long-term ECI plan presented in the last section as a starting point, and then updating the participation assumptions for all measures. The changes in participation were influenced and informed by the savings potential and participation figures presented in the

[47] DSM Regulation: Paragraph (g) of the definition of a class A demand-side measure: "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 British Columbia".

[48] Order and Decision G-171-23, p. 15.

medium and high market potential scenarios of PNG's 2021 CPR. A comparison of the adjustment to the participation rates and expenses presented in the 2023 – 2024 ECI Schedule of Expenditures for both the Reference and High DSM scenarios is presented in Table 23.

Table 23: DSM Adjustments Applicable to Scenarios

	Reference Scenario	High DSM Scenario
Average yearly~~Yearly~~ increase in participation for dual-fuel (hybrid) heating measures	20%	30%
Average yearly~~Yearly~~ increase in participation for all ~~other~~ measures	13%~~5%~~	23%~~30%~~
Yearly increase in spending on Transformation and Enabling activities	5%	10%~~20%~~

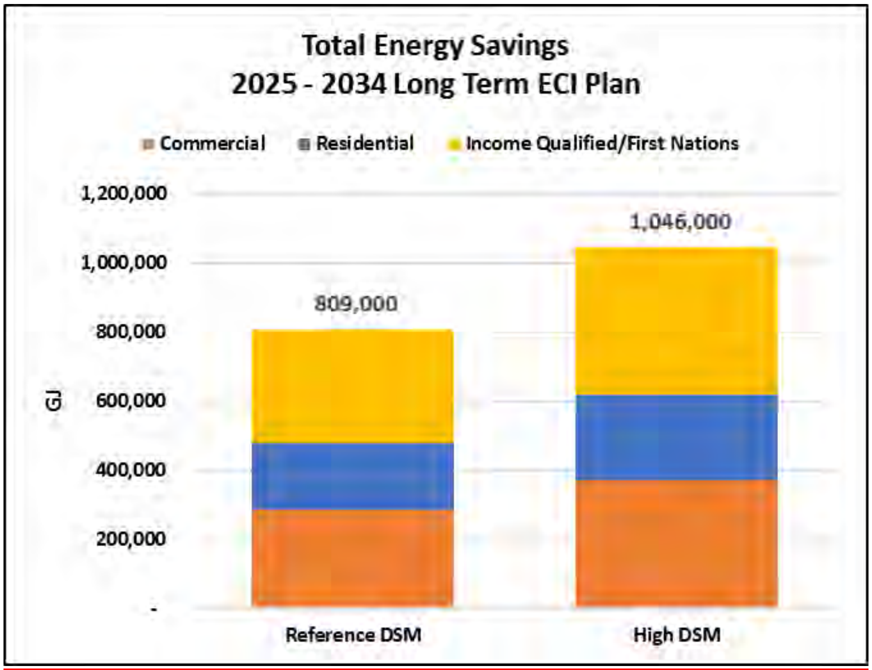
Consistent with the approach in the 2019 CRP, PNG has not included an analysis of a "Low DSM" funding scenario in this submission because it envisions such a scenario would correspond to a DSM portfolio that meets the adequacy requirements of the DSM regulation only. In its decision on the 2019 CRP, the BCUC accepted that PNG had identified acceptable demand-side measures as required by the UCA despite not having a low DSM funding scenario.[49]

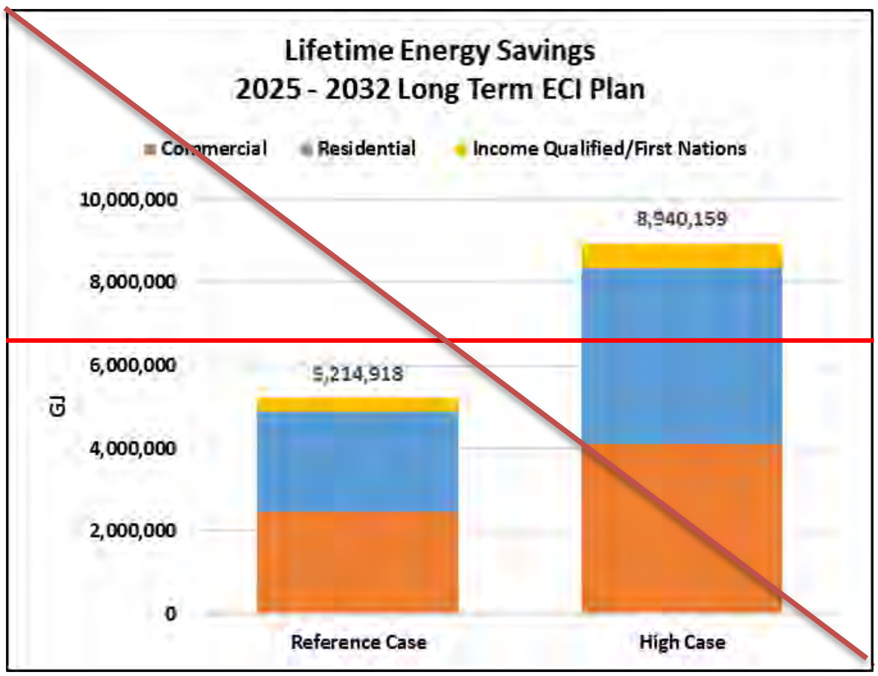
8.2.2 Results

The cumulative energy savings associated with the Reference and High DSM scenarios of the long-term ECI plan are presented in Figure 52 ~~Figure 5152~~. The lifetime gas savings of 1,046 TJ~~8.9 PJ~~ in the High DSM scenario are 29%~~71%~~ higher than the lifetime gas savings in the Reference scenario (809 TJ~~5.2 PJ~~).

[49] Decision and Order G-265-20, Section 2.3.2.

Figure ~~51~~52: 2025 – 2034~~2032~~ Long-Term ECI Plan Lifetime Energy Savings





Expenditures associated with the Reference and High DSM funding scenarios are presented in Table 24 and Table 25. The amount for 2024 is ~~Amounts for 2023 and 2024~~

~~are~~ as approved in BCUC Order G-171-23.[50] Year over year increases are ~~is~~ driven largely by assumptions on participation rates and expenditures on the Transformation and Enabling activities that are presented in Table 23. The total expenditures of $35 million~~$57 million~~ in the High DSM funding scenario are 47 percent~~70 percent~~ higher than the $24 million~~$34 million~~ expenditures identified in the Reference scenario.

Table 24: Summary of 2025 - 2034~~2032~~ Long-Term ECI Expenditures – Reference Case ($000s)

Program Area/ ($000)	2024	2025	2026	2027	Average Annual % Increase	2034	Total 2025 - 2034
Residential	$ 476	$ 279	$ 314	$ 354	13%	$ 815	$ 4,993
Income Qualified/First Nations	$ 185	$ 353	$ 382	$ 414	13%	$ 952	$ 5,870
Commercial	$ 476	$ 480	$ 561	$ 591	13%	$ 1,360	$ 8,379
Transformation & Enabling	$ 645	$ 405	$ 412	$ 413	5%	$ 580	$ 4,756
Total	**$ 1,781**	**$ 1,517**	**$ 1,668**	**$ 1,771**	**11%**	**$ 3,708**	**$ 23,998**

Program Area/ ($000)	2023	2024	2025	Average Annual % Increase	2032	Total 2025 - 2032
Residential	$ 266	$ 431	$ 649	15%	$ 1,715	$ 8,812
~~Income Qualified/First Nations~~	~~$ 194~~	~~$ 194~~	~~$ 288~~	~~19%~~	~~$ 950~~	~~$ 4,494~~
Commercial	$ 487	$ 492	$ 635	9%	$ 1,127	$ 6,755
Transformation & Enabling	$ 373	$ 645	$ 1,425	5%	$ 2,005	$ 13,609
Total	**$ 1,319**	**$ 1,761**	**$ 2,997**	**10%**	**$ 5,797**	**$ 33,670**

Table 25: Summary of 2025 - 2034~~2032~~ Long-Term ECI Expenditures – High DSM Case ($000s)

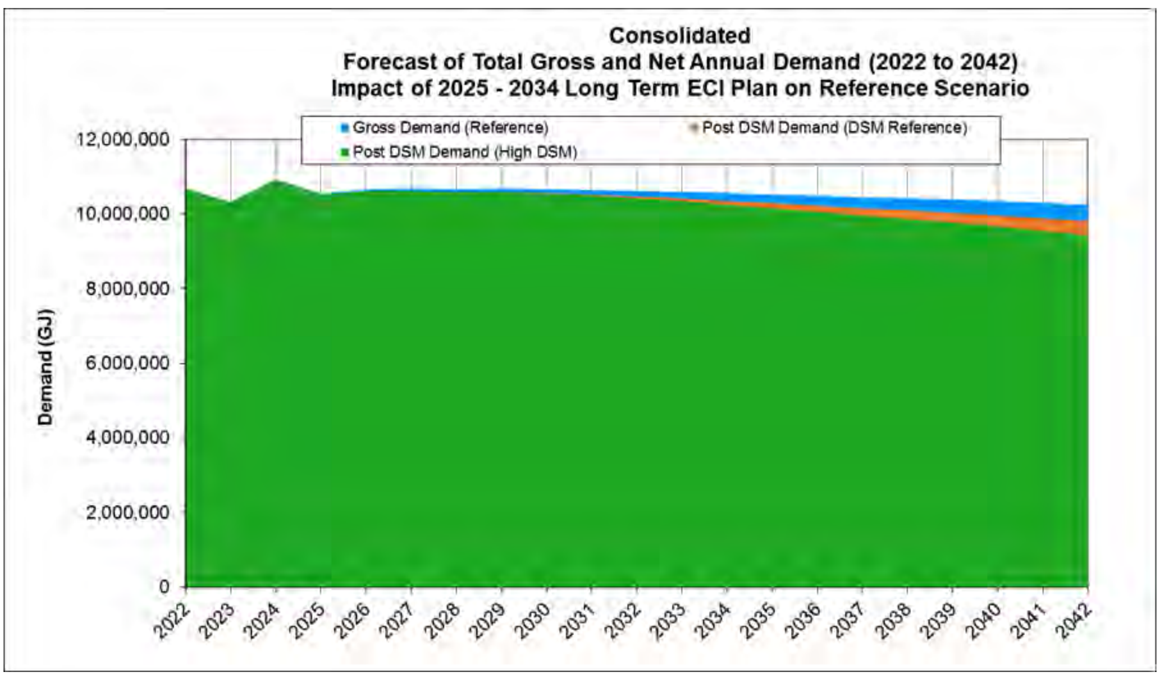
Program Area/ ($000)	2024	2025	2026	2027	Average Annual % Increase	2034	Total 2025 - 2034
Residential	$ 476	$ 279	$ 314	$ 354	26%	$ 1,785	$ 7,729
Income Qualified/First Nations	$ 185	$ 353	$ 382	$ 414	26%	$ 2,084	$ 9,063
Commercial	$ 476	$ 480	$ 561	$ 591	26%	$ 2,977	$ 12,941
Transformation & Enabling	$ 645	$ 405	$ 412	$ 413	10%	$ 804	$ 5,534
Total	**$ 1,781**	**$ 1,517**	**$ 1,668**	**$ 1,771**	**22%**	**$ 7,650**	**$ 35,268**

[50] Actual expenditures in 2023 on all ECI program areas was $547,000.

Program Area/ ($000)	2023	2024	2025	Average Annual % Increase	2032	Total 2025 - 2032
Residential	$ 266	$ 431	$ 649	30%	$ 4,099	$ 15,577
~~Income Qualified/First Nations~~	~~$ 194~~	~~$ 194~~	~~$ 288~~	~~30%~~	~~$ 1,822~~	~~$ 6,909~~
Commercial	$ 487	$ 492	$ 730	19%	$ 2,437	$ 10,974
Transformation & Enabling	$ 373	$ 645	$ 1,425	20%	$ 5,105	$ 23,508
Total	**$ 1,319**	**$ 1,761**	**$ 3,092**	**23%**	**$ 13,463**	**$ 56,968**

Forecast energy savings in gigajoules (GJ) and as a portion of demand forecast under the Reference scenario are presented in Figure 53, as a percentage reduction in demand under the Reference demand forecast in Figure 54, and in tabular form in Table 26. The CRP scenario forecasts go to 2042, while the long-term ECI plans were developed up to 2034~~2032~~ and the incremental annual ECI-related savings for 2034~~2032~~ are assumed to continue through to 2042.

Figure 53: Consolidated Forecast of Total Gross and Net Annual Demand (2022 – 2042)



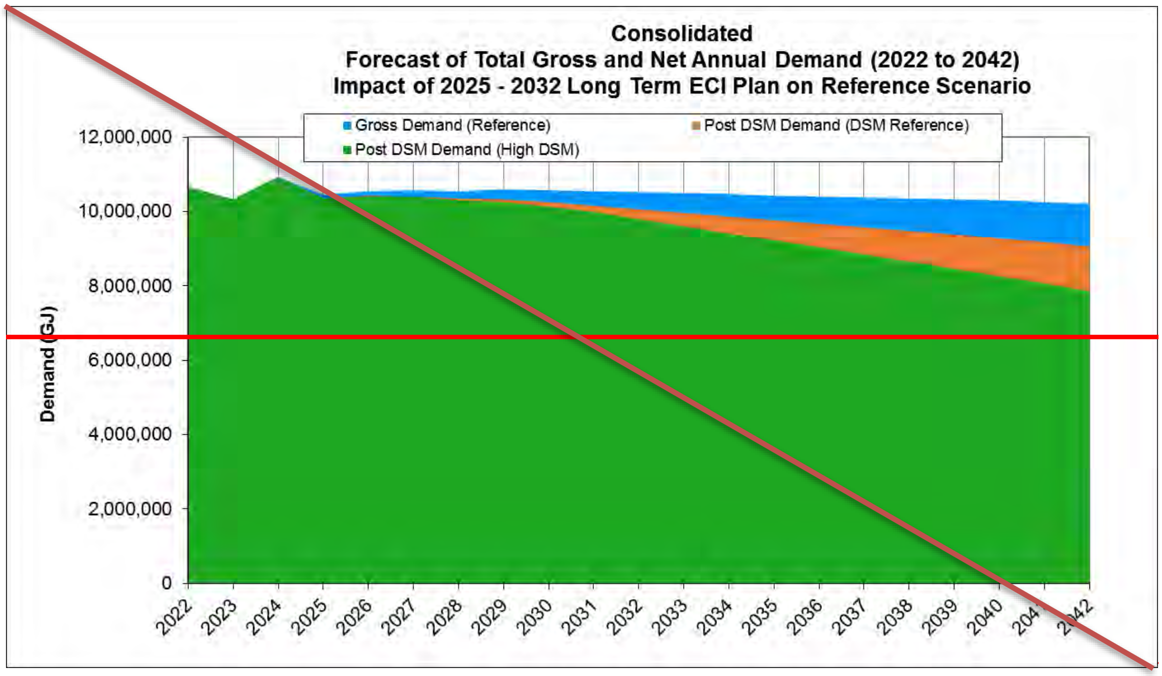
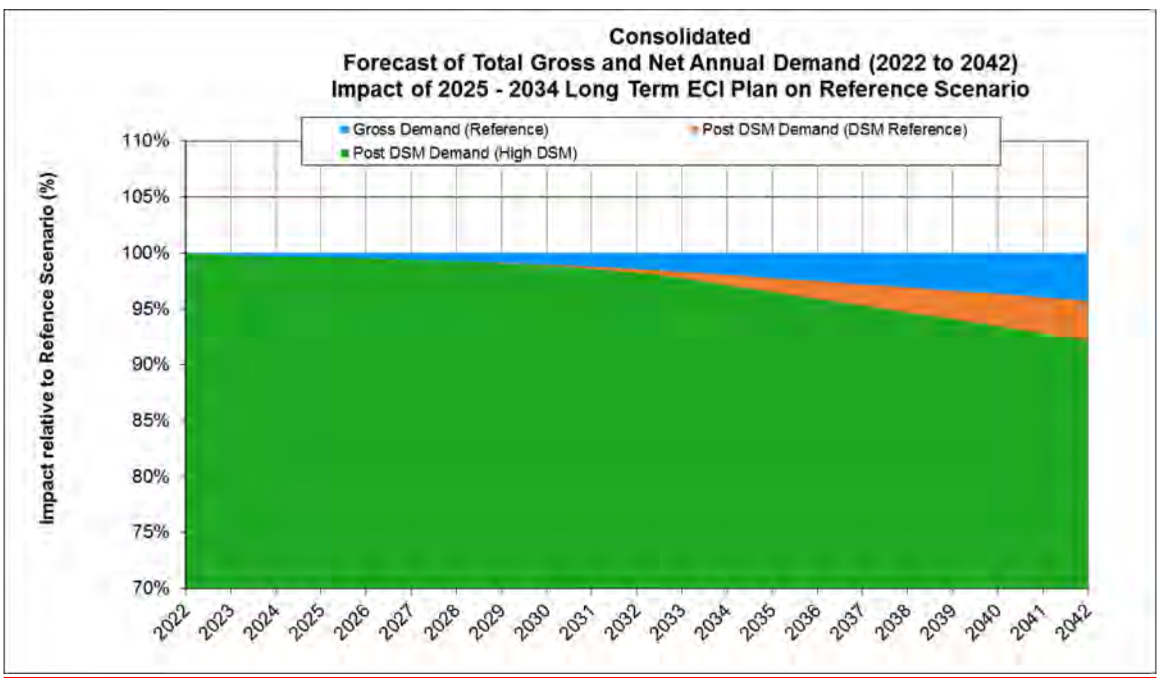
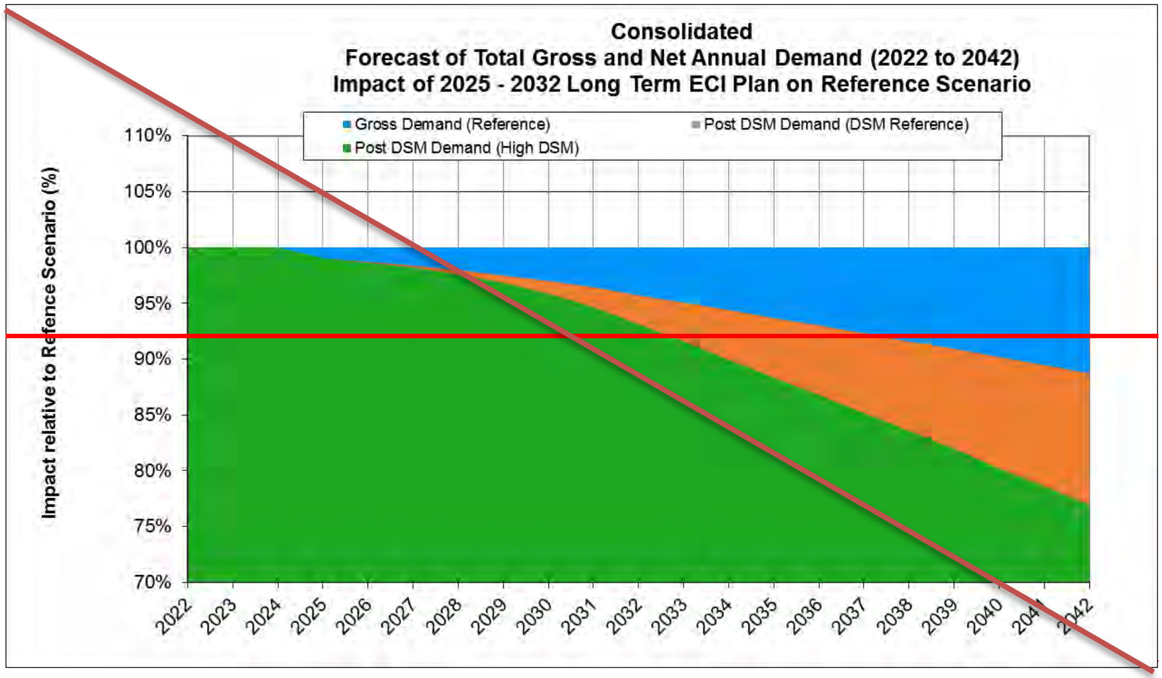


Figure 54: Consolidated Forecast of Net Annual Demand – Percentage Reduction (2022 - 2042)





By 2034~~2032~~, the Reference DSM scenario is expected to reduce the annual gas demand by 2.0 percent~~4.3 percent~~, with a forecast of 2.9 percent~~7.0 percent~~ under the High DSM scenario.

Table 26: ECI Plan Impacts on Demand

Impact of 2025 - 2034 Long Term ECI Plan: Reduction in Annual Demand						
Scenario		**2025**	**2026**	**2027**	**2028**	**2029**
Reference	**TJ**	42	53	66	80	95
	%	0.4%	0.5%	0.6%	0.7%	0.9%
High DSM	**TJ**	42	53	66	81	100
	%	0.4%	0.5%	0.6%	0.8%	0.9%
Scenario		**2030**	**2031**	**2032**	**2033**	**2034**
Reference	**TJ**	113	132	154	179	208
	%	1.1%	1.2%	1.5%	1.7%	2.0%
High DSM	**TJ**	124	154	193	241	304
	%	1.2%	1.4%	1.8%	2.3%	2.9%

Impact of 2025 - 2032 Long Term ECI Plan: Reduction in Annual Demand					
Scenario		2025	2026	2027	2028
Reference	TJ	100	134	172	215
	%	0.7%	1.0%	1.3%	1.7%
High DSM	TJ	102	142	192	254
	~~%~~	~~0.7%~~	~~1.0%~~	~~1.4%~~	~~1.8%~~
Scenario		2029	2030	2031	2032
Reference	TJ	262	317	378	448
	%	2.5%	3.0%	3.6%	4.3%
High DSM	TJ	333	433	560	724
	%	3.2%	4.2%	5.4%	7.0%

8.2.3 Customer Rate Impacts

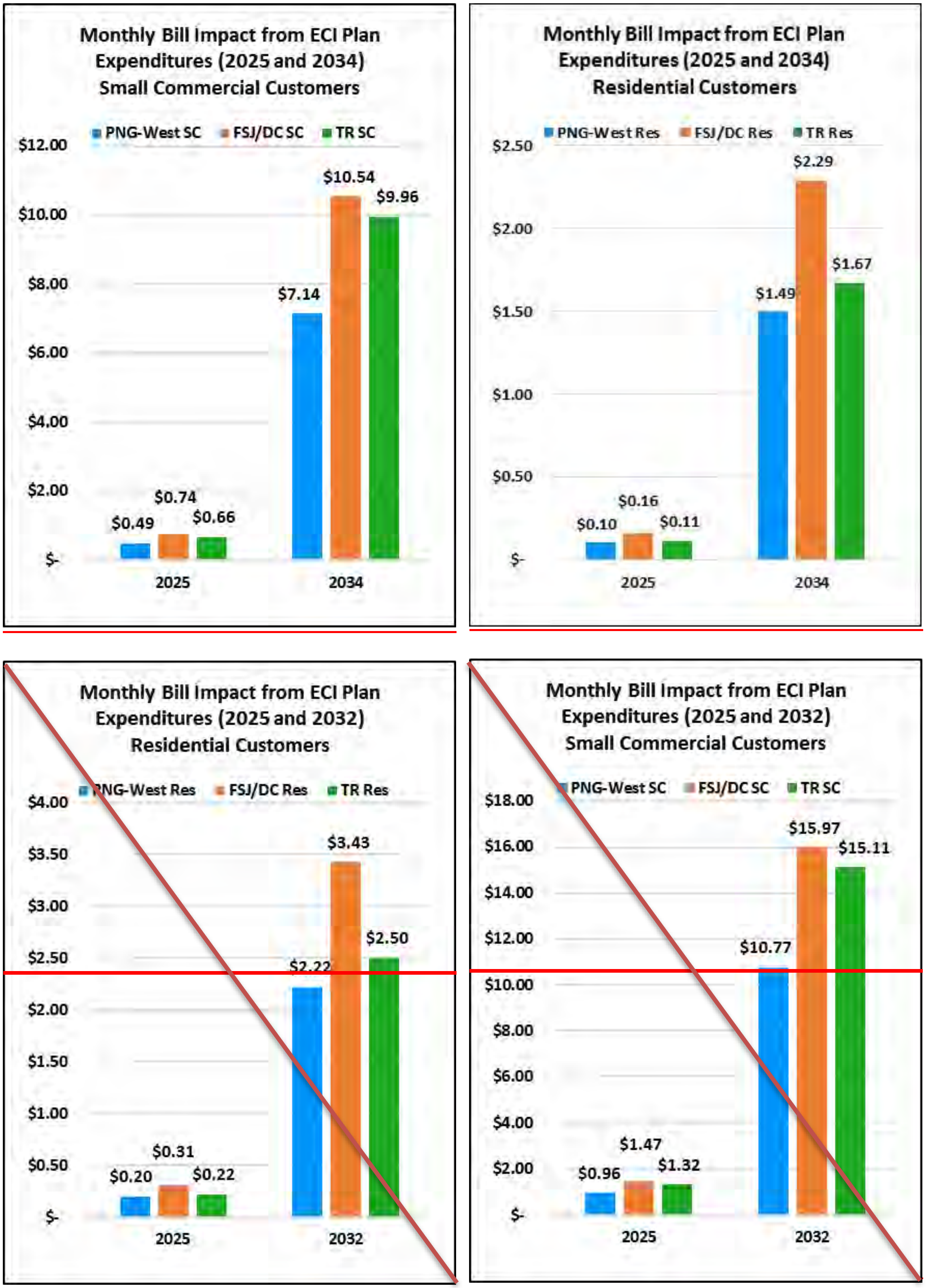
In the Decision accompanying Order G-265-20 approving PNG's 2020 – 2022 ECI Schedule of Expenditures, the BCUC directed PNG to "include an analysis of bill and rate impacts relating to all customer groups in future DSM/ECI Plans".[51]

PNG has completed such an analysis, and the results are presented in Figure 55 and Figure 56, below. The cost impacts have been determined based on the current accounting treatment of ECI expenditures that were approved in BCUC Order G-171-23, namely that ECI expenditures continue to be recorded in a rate base deferral account that is amortized over a 10-year period.[52]

[51] BCUC Decision and Order G-265-20, p. 24.

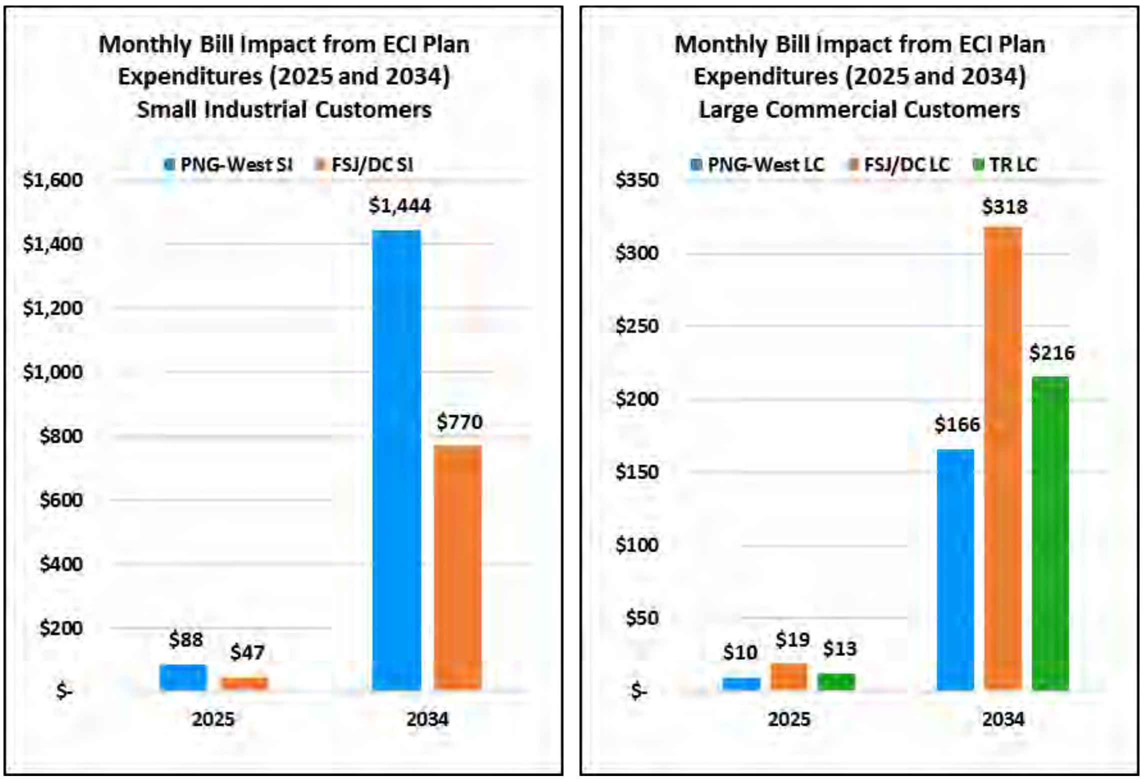
[52] PNG's 2023-2024 Energy Conservation and Innovation Portfolio Funding Application: BCUC Decision and Order G-171-23, p. 27.

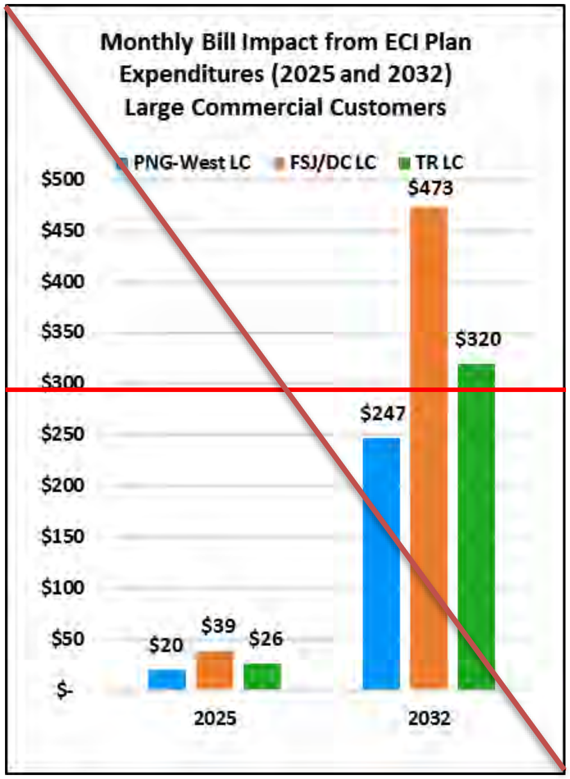
Figure 55: Residential and Small Commercial Rate Impacts (Reference DSM Scenario)

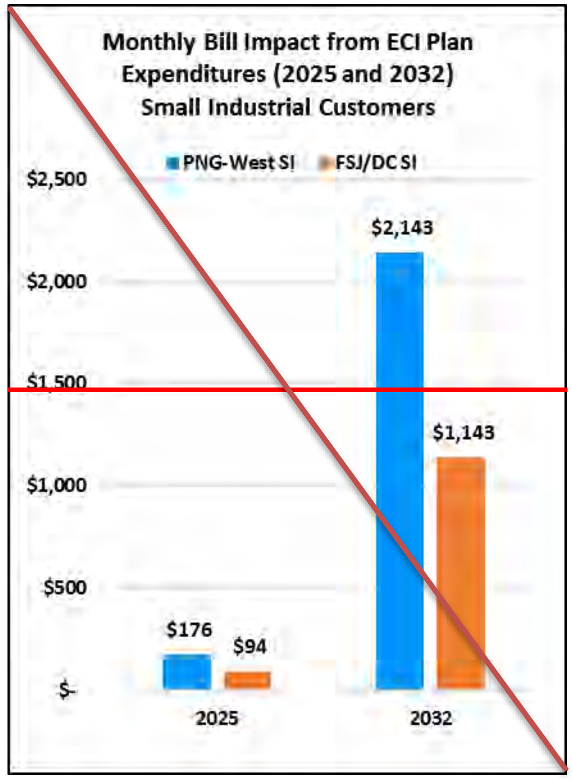


The impact of the amortization of expenditures identified in the 2025 – 2034~~2032~~ long-term ECI plan in 2025 is estimated to be in the range of $0.10 to $0.16~~$0.20 to $0.31~~ per month for an average residential customer, depending on their annual demand. The demand of an average residential customer in Fort St. John and Dawson Creek is higher than in PNG-West or Tumbler Ridge. The impact of the cumulative $24 million~~$34 million~~ expenditures by 2034~~2032~~ identified in the Reference DSM scenario increases to $1.50~~$2.22~~ per month for a residential customer in PNG-West, and to $2.29~~$3.43~~ per month for a customer in Fort St. John or Dawson Creek.

Figure 56: Large Commercial and Small Industrial Rate Impacts (Reference DSM Scenario)





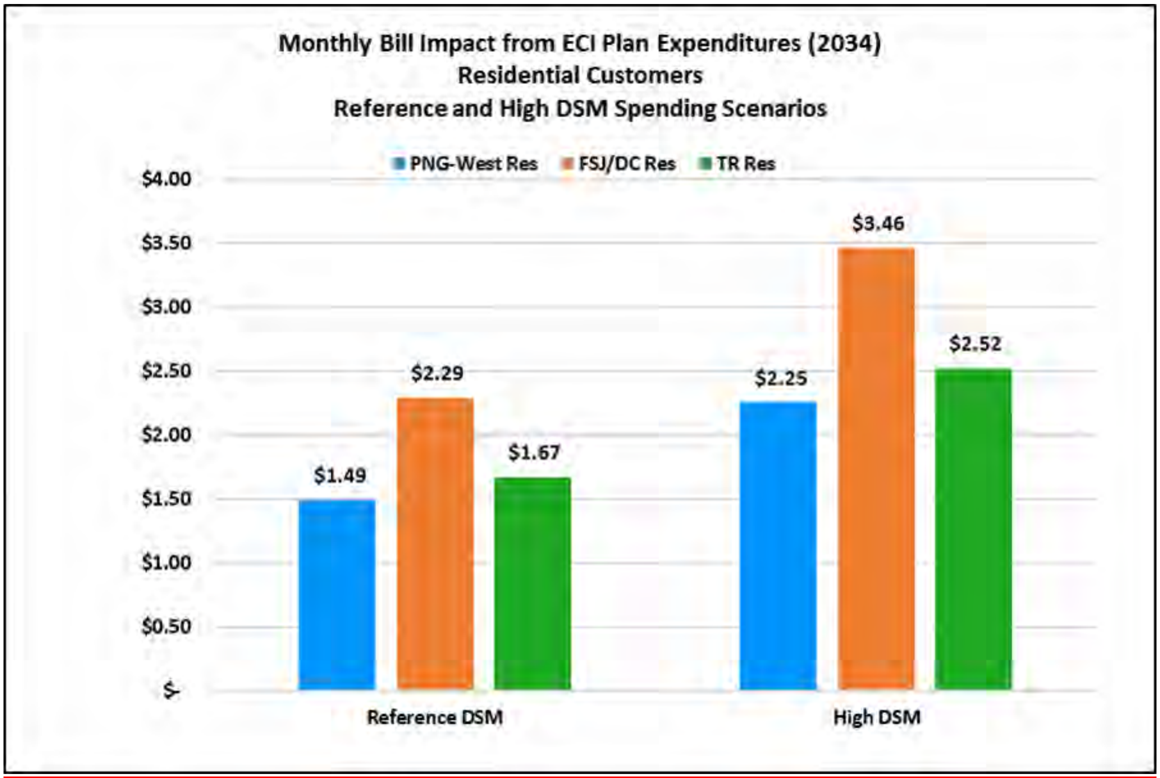


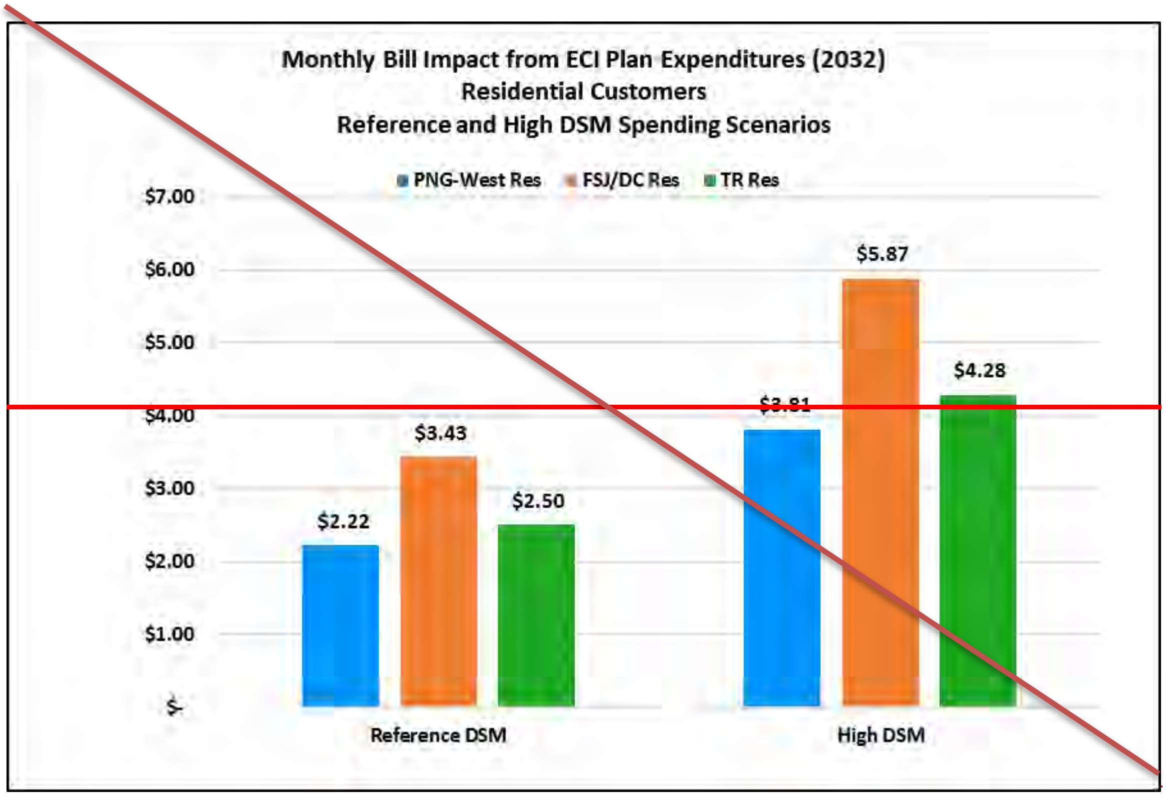
Based on an annual use per account of a large commercial customer of:
PNG-West: 6,550 GJ/y
FSJ/DC: 12,350 GJ/y
TR: 8,500 GJ/y

Based on an annual use per account of a small industrial customer of:
PNG-West: 56,800 GJ/y
FSJ/DC: 30,300 GJ/y

Increased spending under the High DSM scenario increases the impact in 2034~~2032~~, on a residential customer in PNG-West to $2.25~~$3.81~~ per month, up from $1.50~~$2.22~~ per month under the Reference DSM scenario. For a customer in Fort St. John or Dawson Creek, the impact increases from $2.29~~$3.43~~ per month under the Reference DSM scenario, to $3.46~~$5.87~~ per month under the High DSM scenario (Figure 57).

Figure 57: Impact of Reference DSM and High DSM Spending Scenarios





8.2.4 Consideration of Legal Framework

The legal framework for consideration of the implementation of demand-side measures is set out in the UCA, the DSM Regulation and the definition of "demand-side measure" set out in section 1(1) of the *Clean Energy Act*. Specifically, a "demand-side measure" is defined as follows:

> "demand-side measure" means a rate, measure, action or program undertaken
>
> (a) to conserve energy or promote energy efficiency,
>
> (b) to reduce the energy demand a public utility must serve, or
>
> (c) to shift the use of energy to periods of lower demand,
>
> but does not include
>
> (d) a rate, measure, action or program the main purpose of which is to encourage a switch from the use of one kind of energy to another such that the switch would increase greenhouse gas emissions in British Columbia, or
>
> (e) any rate, measure, action or program prescribed.

PNG confirms that all of its planned DSM activities meet the definition of "demand-side measure" as set out above in that they help customers reduce their natural gas consumption which in turn reduces GHG emissions.

The DSM Regulation defines what demand-side measures must be included in a utility's plan such that it would be considered to be "adequate" and would meet the requirement set out in section 44.1(8)(c) of the UCA. The table below considers how PNG's DSM/ECI plan meets these requirements.

PNG
PACIFIC NORTHERN GAS

Table 27: Elements of Demand Side Measures Regulation

Adequacy Requirement	ECI Portfolio
3(1)(a) A demand-side measure intended specifically: (i) to assist residents of low income households to reduce their energy consumption, or (ii) to reduce energy consumption in housing owned or operated by (A) a housing provider that is a local government, a society 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, if the benefits of the reduction primarily accrue to (C) the low income households occupying the housing, (D) a housing provider referred to in clause (A), or	PNG will continue to provide the Energy Savings Kit and Energy Conservation Assistance Program identified in the 2023-2024 ECI Schedule of Expenditures to Income Qualified Customers (Appendix H: 2023 – 2024 ECI Plan)
3(1)(b) If the plan portfolio is submitted on or after June 1, 2009, a demand-side measure intended specifically to improve the energy efficiency of rental accommodations;	All of PNG's ECI programs are available to customers in rental accommodations.
3(1)(c) An education program for students enrolled in schools in the public utility's service area;	PNG will continue to offer its "Smart Energy Kids" online content as identified in the 2023-2024 ECI Schedule of Expenditures.
3(1)(d) If the plan portfolio is submitted on or after June 1, 2009, an education program for students enrolled in post-secondary institutions in the public utility's service area;	As discussed in Section 8.2.2, PNG has included some funding to advance this program.

Adequacy Requirement	**ECI Portfolio**
3(1)(e) One or more demand-side measures to provide resources as set out in paragraph (g) of the definition of "class A 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;	As discussed in Section 8.2.2, PNG has included some funding to advance this program.
3(1)(f) One or more demand-side measures intended to result in the adoption by local governments and first nations of a step code or more stringent requirements within a step code.	PNG will continue to offer incentives to builders and energy advisors to support the adoption of building practices that adhere to the BC Energy Step Code.
3(1)(g) a demand-side measure intended specifically to reduce energy consumption in any of the following: (i) housing owned or operated by an Indigenous governing body or located on reserve land; (ii) a public building owned or operated by an Indigenous governing body.	PNG will continue to offer an Income Qualified Furnace Replacement program, as well as its Commercial Efficient Boiler Replacement program for Non-Profits, but only to Indigenous customers.

The cost-effectiveness of PNG’s proposed demand-side measures will be included in future expenditure filings.

9 Renewable Natural Gas Supply

9.1 Overview

In its 2019 CRP, PNG laid out a framework RNG strategy for developing a portfolio of low carbon energy (LCE) supply that included the acquisition of "RNG, either through entering into supply agreements with third parties, or by developing its own supply projects."[53]

In its Decision and Order accepting PNG's 2019 CRP, the BCUC accepted PNG's RNG strategy and supported PNG's intention to adopt, and seek BCUC approval of, a set of principles governing PNG's ability to develop RNG supply infrastructure. The BCUC also signaled its support for PNG's intentions to acquire RNG to meet the goals of the Roadmap: "The Panel encourages PNG to prepare itself for the CleanBC Plan goal of using 15% renewable gas by 2030, but acknowledges this is not yet a legislated standard."[54]

PNG's acquisition strategy for biomethane balances the CleanBC policy objective of a 15 percent renewable content in natural gas deliveries with important considerations unique to PNG's operating environment. First and foremost of these considerations is the rate impact on PNG's ratepayers of introducing quantities of higher-priced RNG supply. PNG's customers in the PNG-West and Tumbler Ridge service areas already pay the highest burner tip rates for natural gas in the province. Accordingly, the added cost of a portfolio of biomethane that is scaled to meet the maximum CleanBC 15 percent target will put further upward pressure on the cost for residents of northern B.C. to heat their homes and businesses.

Secondly, while the CleanBC 15 percent RNG target remains a voluntary target at this time, further policy directions set out in the Roadmap , most notably limiting the emissions from natural gas used in homes and offices to 6 MT per year by 2030, signal to PNG the importance of building a foundational portfolio of RNG supply in preparation for meeting future regulatory requirements.

Following on PNG's biomethane strategy introduced in its 2019 CRP, PNG has since put

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[53] 2019 Consolidated Resource Plan, p. 68.

[54] BCUC Reasons and Decision, Order G-265-20, p. 36.

in place a mechanism for recovering the cost of higher priced biomethane through rates charged to customers. PNG has also entered into two agreements for biomethane supply. Both the cost recovery mechanism and the supply agreements were the subjects of a prior application to the BCUC that was approved.[55]

PNG took delivery of a small quantity of biomethane under its first, short term contract in Q4 of 2022. PNG expects to receive the first quantities of biomethane under a second, long term supply agreement beginning in Q3 of 2024. Once the full contracted volume of RNG from the long-term supply agreement is realized, this will represent an approximate two per cent blend of RNG.

Together, the cost recovery mechanisms and volume accounting practices that PNG has established, along with the successful negotiation of two supply agreements has helped PNG to build the knowledge and capacity to identify prospective sources of RNG supplies both inside and outside of B.C., and to establish relationships with project developers and marketers of biomethane for future sources of supply consistent with a possible future GHG reduction mandate.

However, PNG is not currently planning on acquiring additional quantities of RNG. RNG costs are much higher than the commodity costs for traditional natural gas. As a result, PNG must balance the expectation that PNG will undertake actions voluntarily to help customers reduce their GHG emissions against the increased costs incurred to acquire RNG.

9.2 Scenarios

PNG estimates that, in order to meet the CleanBC target of 15 percent RNG supply, PNG would need to acquire nearly 1,600 TJ~~approximately 1,500 TJ~~ of biomethane. Figure 58 presents three possible trajectories of RNG supply growth, each one aligned with a particular demand forecast scenario described in Section 4.2. Under the Reference scenario, quantities of RNG reach 15 percent of throughput by 2030, and hold at that level for the remainder of the planning period. PNG notes that the RNG volume assumption for

[55] Application for Approval of a Low Carbon Energy (LCE) Cost Recovery Mechanism and Biomethane Purchase Agreements approved by way of BCUC Orders G-339-22 and E-7-22, respectively.

the Reference scenario would not be possible to achieve using RNG produced only in B.C. due to insufficient supply of feedstock and is reliant on unfettered access to North American sources of RNG.

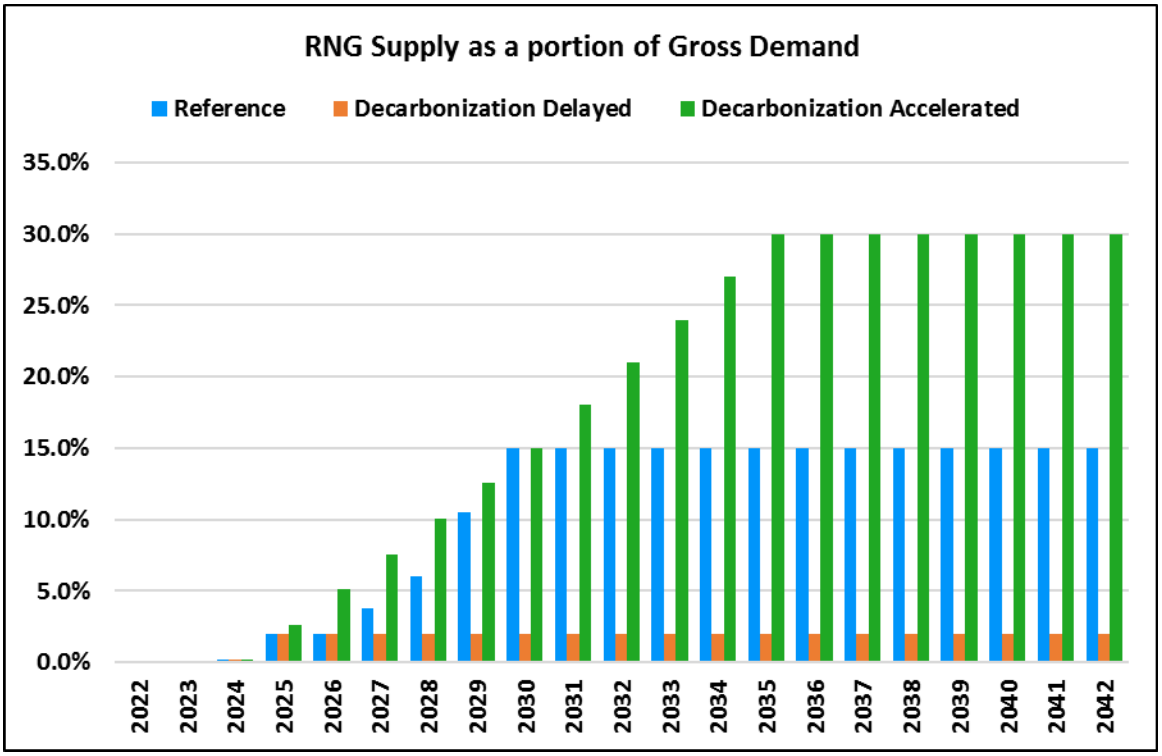
The Decarbonization Accelerated scenario assumes that blends of up to 30 percent are enabled by regulation. The portion of RNG on PNG's system therefore is assumed to continue to increase beyond 15 percent in 2030, and up to 30 percent by 2035, at which point it remains constant out to 2042. In the Decarbonization Delayed scenario, the CleanBC targets for RNG blending are not met, with RNG remaining at a two percent blend from 2025 and beyond, consistent with its currently contracted-for RNG supply.

In setting a trajectory for reaching 15 percent RNG under the Reference scenario, PNG has taken the view that regulations mandating the CleanBC Plan goal of blending 15 percent RNG by 2030, and (or) regulations mandating the GHGRS come into effect under this scenario. In response to this outcome, PNG has provided an indicative trajectory of RNG supply growth that is, however, not underpinned by any specifically identified sources of supply.

As indicated in the introduction to this section, PNG's RNG acquisition strategy is shaped primarily by consideration of the cost impact to customers and the availability of supply. PNG estimates the average rate impact across all customers, of the cost of acquiring sufficient quantities of RNG to supply 15 percent of PNG's throughput by 2030 to be approximately $3.00 per GJ. The impact on rates reflects the incremental cost of RNG compared to the natural gas commodity and the carbon tax forecast under the Reference demand forecast scenario.[56]

[56] Assuming a carbon tax rate of $170 per tonne in 2030, equivalent to a charge of $8.44 per gigajoule of natural gas consumed (biomethane is considered carbon neutral and receives a credit equivalent to the carbon tax rate on natural gas), a commodity cost of natural gas of $3.75 per gigajoule, and a price for biomethane set at 80% of the maximum price set under the GGRR, forecast at $40 per gigajoule in 2030 (i.e. a forecast price for biomethane supply of 80% x $40 = $32/GJ).

Figure 58: RNG Supply as a Portion of Gross Demand



9.3 Development of RNG Supply Infrastructure and a Cost Recovery Mechanism

9.3.1 Introduction

In the proceeding leading to the approval of the 2019 CRP, PNG stated that it anticipated making an application to the BCUC, for approval of a 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 that application, PNG would propose a set of principles governing how the cost associated with these facilities will be recovered from PNG customers.[57] In the Decision attached to Order G-265-20 approving PNG's 2019 CRP, the BCUC responded by directing PNG "to file a set of principles regarding the development of RNG supply infrastructure no later than the filing of its next long-term resource plan and ECI application in 2023."

[57] Exhibit B-3; Response to BCUC IR 13.2, 2019 CRP Proceeding.

On November 17, 2021, PNG filed an application to the BCUC, for approval of a Low Carbon Energy (LCE) Cost Recovery Mechanism and Biomethane Purchase Agreements that was subsequently approved by the BCUC by way of Orders E-7-22 (biomethane purchase agreements) and G-339-22 (cost recovery mechanism).[58] Included in the cost recovery mechanism is a methodology for the disposition of biomethane through four mechanisms that serve to mitigate the impact of higher priced biomethane on the costs borne by PNG's customers:

1. Voluntary biomethane program (the Smart Energy program);
2. Biomethane supplied to PNG's Company Use Gas Account;
3. Off-system sales; and
4. Recovery of biomethane costs from all non-bypass sales and transport customers.

In its application, PNG had not provided a set of principles regarding the development of RNG supply infrastructure, deferring that to this CRP.[59]

9.3.2 Development of RNG Supply Infrastructure

To date, PNG has not identified any economically viable biomethane supply opportunities in any of its service areas. PNG has evaluated a small number of prospective sources of biomethane supply, including from landfills and composting facilities. However, in each case assessed thus far, the quantity of feedstock and sources of supply is not sufficient or secure enough to support: (i) the production of biogas; (ii) the upgrading of biogas to sales quality biomethane; and (iii) the construction of the facilities to connect with PNG's distribution system. Therefore, at this time, PNG does not anticipate constructing, owning, operating, or connecting an RNG facility to its system.

Accordingly, the development of a "set of principles regarding the development of RNG supply infrastructure" would be carried out in the abstract and would not be informed by a specific prospective facility. Instead, PNG proposes that, if such an opportunity should arise in future, it would provide the set of principles that meet the requirements of this

[59] Application for Approval of a Low Carbon Energy (LCE) Cost Recovery Mechanism and Biomethane Purchase Agreements, p. 22.

directive as part of an application for approval of capital expenditures for the identified opportunity.

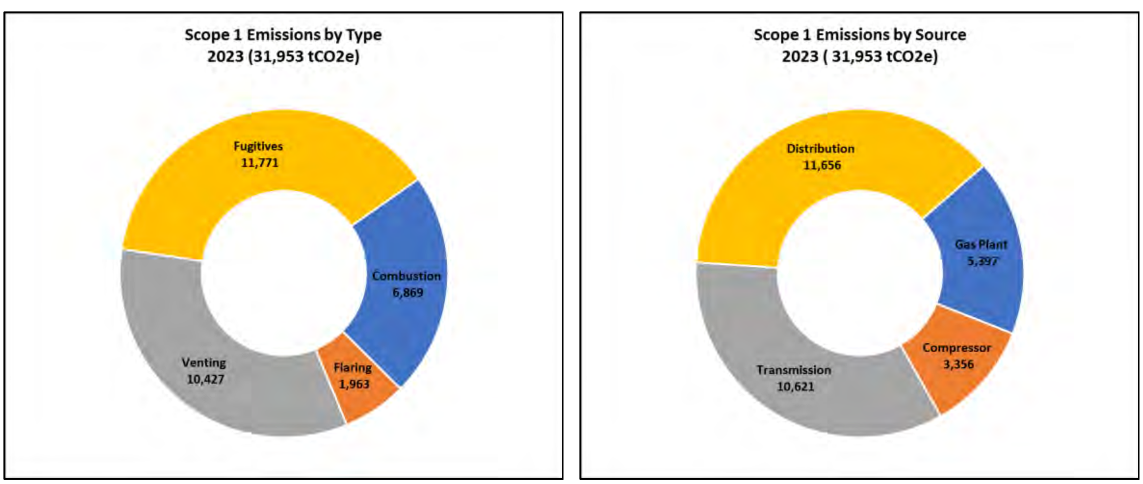
10 GHG Reduction Plans

10.1 PNG GHG Emissions

Under the B.C. Greenhouse Gas Emission Reporting Regulation, industrial facilities that emit 10,000 tCO_2e or more per year, and those that have emitted more than 10,000 tCO_2e in any of the previous three years, are required to report their emissions annually. Operations emitting over 25,000 tCO_2e are required to have their emission reports independently verified.

PNG, as an operator of natural gas transmission, distribution and processing facilities whose emissions exceed 25,000 tCO_2e, is required to submit third-party verified emissions reports. In 2023, PNG's direct emissions aggregated across all of its facilities and from all sources were just under 32,000 tCO_2e (Figure 59). Emissions from PNG's R1 compressor station located at Summit Lake, and the Tumbler Ridge gas processing plant together account for approximately one quarter of PNG emissions, while venting from the transmission system (removal of gas from a pipeline segment in order to safely perform maintenance and repair work) and fugitive emissions from the distribution system (small leaks from pipeline fittings, meters, and appliances) account for about three quarters of PNG's direct emissions.

Figure 59: Direct (Facility) GHG Emissions of PNG by Function and by Source



10.2 PNG Customer Emissions

The Roadmap provides high level policy direction with respect to the role the natural gas delivery system will play to help meet the Province's target of a 40 percent reduction in

GHG emissions from all sectors of B.C. economy by 2030, as compared to emissions in 2007.

As discussed in Section 2.2.2 above, the Province is contemplating legislation to impose a mandatory requirement on natural gas utilities to reduce the GHG emissions associated with natural gas consumed in buildings and industrial processes of their customers to, or below, a defined emissions cap by 2030. The GHGRS (defined above) proposed by the Province is set at 6.11 MtCO2e, consistent with the Province's legislated sectoral targets for the built environment and industrial sectors (excluding upstream natural gas) If the proposed GHGRS was to simply be allocated between PNG and FortisBC based only on a proportion of throughput, with no consideration for PNG's northern climate or oil and gas sector customer loads, PNG's allocated emissions in 2030 are estimated to be 254 kTCO2e (i.e., based on PNG being allocated four percent and FortisBC being allocated 96 percent of the proposed GHGRS). This is equivalent to a reduction in emissions associated with natural gas consumption in the built environment and industrial sectors of approximately 50 percent, as compared to 2023.[60]

In its load forecast, PNG has separately identified its deliveries of natural gas to the upstream oil and gas sector. PNG's interpretation of the Roadmap is that GHG emissions associated with deliveries of natural gas to the oil and gas sector are not subject to the proposed GHGRS that PNG would be obligated to meet. As well, PNG has assumed GHG emissions of LNG production facilities will be accounted for in the emissions of the LNG product once it is consumed by an end-use customer. Therefore, GHG emissions of LNG production facilities are not subject to the proposed GHGRS.

Although the methodology for achieving these GHG emission reductions in BC has not yet been determined, PNG provides an example of what a proportional implementation of the GHGRS might mean for PNG, were the GHGRS in place today. In 2023, PNG's customers produced an estimated 535 kilotonnes~~542 kilotonnes~~ of GHG emissions (535 ktCO2e~~542 ktCO2e~~) from the combustion of natural gas. Of this total, 45 ktCO2e is

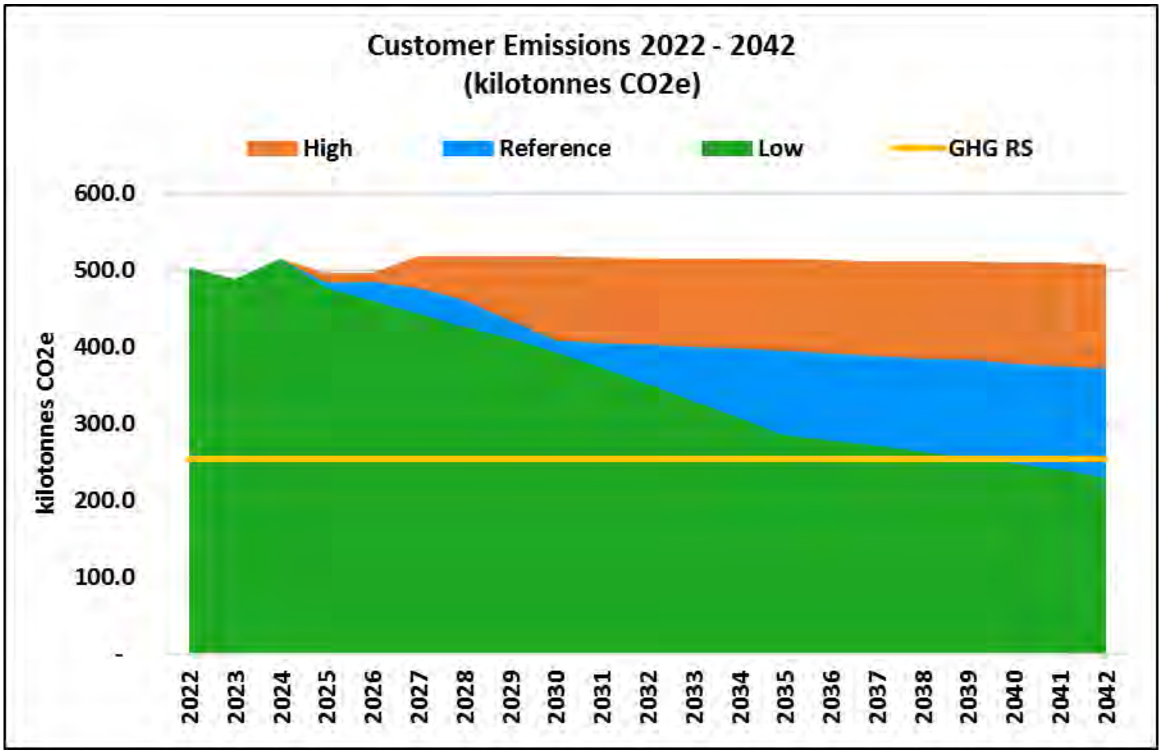
[60] The assumption of an allocation of the GHGRS between PNG and FortisBC based on throughput is used by PNG for illustrative purposes only. At this time, PNG has no information to suggest how, or even whether, the GHGRS will become a regulatory requirement, rather than a policy direction identified in the CleanBC Roadmap to 2030.

associated with deliveries to customers in the upstream oil and gas and the LNG production sector. The 490 ktCO2e~~497 ktCO2e~~ balance (i.e. 535 ktCO2e less 45 ktCO2e) arising in 2023 would then be subject to the proposed GHGRS.

In order to achieve the notional proposed GHGRS as noted above and based on its 2023 deliveries only, PNG would need to achieve a reduction in GHG emissions associated with its customers of approximately 236 ktCO2e~~243 ktCO2e~~ (i.e. 490 ktCO2e~~497 ktCO2e~~ less the 254 ktCO2e~~243 ktCO2e~~) in order to achieve the proposed GHGRS allocated to PNG of 254 ktCO2e. The implementation details of the proposed GHGRS in B.C. are highly uncertain, including knowledge of the role PNG will be expected to play in that implementation.

To further build on this example, if: (i) PNG were expected to proportionally reduce its allocated GHG emissions under the proposed GHGRS; (ii) PNG was able to achieve an RNG blend of 15 percent by 2030 as contemplated in the Roadmap; and (iii) increasingly stringent building code and equipment standards cause gas demand to decline as forecasted in PNG’s Reference Scenario, then the figure below would reflect PNG’s emissions reductions relative to the notional projected emissions cap in 2030. This outcome would still represent a significant shortfall in emissions reduction by 2030 relative to the proposed GHGRS. (Figure 60 and Table 28).

Figure 60: Forecast Customer GHG Emissions



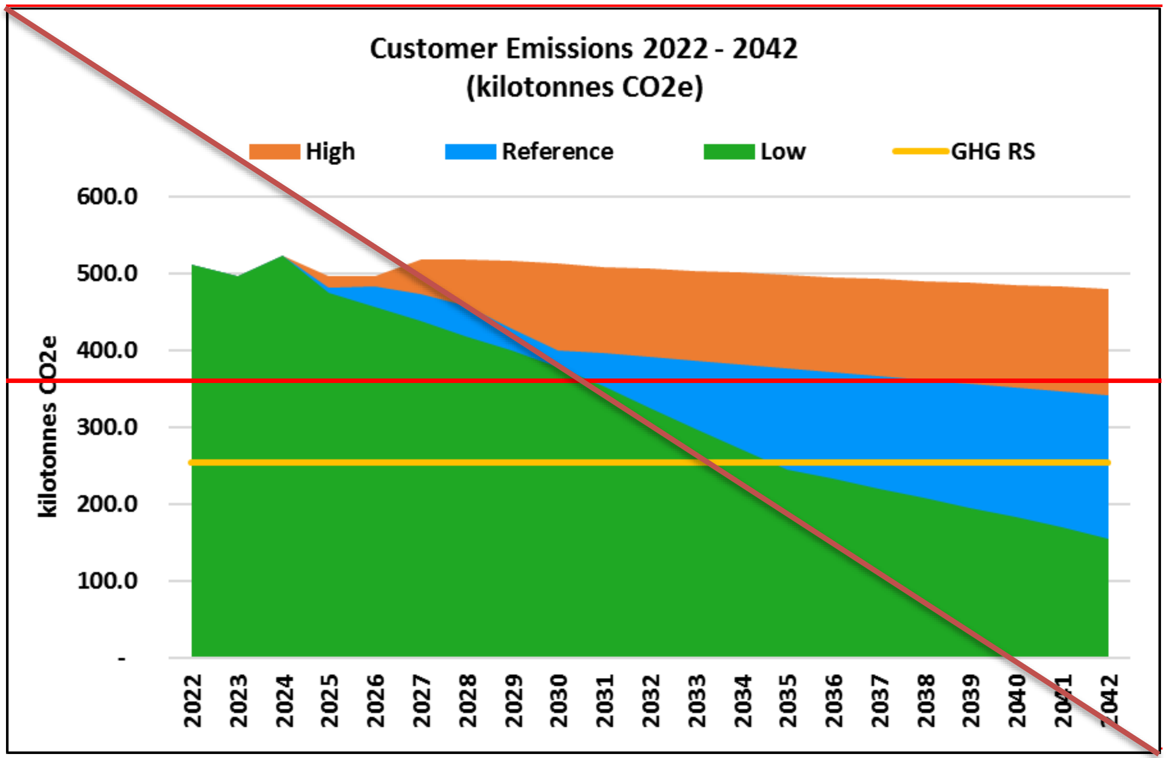


Table 28: Forecast GHG Emissions Compared to the Proposed GHGRS

2030 Emissions (kTCO2e)	Reference	Decarbonization Accelerated	Decarbonization Delayed
Emissions subject to the GHGRS	498.1	480.0	537.2
Less: Reduction from DSM	(6)	(7)	(6)
Less: Reduction from RNG	(84)	(80)	(12)
Net Emissions	408	394	519
GHGRS	254	254	254
Emissions reduction short fall	**154**	**140**	**265**

2030 Emissions (kTCO2e)	Reference	Decarbonization Accelerated	Decarbonization Delayed
Emissions subject to the GHGRS	500.3	480.0	542.9
Less: Reduction from DSM	(17)	(23)	(17)
Less: Reduction from RNG	(83)	(78)	(12)
Net Emissions	400	379	514
GHGRS	254	254	254
Emissions short fall	**146**	**125**	**260**

11 Portfolio Evaluation and Planning

11.1 Introduction

The purpose of preparing this CRP was to determine whether any actions are required at this time and in the foreseeable future with respect to supply side system capacity additions or supply resources.

Through its analysis of the current and forecast design day demand, and as presented in Section 7.1, PNG has demonstrated that the capacity of the transmission and distribution infrastructure of PNG-West, Fort St. John and Dawson Creek are sufficient to meet the design day demand of its firm service customers over the entire planning period, while Tumbler Ridge is forecast to experience a constraint in its ability to serve the design day demand by as early as 2025, depending on the demand from Quintette mine.

11.2 PNG-West

The design day forecasts developed as part of this CRP determine that no expansion of the deliverability of the PNG-West system as a whole is required to serve future demand under all scenarios contemplated. Under the current operating configuration with just one unit at compressor station R1 in operation, the current deliverability at Summit Lake is nearly sufficient to meet the peak winter demand on a design day. In order to ensure adequate delivery pressures at the western end of the system on cold winter days, PNG periodically adds additional compression from the unit at compressor station R3.

PNG has evaluated how it can serve additional demand from large customers. Additional demand can be added by increasing the operating pressure of the system through compressor station reactivation and associated pipeline integrity reinforcement. System reinforcement requirements will be driven by the size and location of the new load(s).

While PNG expects to meet the load requirements of firm service customers through operation of the R1 Summit Lake compressor station, demand growth in localized portions of the system may require area-specific system upgrades to alleviate system constraints. For example, PNG has recently upgraded a portion of its distribution system serving two small industrial customers in Telkwa whose operations were subject to curtailment risk due to system bottlenecks. PNG has made upgrades to the Telkwa distribution system, Telkwa Gate Station and the PNG-West Transmission line in 2023 to improve service reliability. However, the 1.25" high pressure lateral linking Telkwa Gate Station to the PNG-West Transmission line remains a limiting bottleneck on the local system. PNG may consider future upgrades to this lateral in future years depending on the demand outlook.

The entire PNG-West system is supplied at one end from a connection with the Enbridge-owned Westcoast T-South transmission system. An outage of transportation service on either T-South, or on the PNG-West system upstream of community and industrial loads would lead to a significant interruption of PNG ability to serve its customers. PNG's emergency response plans include actions to maintain service in such an event and include curtailment of interruptible and large industrial customers, short term supply of critical loads from existing line pack, and the delivery of LNG supplies. However, such measures cannot replace the loss of supply from T-South for any extended period of time.

11.3 Fort St. John

The Fort St. John System consists of a high-pressure pipe that begins in the Town of Taylor and runs parallel to the Alaska Highway for approximately 46 kilometres to the CNRL Stoddard gas plant located north-west of Charlie Lake. Gas is received at either end of the high-pressure pipe. Numerous regulating stations on this pipe reduce the pressure to portions of the distribution system supplying gas to the City of Fort St. John, the Town of Taylor, as well as outlying regions. In addition, gas can be received at seven other receipt points supplying portions of the distribution system as well as the non-integrated systems of Goodlow, Cecil Lake, and Kistkatinaw. The system therefore has a considerable degree of hydraulic flexibility.

The flexibility of the Fort St. John system and the relatively minor capital expenditures involved with any expansion of the capacity of the receipt regulating station facilities, should they be required, together do not warrant a more detailed analysis at this time.

Should demand growth in localized portions of the system arise, PNG may require area-specific system upgrades to alleviate system constraints.

11.3.1 Wonowon New Supply

Wonowon is an independent distribution system supplied by a high-pressure fuel gas system owned and operated by Petronas. Petronas provided PNG 18 months' notice of termination of service due to integrity concerns on their system in February 2024. In May 2024, Petronas notified PNG of the imminent need to shut down the supply point entirely.

PNG is now in the process of identifying its best supply alternative, comparing the cost of constructing a new supply point which will require PNG to construct a connection to the existing distribution system or supplying the town with LNG through a virtual pipeline. On an interim basis, the system will be serviced by LNG. If necessary, PNG will make an application to the BCUC for capital expenditure approval.

11.4 Dawson Creek

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 Penn West in 2014 (the Penn West segment), followed by the 10-kilometre Sunrise Lateral running south to the Dawson Creek Gate Station.

In 2013, PNG(N.E.) completed the construction of a six-kilometre high-pressure lateral extending from the Sunrise lateral at a point north of the Dawson Creek City limits, westward to serve the Air Liquide nitrogen production plant (since shutdown) and the Regional LNG plant at a site west of the city.

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

PNG has identified high integrity risk items on the single gas feed for Dawson Creek and rural areas that cannot be addressed without implementing a system-wide outage. Given the project costs, risks, and overall uncertainties for the previously identified Rolla Lateral Repair and Recommissioning project, which is a project that was exploring cost-effective upgrades and integrity repairs on the Penn West/Sunrise Lateral, PNG initiated a Dawson Creek High Pressure Supply Study to assess alternative supply options to maintain reliable gas supply to Dawson Creek.

Through this work, PNG has identified an alternative supply option in the region which would require construction of new pipeline infrastructure to connect to the new supply. PNG is evaluating the viability of this option as compared to repairing existing assets. If this option is viable, it would replace the System Betterment projects for the Rolla Lateral and the Sunrise/Penn West lateral. Construction would be estimated to commence in

2026.

11.5 Tumbler Ridge

The operational capacity of the Tumbler Ridge system is based on: (i) the provision of sufficient volumes of raw gas to the Tumbler Ridge gas plant; (ii) the acid gas processing capacity of the Tumbler Ridge gas plant; and (iii) the integrity of the transmission pipeline system that delivers processed sales gas to customers. PNG has assessed the long-term availability of raw gas supply (through evaluation of forecast gas reserves and well decline rates) and assessed the integrity of the transmission pipeline (via indirect inspection methods) to confirm there is sufficient gas supply and pipeline delivery capacity to serve the forecast demand from existing customers over the planning period and under both the Reference and Decarbonization Accelerated scenarios.

However, the sour gas processing capacity of the Tumbler Ridge gas plant is constrained and requires immediate attention. Through a combination of internal and third-party engineering assessments, PNG has determined that the Tumbler Ridge gas plant is currently limited to approximately 3 million standard cubic feet per day (MMSCFD) of processing capacity with up to 35 ppm of hydrogen sulphide (H_2S). This compares to the original gas plant design capacity of 9 MMSCFD with up to 500 ppm of H_2S. Accordingly, gas plant rehabilitation and reinforcement is required to maintain safe and reliable service to existing customers.

PNG intends to complete the identified rehabilitation and reinforcement works on the gas plant during 2024 and 2025 and will be applying to the BCUC under Section 44.2 of the UCA for approval of the associated expenditure schedule. With a restoration of sour gas processing capacity, PNG expects to have adequate capacity to reliably serve the demand from firm sales customers, and curtailable transportation service[61] under all planning scenarios.

[61] Roughly 80 percent of total gas volumes on the Tumbler Ridge system are delivered under a curtailable transportation service agreement to CNRL. In the event that supply or deliverability through the Tumbler Ridge gas plant or transmission system is inadequate to meet the demand from firm sales service customers, PNG has the right to curtail deliveries to CNRL and any Large Volume Customer taking in excess of 20,000 GJ/yr.

11.6 Gas Supply Resources

PNG has engaged a third-party to provide energy management services (EMS) in order to facilitate natural gas supply and transportation contracts necessary to meet the supply requirements for its geographically dispersed customer base. Acting on behalf of PNG, the EMS provider is responsible for: gas supply planning and resource selection analysis; gas supply contract negotiation and administration; daily energy management services; and monitoring and reporting on credit, hedging positions and gas prices.

The foundation for management of PNG's gas supply portfolio is the Annual Gas Contracting Plan (ACP) process. Preparation of the ACP is an annual process that is subject to review and approval by the Commission prior to its implementation. The ACP 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 1st.

The objectives of the ACP include: providing cost-effective gas supply that ensure secure and reliable gas deliveries to customers; achieving a balance of term diversity and cost effectiveness in the supply portfolio; and diversification of the gas supply portfolio and transportation capacity contracts to incorporate shorter and longer terms to allow for contracting flexibility.

PNG has developed a supply resource portfolio of gas commodity, storage and pipeline contracts in order to satisfy its gas contracting objectives. PNG ensures secure reliable supply by entering into a diversified gas supply portfolio to minimize the risk associated with any one particular supply option. In PNG's case, a diversified gas supply portfolio includes daily, monthly, seasonal and peaking gas supply contracts. In 2013, PNG incorporated gas storage services into its ACP in order to reduce PNG's exposure to the spot market and to provide security of supply and operational flexibility to manage load fluctuations due to weather, effectively providing additional gas cost certainty and winter price diversity. Further, PNG holds firm pipeline transportation capacity on the Spectra mainline (T-South from Station 2 to Summit Lake) consistent with PNG's estimated peak day demand from its firm sales customers in its PNG-West service area. Contracting in this manner allows PNG to meet its objectives of providing cost effective, safe, and reliable firm gas supply to its customers.

12 STAKEHOLDER CONSULTATIONS AND FIRST NATIONS RELATIONS

As noted previously, all of PNG's systems are not expected to require any incremental supply or capacity resources during the planning period. PNG has therefore not engaged stakeholders on matters related to the development of alternative resource portfolios.

As it has traditionally done, PNG will provide a copy of this 2024 CRP to the Residential Consumer Intervener Association (RCIA) and the BC Old Age Pensioners' Organization, Active Support Against Poverty, Council of Senior Citizens' Organizations of BC, Disability Alliance BC, and the Tenant Resource and Advisory Centre (BCOAPO et al.), both of whom regularly register as interveners in PNG-West and PNG(N.E.) matters, as well as to the British Columbia Sustainable Energy Association (BCSEA) who regularly register as an intervener in PNG resource plan and DSM/ECI funding matters..

13 APPENDICES

Appendix A: 2022 Residential End-use Study

Appendix B: Demand Forecasting End-use Model

Appendix C: Critical Driver Input Assumptions

Appendix D: Sensitivity Analysis Variables

Appendix E: Annual Demand Tables

Appendix F: Design Day Demand Tables

Appendix G: 2021 Conservation Potential Review

Appendix H: 2023 – 2024 ECI Plan

APPENDIX A: 2022 RESIDENTIAL END-USE STUDY

See attached PDF file: “Appendix A - PNG 2022 Residential End-use Study”

APPENDIX B: DEMAND FORECASTING END-USE MODEL

PNG retained Posterity Group Consulting Inc (PG) to develop the demand forecasting scenarios and DSM Plan. PG used the Navigator Energy and Emissions Simulation Suite ("Navigator") to develop the models to produce the load forecast scenarios for the 2024 CRP and DSM plan.

> *Disclaimer: Posterity Group's Navigator Energy and Emissions suite generates numerous outputs that can provide several insights into current and future energy use. However, there are limitations to the model outputs due to constraints on obtaining necessary input data and the priorities for enhancing the model's capabilities based on common uses to date. For example, changes to air quality and the associated impacts on human health from combusting various fuels or the societal costs from greenhouse gas emissions are currently not included in the model outputs.*

This section provides an overview of the model structure and scope for this project.

Model Parameters

Table 29 defines the six parameters that provides the structure for the model used for the CRP load forecast.[62]

Table 29: 2024 CRP end use model parameters

Parameter	Definition
Accounts[63]	Number of PNG customer accounts
Units	The basis for how energy consumption is expressed. The unit of analysis is unique to each sector: dwellings in the residential sector, square metres in the commercial sector and production capacity in the industrial sector.
Size	The change in average number of units per account. In the reference case, this is primarily used to reflect the forecast change in production volumes in the Industrial sector.
Saturation	For most end uses, saturation is the extent to which an end-use is present in a region and segment.64
Fuel Share	The percentage of the energy end-use that is supplied by each fuel.
Unit Energy Consumption (UEC)	The amount of energy used by each end-use per unit.

[62] Some of the model parameters are adjusted when necessary to reflect a distinct characteristic of a sector. Any adjustments are explained in this document.
[63] PG uses 'Accounts' instead of customers in this document as one customer could have multiple accounts.
[64] A segment is a grouping or category of buildings (e.g. single-family detached in Residential, or large offices in Commercial). Segments reflect the main purpose of the building and helps to differentiate between energy use intensity or patterns across building types within a sector.

Once each parameter of the model is populated with the applicable data, energy consumption is calculated for a specific end use for each region, segment, and vintage each year using the following equation:

*Consumption = Units * Saturation * Fuel Share * Unit Energy Consumption*

Size and Accounts can both be used to scale Units, which appear in the consumption equation. Size is used to scale Units when units per account is changing. (For example, if the average size in square metres of a commercial building is changing over time.) Accounts are used to scale Units when the number of Accounts is changing.

The model is populated with inputs for each parameter, as explained in the following section.

Key Data Sources to Populate the End-Use Model

Key data sources common to all sectors used to populate the end-use model base year:

- *2023~~2022~~ "Actuals":* PNG provided PG with 2023~~2022~~ gas demand in GJs and number of PNG customers by region, sector, and sub-sector. These actuals provided the basis for the base year (2023~~2022~~) of the forecast. PG maps these actuals into the model parameters (outlined above) and calibrates back to the actuals provided by PNG (as explained in the base year worked examples for each sector).
- *2022 PNG REUS:* PNG provided PG with its 2022 Residential End-Use Study. This source is used to update data in the residential model relating to dwelling type, end use saturation, fuel share, and UEC.
- *2021 PNG Conservation Potential Review:* The 2021 PNG CPR model is used to fill in data gaps in the base year development, when necessary.

CRP Model Scope

This subsection outlines coverage of the CRP end-use model in terms of forecast period, regions, sectors, segments, end uses, and vintages.

Forecast Period

The CRP begins with a base year of 2023~~2022~~. The Reference case forecast is for 2024~~2023~~ to 2042, with results available in annual increments.

Regions

The CRP covers the following regions in PNG's service territory:

- Pacific Northern Gas West Region (PNG-West)
- Fort St. John (FSJ)
- Dawson Creek (DC)
- Tumbler Ridge (TR)

Segments, End Uses & Vintages by Sector

The CRP covers three sectors: residential, commercial, and industrial. Each sector is unique and has important differences which are reflected in how inputs and outputs are organized. PG used the key data sources described above to populate the model parameters to generate a model of each sector. PNG's customer data is organized by customer type that PG mapped to sectors. Table 30 show how PNG's customer types, or sub-sectors, were mapped to the sector models.

Table 30: Base year data sub-sector to sector mapping

Sector	Sub-Sector	Notes
Residential	Residential	
Commercial	Small Commercial	
	Large Commercial Firm Sales (RS3)	
	Commercial Transportation (RS23)	
	Commercial Firm Transportation (RS22, RS24)	
	Seasonal	
	NGV	
	Company Use (Commercial)	Assume 1% company use is Commercial
	Interruptible Sales and Transport (Commercial)	Large Commercial (RS5) only
Industrial	Small Industrial Firm Sales (RS4)	
	Industrial Transportation	
	Regional LNG (RS7)	
	Company Use (Industrial)	Assume 99% company use is Industrial
	Interruptible Sales and Transport (Industrial)	Small Industrial IT Transport (Special Contract) Industrial IT Transport (BC Hydro)

Table 31 presents how inputs and outputs for each sector are disaggregated by segment, end use, vintage, rate class, and fuel.

Table 31: CRP End-use model scope and granularity

	Residential	Commercial	Industrial
Segments	Single Family Detached/Duplexes Single Family Attached/Row Mobile/Other Residential	Apartments - Medium Apartments - Large Food Retail Hospital Hotel – Medium Hotel – Large Non-Food Retail – Medium Non-Food Retail – Large Nursing Home Office – Medium Office – Large Other Commercial	Agriculture Pulp & Paper - Kraft Upstream Oil and Gas Utilities Wood Products

	Residential	Commercial	Industrial
		Restaurant School – Medium School – Large University/College Warehouse	
End Uses	Clothes Dryer Clothes Washer Cooking Dishwasher Dishwasher DHW Washer DHW Shower DHW Other DHW Fireplace Other Electrical Internal Loads Other Gas Uses Pool & Spa Heaters Space Cooling Space Heating Ventilation and Circulation	Space Heating Water Heating Food Service Other Pools; Spa & Hot Tubs	Direct-fired Heating Direct Gas Use Heat Treating Kilns On-Site Generation Other Ovens Product Drying Petrochem Refining Process Boilers Space Heating Water Heaters
Vintages[65]	Pre-1950 1950-1975 1976-1985 1986-1995 1996-2005 2006-2015 Post-2015	Existing New	Existing New
Rate Classes	101 111 113 201 301 401	102 114 103 106 122 124 C199 105 202 203 223 C299 302 303 323 C399 402 403 C499	104 N109 I199 N100 204 N209 I299 304 N300 I399 404 I499
Fuels	Natural gas Renewable natural gas (RNG)		

[65] The residential sector has Vintages to define time periods when residential dwellings are built. Existence Categories also apply to the residential vintages, as there is conversion of existing dwellings into new homes (i.e., renovations). 'New' residential dwellings do not appear until the first year of the reference case.

Appendix C: Critical Driver Input Assumptions

This section describes each Critical Driver, how the settings were developed, and the approach used to model their impact on annual consumption and GHG emissions using the end-use model described in appended Appendix A: PNG 2022 Residential End-use Study and in Appendix B: Demand Forecasting End-use Model.

Carbon Price

Description	BC Carbon Tax applied to greenhouse gas (GHG) emissions from stationary combustion of natural gas.
Modelling Approach	Used to estimate the change in annual consumption in response to changes in carbon taxes. As prices change relative to the reference prices, customers decrease demand for gas and are assumed to switch to electricity when applicable equipment reaches the end of life. The fuel share for natural gas for these end uses declines.
Settings	• High: BC carbon price increases as planned to \$170/tonne in 2030 and increases by \$15/tonne every year thereafter. • Reference: BC carbon price as announced; escalating to \$170/tonne in 2030 and held constant afterwards • Low: BC carbon price held constant after 2024 at \$80/tonne
Applicability	• All sectors
Model parameter adjusted	Natural Gas Fuel Share
Data Source(s)	• BC Government, Environment and Climate Change Canada

Assumptions, Caveats and Limitations	• The Carbon Tax increases on April 1 of each year in BC. Applied the expected price for April 1 for the entire year since that is the price for the majority of the year (i.e., on April 1, 2023 the price went from $50 to $65/tonne, so $65/tonne was used for all of 2023). • Tax rebates are not incorporated in the analysis. • Not estimating the societal cost of carbon emissions; just the cost of the energy user for emissions associated with using gas. • Only own-price elasticity is used, and cross-price elasticity is not considered when adjusting gas demand in response to changes in gas prices. • Comparison to other fuel sources (i.e., electricity) is not used when adjusting gas consumption in response to changes in gas price. • Changes to burner tip prices and carbon prices impact fuel share for natural gas only; RNG fuel shares are not adjusted because the amount of RNG on PNG's system is currently driven by policy and there are some customers that are willing to pay a premium for RNG therefore the relationship between price and demand for RNG may be different than for fossil-natural gas. • Prices are inputted in the model in real terms (2022 CAD).

Setting Development

PG and PNG worked collaboratively to develop the carbon price settings based on announced policy plans by the federal and B.C governments.

The low setting was not set to $0 although that is a plausible lower bound because it is assumed there would be no political appetite in BC to abolish the Carbon Tax.

Analysis Approach and Modelling Method

First, carbon prices in cost per tonne of CO_2e in nominal terms are converted into real values and then into $ per GJ. Carbon prices are combined with burner tip prices (described below) to develop an annual cost of gas by sector (burner tip prices for Commercial sector accounts are split into small commercial and large commercia).

We apply the price elasticity value for each sector to calculate the change in demand when there is a change in reference case prices for natural gas and/or carbon. This calculation is conducted in Excel, outside of the Navigator model. The calculated change in demand is then used as a "target" to achieve, and the Navigator models calculate the required fuel shares to meet the gas demand target, with changes to fuel share changes constrained by end use lifetimes and fuel switching assumptions.

Burner Tip Price

Description	Price to PNG customers including the monthly fee, delivery, and commodity charge ("burner tip price" for simplicity). Excludes carbon tax, price for RNG, biomethane credit, DSM and offsets as those prices are captured in other Critical Drivers. Projected commodity prices are used as a proxy to inform how prices to PNG customers may change.
Modelling Approach	Used to estimate the change in demand for gas in response to changes in prices that PNG customers may face. As prices change relative to the reference prices, customers decrease demand for gas and are assumed to switch to electricity when applicable equipment reaches end of life. The fuel share for natural gas for these end uses declines.
Settings	• High: High commodity price is 2.1x the reference case commodity price as determined by medium and high price forecasts from NWPCC. Delivery cost is 1.5x that of the reference case, as per direction from PNG. Deviation from the reference case is gradually introduced after 2023. • Reference: as per PNG's forecast • Low: Low commodity price is 0.45x the reference case commodity price as determined by medium and low price forecasts from NWPCC. Delivery cost is 0.9x that of the reference case, as per direction from PNG. Deviation from the reference case is gradually introduced after 2023.
Applicability	• Annual prices applied by sector and region
Model parameter adjusted	Natural Gas Fuel Share
Data Source(s)	• PNG • Northwest Power and Conservation Council (NWPCC), "The 2021 Northwest Power Plan" https://www.nwcouncil.org/2021-northwest-power-plan/
Assumptions, Caveats and Limitations	• Changes to burner tip prices and carbon prices impact fuel share for natural gas only; RNG fuel shares are not adjusted because the amount of RNG on PNG's system is currently driven by policy and there are some customers that are willing to pay a premium for RNG therefore the relationship between price and demand for RNG may be different than for fossil-natural gas. • Only own-price elasticity is used, and cross-price elasticity is not considered when adjusting gas demand in response to changes in gas prices. • Comparison to other fuel sources (i.e., electricity) is not used when adjusting gas consumption in response to changes in gas price. • Prices are inputted in the model in real terms (2022 CAD).

Setting Development

PNG-provided the burner tip price forecasts by region and customer type[66] that are used for the reference settings. High and low settings were developed using gas commodity price forecasts from The Northwest Power and Conservation Council's (NPCC) 2021 Northwest Power Plan to scale the 'reference' setting commodity prices. We used the relative change from the NPCC's medium scenario to their high/low scenarios on an annual basis and applied these annual factor differences to the PNG commodity price forecast. These factor differences were compared to historical Station 2 annual gas prices from 2010 to 2022 to ensure they reflect the variation in historical gas prices. Deviation in the High/Low settings from the reference setting is applied gradually over the first 5 years. Beginning in 2024, the deviation from the reference setting is restricted to 20% of the calculated difference, which increases by 20% each year (e.g. in 2025, the deviation from the forecasted price is 40% of the calculated difference, and so on).

Analysis Approach and Modelling Method

Please see the approach outlined under the Carbon Price CD which includes how the impact of changing burner tip prices is modelled.

Blend Percentage of Renewable Natural Gas (RNG)

Description	Percent blend of annual consumption by volume of renewable natural gas (RNG)
Modelling Approach	The fuel share of the 'baseline' fuel of fossil-natural gas is reduced and the fuel share for RNG is increased to meet the annual percent blend target. As such, the portion of annual consumption met by fossil-gas demands and the portion of annual consumption met by RNG increases. GHG emissions decline as fossil-gas is displaced by RNG.
Settings	• Low: Fails to meet CleanBC targets; remains constant at 2025 level of 2% • Reference: Meets CleanBC target of 15% by 2030 and remains constant thereafter. • High: Meets CleanBC target of 15% by 2030 and increases to 30% in 2035, remaining constant thereafter.
Applicability	• All sectors

[66] PNG price forecasts were provided by region and the following customer types: residential, small commercial, large commercial, and small industrial. PG applied the residential prices to the residential sector model, the small and large commercial prices to small and large customers within the commercial sector model, respectively, and the prices for the small industrial customers to the industrial sector model.

Model parameter adjusted	Fuel share
Data Source(s)	• PNG
Assumptions, Caveats and Limitations	• RNG is divided into the sector-models based on base year (2022) proportions of fossil-gas consumption. • Cost to procure the RNG is not a model input to determine the amount of RNG on this system, nor is the price customers may pay for RNG. This is assumed because: A) RNG amounts are thought to be mainly driven by policy (i.e., CleanBC); B) the amount PNG can charge customers for RNG is regulated and may not be equal to the cost to procure RNG; and, C) the price elasticity of demand for RNG may not be the same as for natural gas, as some customers may be willing to pay a premium for a lower-carbon fuel.

Setting Development

PG and PNG developed the settings in collaboration based on what is currently planned via the Low Carbon Energy Program and based on the Roadmap RNG blend targets.

Analysis Approach and Modelling Method

PG worked with PNG to establish the RNG blend targets in each year of the forecast period for each setting. The blend percentages are based on current policies from the BCUC and provincial government, and elements of the CleanBC plan related to RNG.

We assume that RNG is blended into PNG's system so each sector-model receives RNG. The amount is allocated across the sectors based on the proportion in the base year (2022) gas consumption.

The blend targets of RNG are met by adjusting fossil-gas fuels shares down and increasing the fuel share for RNG. The model calculates the required gas fuels shares necessary to obtain the desired amount of RNG.

Customer Accounts – Residential Sector

Description	Change in number of accounts by sector calculated by multiplying the household formation forecasts with assumed capture rates.
Modelling Approach	The change in number of accounts impacts annual consumption which scales GHG emissions, all else being equal. More accounts relative to the Reference scenario, consumption and emissions increase; and vice versa.
Settings	All scenarios use the same household formation projections. Capture rates are adjusted to produce different settings: • Low: 10% lower capture rates • Reference: use capture rates from the 2019 CRP

	• High: 10% higher capture rates
Applicability	• Residential sector
Model parameter adjusted	Number of accounts
Data Source(s)	• PNG • BCStats, "Household Projections for British Columbia". https://bcstats.shinyapps.io/hsdProjApp/
Assumptions, Caveats and Limitations	• Capture rates taken from 2019 CRP

Setting Development

The number of accounts by year and region within the sector are changed as per the setting applied to the scenario. The following steps were taken to develop the setting input values:

Step 1: Obtain housing start projections

We used the BC Stats dataset for household projections from 2023 to 2042 by municipality[67], and selected the municipalities relevant to PNG's service territory. As per Exhibit 1, we mapped the municipalities into PNG regions.

Exhibit 1: Municipalities in PNG service areas

Municipality	PNG System
Prince Rupert	PNG West
Kitimat	PNG West
Terrace	PNG West
Burns Lake	PNG West
Smithers	PNG West
Unincorporated Areas – Bulkley-Nechako	PNG West
Tumbler Ridge	Tumbler Ridge
Dawson Creek	Dawson Creek
Fort St. John	Fort St. John

We calculated growth in houses based on the change in households each year by region.

[67] "Household estimates & projections for British Columbia." BCStats. https://bcstats.shinyapps.io/hsdProjApp/. Accessed on September 20th, 2023.

Step 2: Develop capture rate settings

Capture rates reflect the portion of new construction residential dwellings that become PNG customers. PNG provided historical data on housing starts, customers, customer additions, and capture rates, by region. We planned to use historical capture rates, however, the number of housing starts and customer additions was too low to produce meaningful data. Instead, we used the capture rates by region from the 2019 CRP. Electrification of new building stock is addressed by the Building Codes – New Construction and Appliance Standards critical drivers, thus, the capture rates are not adjusted *over* the forecast period. Rather, two settings deviate from the reference setting to capture variation in capture rates: high is 10% higher than reference and low is 10% lower. (The change in housing starts over the forecast period provides variation in number of new residential customers over the forecast period). Exhibit 2 provides the capture rates for residential new construction by PNG region and setting.

Exhibit 2 – Residential housing start capture rate settings by region

Scenario	Low	Reference	High
PNG-West	68%	78%	88%
FSJ/DC	80%	90%	100%
TR	80%	90%	100%

Step 3: Apply capture rates to housing start projections

The capture rate settings were applied to the housing start projections to get the growth rate of residential accounts by region for each setting.

Analysis Approach and Modelling Approach

The number of new accounts in the residential sector model are adjusted by region based on the growth rate in the setting for the scenario. As these customer additions are assumed to be new construction dwellings, the increase in annual consumption is based on the expected usage per customer for a newly constructed residential dwelling. GHG emissions scale accordingly.

Customer Accounts – Commercial Sector

Description	Change in number of accounts by sector calculated by multiplying population forecasts by assumed capture rates.
Modelling Approach	The change in number of accounts impacts annual consumption which scales GHG emissions, all else being equal. More accounts relative to the Reference scenario, consumption, and emissions increase; and vice versa.

Settings	All settings use the same population projections. Capture rates are adjusted to produce different settings: • Low: 10% lower capture rates • Reference: use capture rates from the 2019 CRP • High: 10% higher capture rates
Applicability	• Commercial sector
Model parameter adjusted	Number of accounts
Data Source(s)	• BC Stats, "Population Estimates & Projections for British Columbia". https://bcstats.shinyapps.io/popApp/
Assumptions, Caveats and Limitations	• Capture rates taken from 2019 CRP

Setting Development

The number of accounts by year and region within the sector are changed as per the setting applied to the scenario. The following steps were taken to develop the setting input values:

Step 1: Obtain population projections

We used the BC Stats dataset for population projections from 2023 to 2042 by municipality[68], and selected the municipalities relevant to PNG's service territory. We mapped the municipalities into PNG regions in accordance with Exhibit 1.

Step 2: Develop capture rate settings

Similar to the residential sector, the capture rates by region for the reference scenario reflect the initial capture rates from the 2019 CRP. The high setting is 10% higher than reference and low is 10% lower. Capture rates do not vary by year. Exhibit 3 provides the capture rates for commercial new construction by PNG region and setting.

[68] "Population estimates & projections for British Columbia." BCStats. https://bcstats.shinyapps.io/popApp/. Accessed September 20th, 2023.

Exhibit 3 – Commercial new building capture rate settings by region

Scenario	Low	Reference	High
PNG-West	75%	85%	95%
FSJ/DC	90%	100%	100%
TR	90%	100%	100%

Step 3: Apply capture rates to population projections

Capture rate settings are applied to the population projections to obtain the growth rate of new commercial accounts by region.

Analysis Approach and Modelling Method

The number of new accounts in the commercial sector model are adjusted by region based on the growth rate in the setting for the scenario. Unlike the residential sector model, vintage is not assigned to commercial dwellings. Rather, the existence category is used to reflect if an account existed in the base year or was added during the forecast period. Annual consumption increases when accounts are added, all else being equal, and GHG emissions scale accordingly. As these customer additions are assumed to be new construction dwellings, the increase in annual consumption is based on the expected usage per customer for a new construction *commercial* dwelling. GHG emissions scale accordingly.

Customer Accounts – Industrial Sector

Description	Change in number of accounts by sector
Modelling Approach	The change in number of accounts impacts annual consumption which scales GHG emissions, all else being equal. The more accounts relative to the Reference scenario, the more consumption and emissions increase; and vice versa.
Settings	• Reference: no change in number of industrial customer accounts
Applicability	• Industrial sector
Model parameter adjusted	Accounts
Data Source(s)	• PNG
Assumptions, Caveats and Limitations	• The number of Industrial sector accounts is not adjusted because it is difficult to forecast the number of industrial customers and one industrial customer can have a significant impact on consumption and emissions

	depending on its load. Therefore, large customer demand is forecasted and varied across the scenarios.

Setting Development

Based on PNG's customer account forecasting method and direction from the BCUC to vary large customer addition/exit via sensitivity analysis, we decided to not change the number of industrial accounts in the scenarios. Therefore, no high or low settings were developed.

Analysis Approach and Modelling Method

Industrial customer accounts are held constant throughout the forecast period and in all scenarios. (Instead of varying accounts, demand from the industrial sector is adjusted in the scenarios. Please see section 0 for a description of how industrial demand was modelled.)

Large Customer Demand

Description	Change in annual demand from large customers
Modelling Approach	The SIZE parameter in the Navigator industrial-sector model and the UEC parameter in the Navigator commercial-sector model are adjusted to match the large customer demand forecast scenarios provided by PNG. This scales consumption without changing other model parameters. GHG emissions scale accordingly
Settings	• Forecasts of individual large customers for the low, high and reference scenarios provided by PNG.
Applicability	• Industrial and commercial sector by region and segment
Model parameter adjusted	Size and UEC
Data Source(s)	• PNG
Assumptions, Caveats and Limitations	• In the Low and Reference settings, one customer has demand go to zero in 2025. As a result, the account is excluded in the account totals in the results.

Setting Development

PNG provided reference, high and low forecasts of large customer demand by region.

Approach

PG adjusts the SIZE parameter in the industrial-sector model and the UEC parameter in the commercial-sector model to reflect the change in demand.

Building Code - New Construction Code

Description	As part of the Roadmap , the province adopted the B.C. Energy Step Code as regulation in the B.C. Building Code. The B.C. Energy Step Code is a five-step performance-based standard for new construction, with each step requiring a certain level of energy efficiency improvement. As of May 1, 2023, new construction was mandated to attain Step 3 for Part 9 buildings and Step 2 for Part 3 buildings and will be increased so that new buildings are net-zero ready by 2032. Local governments are permitted to enforce compliance with higher steps.
Modelling Approach	More stringent building codes for new construction decreases space heating UEC
Settings	• Reference • Accelerated • Delayed
Applicability	• Residential and commercial sectors • New buildings • Hot water and space heating end uses
Model parameter adjusted	UEC
Data Source(s)	• Government of British Columbia. https://www2.gov.bc.ca/gov/content/industry/construction-industry/building-codes-standards/energy-efficiency • “Energy Step Code”. https://energystepcode.ca/ • Government of British Columbia, “CleanBC Roadmap to 2030”. https://www2.gov.bc.ca/assets/gov/environment/climate-change/action/cleanbc/cleanbc_roadmap_2030.pdf
Assumptions, Caveats and Limitations	• Already announced step code performance requirements largely remain unchanged. • NECB2025 requirements do not surpass the stringency of the B.C Step Code • Municipalities do not voluntarily adopt higher Step Codes than required

Setting Development

The table below provides details of the adoption of the B.C. Energy Step Code for each setting. The reference case reflects the implementation of the Step Code under the B.C. Building Code as planned: “In future, new homes will need to be built better than the current BC Building Code: 20 per cent more energy efficient by 2022, 40 per cent more energy efficient by 2027, 80 per cent more energy efficient by 2032 which is the net-zero energy ready standard.” This scenario is consistent with meeting the Roadmap goal of zero-carbon new construction by 2032. The accelerated scenario reflects faster adoption of the net-zero ready Step equivalent than currently required by the B.C. Building Code with its adoption by 2027. The Delayed setting exhibits slower adoption of net-zero ready Steps and failure to meet the CleanBC target of net-carbon new construction by 2032. It's worth noting that new buildings are also obligated to comply with the federally mandated National Energy for Buildings (NECB). This standard, which is periodically updated every five years and was most recently updated in 2020, is less stringent than the B.C. Energy Code and modeling shows that buildings that adhere to Step 2 of the B.C. Energy Step Code typically surpass the 2020 NECB.[69]

Exhibit 4 – Timeline of B.C. Step Code implementation

Setting	Years	Residential	Commercial
Reference	2023-2026	Step 3	Step 2
	2027-2031	Step 4	Step 3
	2032-2042	Step 5	Step 4
Accelerated	2023-2026	Step 3	Step 2
	2027-2042	Step 5	Step 4
Delayed	2023-2026	Step 3	Step 2
	2027-2035	Step 4	Step 3
	2036-2042	Step 5	Step 4

Analysis Approach and Modelling Method

The BC Energy Step Code's performance-based approach allows buildings to use a variety of measures to meet the required energy efficiency levels. Specific numeric targets for Thermal Energy Demand Intensity (TEDI) and Total Energy Use Intensity (TEUI) are set on a prorated scale according to building type and climate zone[70] with additional TEUI allowances provided for small houses disproportionally impacted by water heating or houses with cooling systems not to discourage the inclusion of space cooling systems.[71] To approximate the impact of the BC Energy Step Code we reference suggested guidelines for achieving the Steps. For Part 3 buildings, the Step Code targets indicate similar declines in both TEDI and TEUI. We assume that space heating

[69] https://energystepcode.ca/app/uploads/sites/257/2022/10/BC-Energy-Step-Code_Metrics-Report_2022-09-29-R1-Compressed.pdf.

[70] https://energystepcode.ca/app/uploads/sites/257/2022/10/BC-Energy-Step-Code_Metrics-Report_2022-09-29-R1-Compressed.pdf.

[71] http://energystepcode.ca/app/uploads/sites/257/2018/09/2018-Metrics_Research_Report_Update_2018-09-18.pdf.

decreases in line with the TEDI savings estimates, while water heating trends more closely with the total energy savings estimates and are consistent across all residential building types.[72] These energy efficiency savings are shown as the change in UEC to space heating and water heating in the table below. In contrast, for Part 3 buildings, the Step Code targets suggest that the reduction in TEDI corresponds with overall energy savings whereas the decrease in TEUI is less substantial. With this in mind, we anticipate the decrease in water heating consumption for commercial buildings to be approximately half of the reduction observed in space heating for commercial buildings covered under the Step Code, which includes MURBs, hotels, offices, retail spaces, warehouses, and restaurants. Buildings classified as Group A, such as schools, libraries, colleges, and recreation centers, along with Group B buildings, like hospitals and care centers are currently covered by Step 1, however, the performance requirements for higher steps have not yet been established for these buildings[73]. To account for this uncertainty, these buildings are determined to lag the Step Code implementation (as shown in Exhibit 4) by 1 step.

Exhibit 5 – Residential percent energy savings – Reference scenario

	2023-2026: Step 3		2027-2031: Step 4		2032-2042: Step 5	
	Space Heating	Water Heating	Space Heating	Water Heating	Space Heating	Water Heating
All residential buildings	20%	20%	40%	40%	80%	80%

Exhibit 6 – Residential percent energy savings – Accelerated scenario

	2023-2026: Step 3		2027-2031: Step 5		2032-2042: Step 5	
	Space Heating	Water Heating	Space Heating	Water Heating	Space Heating	Water Heating
All residential buildings	20%	20%	80%	80%	80%	80%

Exhibit 7 – Residential percent energy savings – Delayed scenario

	2023-2026: Step 3		2027-2035: Step 5		2036-2042: Step 5	
	Space Heating	Water Heating	Space Heating	Water Heating	Space Heating	Water Heating

[72] energystepcode.ca/app/uploads/sites/257/2022/10/BC-Energy-Step-Code_Metrics-Report_2022-09-29-R1-Compressed.pdf.
[73] www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/construction-industry/building-codes-and-standards/bulletins/b19-08_step_code_revision_2_bulletin_2020_01_08.pdf.

All residential buildings	20%	20%	40%	40%	80%	80%

Exhibit 8 – Commercial percent energy savings – Reference scenario

	2023-2026: Step 2		2027-2031: Step 3		2032-2042: Step 4	
	Space Heating	Water Heating	Space Heating	Water Heating	Space Heating	Water Heating
Step-Code buildings	20%	10%	40%	20%	80%	40%
Non-Step-Code buildings	0%	0%	20%	10%	40%	20%

Exhibit 9 – Commercial percent energy savings – Accelerated scenario

	2023-2026: Step 3		2027-2031: Step 4		2032-2042: Step 4	
	Space Heating	Water Heating	Space Heating	Water Heating	Space Heating	Water Heating
Step-Code buildings	20%	10%	80%	40%	80%	40%
Non-Step-Code buildings	0%	0%	40%	20%	40%	20%

Exhibit 10 – Commercial percent energy savings – Delayed scenario

	2023-2026: Step 2		2027-2035: Step 3		2036-2042: Step 4	
	Space Heating	Water Heating	Space Heating	Water Heating	Space Heating	Water Heating
Step-Code buildings	20%	10%	40%	20%	80%	40%
Non-Step-Code buildings	0%	0%	20%	10%	40%	20%

Building Code – Retrofit

Description	Currently, there is no federal retrofit code. However, there has been discussion about the implementation of retrofit codes, both at the provincial and at the federal level. The CleanBC roadmap outlined guidelines to implement an Existing Buildings Renewal Strategy by 2024 while the Government of Canada has committed to develop a retrofit code by the same year.
Modelling Approach	Retrofit code for existing buildings would require all retrofits to include energy efficiency upgrades, decreasing space heating and water heating energy consumption.
Settings	• Reference – no retrofit code • Retrofit Code
Applicability	• Residential and commercial sectors • Existing buildings • Space heating end use

Model parameter adjusted	UEC	
Data Source(s)	•	Government of British Columbia, "Existing buildings renewal strategy". https://www2.gov.bc.ca/gov/content/industry/construction-industry/building-codes-standards/existing-buildings
	•	Efficiency Canada, "Federal mandate letters". https://www.efficiencycanada.org/federal-mandate-letters/
Assumptions, Caveats and Limitations	•	Very limited publicly available information on potential retrofit codes

Setting Development

Research Potential Retrofit Code Implications

In the absence of publicly available details of the B.C. Existing Buildings Renewal Strategy and the federal retrofit code, both planned for release in 2024, we estimated the potential implications of a retrofit code. We reviewed the following literature to inform our assumptions:

- The summary of developments from the Task Group on Alterations to Existing Buildings[74] suggested that the incoming retrofit code should be triggered when buildings undergo minor or major alterations but should not be as stringent as the current code that applies to new buildings.
- In their analysis of the impacts of the CleanBC policies, Navius Research assumes that "1.5% of pre-2010 vintage buildings are retrofit every year after 2030. Residential buildings must reduce their heat load demand (i.e., by improving shell thermal efficiency) by 20%, while commercial buildings must reduce their heat load demand by 15%."[75] Alternatively, Pembina Institute states that given the transition of new construction to net-zero ready by 2032 a deep retrofits scenario, implying 3% of building stock undergoing deep retrofits (60% reduction in energy consumption) would be required in order to achieve the remaining emissions cuts in the CleanBC pathway.[76]

Analysis Approach and Modelling Method

Assume Retrofit Code Scenarios

[74] Canadian Commission on Building and Fire Codes, *Final Report – Alterations to Existing Buildings* (April 2020).
[75] Navius Research, *Supporting the Development of CleanBC: Methodology report for assessing the impacts of CleanBC policies*.
[76] Pembina Institute, "Deep emissions reduction in the existing building stock", 2017. [Online]. Available: https://www.pembina.org/reports/retrofit-strategy-bc-report-2017.pdf.

We developed two settings to reflect a future potential retrofit code:

- Reference – no retrofit code is implemented.
- Retrofit Code – retrofit code takes effect in 2030 and 2% of existing residential and commercial buildings are retrofitted each year. In these buildings, space heating consumption is reduced by 20% for residential dwellings and 15% for commercial buildings. This timeline reflects the implementation period once the retrofit codes are announced (currently planned for 2024).

Accounting for Added Footprint from Renovations

Some retrofits may expand the footprint of the house, which can negate the increase in energy efficiency. However, historic data on permitted renovations – which we assume reflect larger renovation projects which may increase the square footage of the dwelling – accounted for only approximately 1% of total retrofits. Therefore, we did not seek to account for retrofits which may increase the size of the dwelling as it would likely have an immaterial impact on the scenario results.

Appliance Standards

About

Description	Federal and provincial minimum energy performance standards (MEPS) for energy-using appliances.
Modelling Approach	More stringent appliance standards increase energy efficiency thereby decreasing UEC for applicable end uses.
Settings	• Reference • Higher stringency
Applicability	• Residential and commercial sectors • Existing buildings • Space heating end use
Model parameter adjusted	UEC
Data Source(s)	• Natural Resources Canada (NRCan), "Energy Efficiency Regulations". https://natural-resources.canada.ca/energy-efficiency/energy-efficiency-regulations/6845 • Government of British Columbia, "Energy Efficiency Standards". https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/energy-efficiency-conservation/policy-regulations/standards

Assumptions, Caveats and Limitations	• Higher MEPS for new construction is accounted for in the new construction energy code (Section 0) • Only recently implemented standards are included as a critical driver. For example, gas furnaces MEPS have been consistent since 2015, so these are assumed to be modeled through natural replacement, rather than standards as a critical driver.

Analysis Approach and Modelling Method

We developed two settings for appliance standards that reflect future potential MEPS from NRCan and the BC Government. The reference setting reflects in-market NRCan and BC-specific MEPS implemented as of 2023. The higher stringency setting is informed by future amendments to existing MEPS, specifically:

- NRCan's Energy Efficiency Regulation, Amendment 17
- NRCan's 2023-2025 Forward Regulatory Plan
- BC's Energy Efficiency Standards

We reviewed these sources to identify the most stringent MEPS relevant to PNG's service territory by equipment which is summarized in Exhibit 11.

Exhibit 11 – Appliance standard settings by relevant end use

Equipment (end use)	Reference setting	Higher Stringency setting
Gas boilers (space heating)	Amendment 17 to the Energy Efficiency Standards increases the required efficiency of gas boilers for both residential and commercial applications. The Annual Fuel Utilization Efficiency is required to be greater than 90% for residential boilers and the thermal/combustion efficiency is required to be greater than 90% for commercial boilers, both of which are consistent with future NRCan regulations.	Included in list of equipment under Amendment 17 and to include future potential increases of efficiency from BC government is an increase in required efficiency of 95% for both residential and commercial boilers by 2030.
Gas furnaces (space heating)	In 2015, the minimum efficiency of both residential and commercial gas furnaces in the province was increased from 90% to 92%. The change in efficiency of gas furnaces will be accounted for under natural replacement rather than the Standards critical driver.	Included in list of equipment under Amendment 17 and to include future potential increases of efficiency from BC government, including an assumed increase in required efficiency of 95% for both residential and commercial boilers by 2030.

Equipment (end use)	Reference setting	Higher Stringency setting
Windows (space heating)	We assume 20% of existing windows are non-conforming and will be upgraded when they are replaced where the replacement rate is assumed at 1/lifespan or 1/20th per year. Previous work by Posterity Group found this upgrade has on average a 2.7% heating energy savings[77].	Considering the potential strengthening of windows MEPS and the ongoing Amendment 8 consultation to the BC Energy Efficiency Standards, which highlights a review of windows, we assumed a 4% annual heating energy savings from enhanced standards starting in 2030.
Gas storage water heaters (water heating)	New requirements for commercial water heaters under NRCan Amendment 17, however these are approximately consistent with existing BC requirements stringency. Therefore, we model no change in efficiency driven by standards for the gas storage water heaters for either residential or commercial under the reference case.	The Forward Regulatory Plan identifies residential gas storage water heaters as likely to require alignment with US standards[78]. However, it is unlikely the federal MPES will be a greater stringency than the current BC standards.
Gas dryer (drying)	No recent change to the MEPS for gas dryers.	Unclear whether future MEPS will include gas dryers so excluded
Gas range (cooking)	No recent change to the MEPS for gas ranges.	Excluded

<u>Analysis Approach and Modelling Method</u>

Based on our research explained above, we made the following assumptions to develop the model inputs:

- Adjust space heating UEC only, as increased stringency of MEPS would likely affect boilers, furnaces and windows.
- Implementation of higher stringency MEPS would not occur until 2030.

Space heating savings were calculated as follows:

<u>Step 1: Calculate savings from upgraded boilers/furnaces</u>

To calculate the savings from upgraded boilers/furnaces under a new standard, we multiply the number of non-conforming equipment by the assumed replacement rate and the difference in the efficiency between the upgraded efficiency and the baseline efficiency.

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[77] Posterity Group. "Analysis of Cost and Energy Benefits for High Efficiency Low-Rise Fenestration in Canada", NRCan, June 2019.

[78] Gas-fired storage water heaters (canada.ca).

To model the higher stringency case for boilers, which is implemented in 2030, we simplify by assuming that the number of non-conforming pieces of equipment resets in 2030.

Step 2: Calculate savings from upgraded windows

To calculate the savings from upgraded windows, we multiply the assumed number of non-conforming models by the replacement rate and the relative savings from the upgrade.

The higher stringency case, with the assumption that higher efficiency windows are implemented in 2030, is modeled again by assuming the number of non-conforming units resets in 2030.

Step 3: Calculate total space heating savings

Energy savings from the windows are combined with the furnace/boilers according to the following formula:

UEC Space heating savings = window_savings + Heating_savings - window_savings * Heating_savings

Where heating savings are the penetration-weighted savings of the furnaces and boilers. Exhibit 12 and Exhibit 13 provide the UEC changes applied to space heating for the reference and higher stringency scenarios for the residential and commercial sectors respectively.

Exhibit 12 – UEC changes for the reference and higher stringency settings – Residential sectors

	UEC Space Heating Savings	
Year	**Reference**	**Higher Stringency**
2023	0.00%	0.00%
2024	0.08%	0.08%
2025	0.16%	0.16%
2026	0.23%	0.23%
2027	0.31%	0.31%
2028	0.39%	0.39%
2029	0.47%	0.47%
2030	0.54%	0.54%
2031	0.62%	0.65%
2032	0.70%	1.43%
2033	0.78%	1.88%
2034	0.85%	2.32%
2035	0.93%	2.77%
2036	1.01%	3.21%
2037	1.08%	3.66%

	UEC Space Heating Savings	
Year	**Reference**	**Higher Stringency**
2038	1.16%	4.10%
2039	1.16%	4.54%
2040	1.16%	4.98%
2041	1.16%	5.43%
2042	1.16%	5.87%

Exhibit 13 – UEC changes for the reference and higher stringency settings- Commercial sector

	UEC Space Heating Savings	
Year	**Reference**	**Higher Stringency**
2023	0.00%	0.00%
2024	0.28%	0.28%
2025	0.57%	0.57%
2026	0.85%	0.85%
2027	1.14%	1.14%
2028	1.42%	1.42%
2029	1.71%	1.71%
2030	1.99%	1.99%
2031	2.27%	2.40%
2032	2.56%	3.02%
2033	2.84%	3.54%
2034	3.12%	4.06%
2035	3.41%	4.57%
2036	3.69%	5.09%
2037	3.97%	5.60%
2038	4.25%	6.12%
2039	4.25%	6.63%
2040	4.25%	7.14%
2041	4.25%	7.65%
2042	4.25%	8.17%

Gas system GHG mitigation options

Description	This Critical Driver reflects a bundle of options PNG may pursue to reduce emissions in alignment with the proposed GHGRS set out in the Roadmap applied to the gas utility sector by the province. Due to uncertainty over future regulations and costs of various low-carbon gases, this CD could include various amounts of hydrogen, syngas and lignin, and other low-carbon gases needed to reduce emissions.

Modelling Approach	All other CDs are applied to the model first, and the resulting GHG emissions are reviewed to determine further abatement, if any, required to align with the proposed GHGRS cap. A post-model calculation is conducted and the required number of tonnes of CO2e are determined.
Settings	• Reference: amount of abatement required to meet the GHGRS in the Reference scenario.
Applicability	• All sectors
Model parameter adjusted	NA – emissions associated with fuel use is calculated based on annual consumption in the scenario by fuel by applying emission factors
Data Source(s)	
Assumptions, Caveats and Limitations	• NA

Analysis Approach and Modelling Method

Step 1: Determine emissions cap for PNG in 2030

The Roadmap states: "…the cap will be set at approximately 6 Mt of CO2e per year for 2030, which is approximately 47% lower than 2007 levels…Utilities will determine how best to meet the target, which could include acquiring more renewable gases as well as supporting greater energy efficiency. Measures in CleanBC allow gas utilities to use renewables such as synthetic gas, biomethane, green and waste hydrogen and lignin to achieve this."[79]

The emissions cap for PNG in 2030 is estimated at 0.254 Mt CO2e (254 kt CO2e) (based on a carbon intensity of natural gas of 52.52 g/CO2e/MJ).

Step 2: Implement the Critical Drivers and review the GHG results

Posterity Group implemented all the other Critical Drivers in each scenario. We reviewed the results of the models for the total GHG emissions in 2030 for the Reference and Decarbonization Accelerated scenarios, as those two scenarios require meeting this GHGRS.

[79] "CleanBC Roadmap to 2030", page 29.

Step 3: Calculate the additional amount of reductions required to the meet the cap

If the emissions are above the cap, we calculated the additional amount of abatement required to meet the GHG cap if the reductions estimated from the other Critical Drivers do not bring emissions below the cap.

This is conducted in PowerBI based on the outputs of the models.

Appendix D: Sensitivity Analysis Variables

The following variables were used to conduct a sensitivity analysis on the results of the scenarios to estimate the impact on annual demand and GHG emissions from each variable independently. The analysis was conducted on the modelled outputs, and therefore do not have interactive effects with other Critical Drivers.

Addition or exit of a large customer

Description	Captures the impact from the addition or exit of a few large customers (one customer in each region, within a specific segment. Annual demand is either added or removed from the Reference scenario demand.
Approach	Addition of a large customer increases annual consumption and GHG emissions; vice versa for the exit of these customers.
Settings	• Addition: a few large customers join PNG's system. • Removal: a few large customers leave PNG's system.
Applicability	• Industrial sector by region and segment.
Data Source(s)	PNG
Assumptions, Caveats and Limitations	• This CD is meant for a sensitivity analysis of the impact to annual consumption and emissions, and therefore is not an essential component of a scenario narrative. • Design day forecasts are not adjusted based on this sensitivity analysis; only annual consumption is changed.

Analysis Approach and Modelling Method

PNG provided the load to add/remove by region and within a specific segment.

This load is added or removed to the demand forecast by toggling this specific account on or off in each scenario as a sensitivity analysis. The load impacts annual consumption and GHG emissions.

DSM Savings

Description	Gas savings from PNG's Energy Conservation and Innovation (ECI) programs and activities.
Approach	Develop reference case by building on and extending the 2023 – 2024 ECI portfolio, and then model the High DSM scenario using the High Market Potential from the 2021 PNG Conservation Potential Review (CPR) as guidance.

Settings	• Reference • High
Applicability	• Residential and Commercial • Space and Water Heating End-Uses
Model parameter adjusted	Space heating UEC Water heating UEC
Data Source(s)	2023 – 2024 PNG ECI Portfolio 2021 PNG CPR
Assumptions, Caveats and Limitations	• The reference Long-Term (LT) DSM plan included in this CRP uses the filed 2023 – 2024 ECI funding application and DSM plan as the starting point. Several measures were then added / deleted, and the incentives for some measures updated. • The LT DSM Plan is compliant with the revised Demand-Side Measures (DSM) Regulation that was amended by the Province of BC on June 27, 2023. The amended DSM Regulation phases out incentives for conventional gas space and water heating measures that are less than 100% efficient (e.g., furnace, boiler, gas water heater). • The LT DSM Plan also uses the Utility Cost Test (UCT) and the avoided cost of renewable and low-carbon gas for cost effectiveness testing, in line with the amended DSM regulation. • The High DSM scenario is built using the reference LT DSM plan as the starting point. It primarily differs from the reference case in terms of program participation figures. Both the reference and the high DSM scenarios consist of the same programs and measures.

Analysis Approach and Modelling Method

As part of this CRP, PG helped PNG develop a long-term (LT) DSM Plan for 2025 – 2034~~2032~~. The LT DSM Plan used the 2023 – 2024 PNG ECI Portfolio as a starting point, with some measures then added or removed based on the amended 2023 DSM regulation in BC. This long-term DSM plan serves as the "Reference DSM" setting for the CRP scenarios.

APPENDIX E: ANNUAL DEMAND TABLES

This appendix provides the annual demand by scenario, region, and customer type.

Consolidated

Annual Demand (Reference Scenario) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	3,087	3,087	3,155	3,099	3,109	3,102	3,093	3,084	3,072	3,062	3,049
Small Commercial	2,145	2,087	2,145	2,144	2,138	2,124	2,109	2,095	2,080	2,066	2,051
Large Commercial, Small Industrial Sales and Other	1,816	1,438	1,523	1,356	1,428	1,478	1,478	1,500	1,500	1,500	1,500
Firm Transport	2,672	2,837	3,040	2,906	2,938	2,938	2,938	2,969	2,969	2,969	2,969
Company Use	153	135	144	154	156	157	157	158	158	158	158
Interruptible Sales and Transport	808	740	930	900	900	900	900	900	900	900	900
Total	10,682	10,324	10,937	10,559	10,668	10,699	10,675	10,705	10,680	10,655	10,626

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	3,033	3,017	2,998	2,976	2,953	2,929	2,900	2,865	2,826	2,779
Small Commercial	2,037	2,023	2,010	1,997	1,984	1,977	1,969	1,960	1,952	1,942
Large Commercial, Small Industrial Sales and Other	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Firm Transport	2,969	2,969	2,969	2,969	2,969	2,969	2,969	2,969	2,969	2,969
Company Use	158	158	158	158	158	158	158	158	158	158
Interruptible Sales and Transport	900	900	900	900	900	900	900	900	900	900
Total	10,597	10,566	10,534	10,500	10,464	10,432	10,395	10,352	10,304	10,248

Consolidated

Annual Demand (Reference Scenario) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	3,087	3,087	3,155	3,038	3,048	3,035	3,023	3,011	2,999	2,991	2,978
Small Commercial	2,145	2,087	2,145	2,104	2,099	2,087	2,074	2,062	2,049	2,037	2,024
Large Commercial, Small Industrial Sales and Other	1,816	1,438	1,523	1,356	1,428	1,478	1,478	1,500	1,500	1,500	1,500
Firm Transport	2,672	2,837	3,040	2,906	2,938	2,938	2,938	2,969	2,969	2,969	2,969
Company Use	153	135	144	143	146	147	147	148	148	148	148
Interruptible Sales and Transport	808	740	930	900	900	900	900	900	900	900	900
Total	10,682	10,324	10,937	10,447	10,557	10,584	10,560	10,590	10,565	10,544	10,519

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	2,964	2,949	2,934	2,917	2,899	2,880	2,856	2,828	2,795	2,757
Small Commercial	2,012	2,001	1,990	1,979	1,969	1,964	1,958	1,952	1,946	1,939
Large Commercial, Small Industrial Sales and Other	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Firm Transport	2,969	2,969	2,969	2,969	2,969	2,969	2,969	2,969	2,969	2,969
Company Use	148	148	148	148	148	148	148	148	148	148
Interruptible Sales and Transport	900	900	900	900	900	900	900	900	900	900
Total	10,493	10,467	10,440	10,412	10,384	10,360	10,331	10,297	10,258	10,212

Consolidated

Annual Demand (Decarbonization Accelerated) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	3,087	3,087	3,155	3,085	3,086	3,072	3,055	3,036	3,004	2,957	2,913
Small Commercial	2,145	2,087	2,145	2,127	2,105	2,076	2,046	2,015	1,978	1,938	1,899
Large Commercial, Small Industrial Sales and Other	1,816	1,438	1,523	1,291	1,291	1,280	1,269	1,258	1,247	1,236	1,236
Firm Transport	2,672	2,837	3,040	2,879	2,879	2,863	2,847	2,832	2,816	2,801	2,801
Company Use	153	135	144	150	150	149	149	149	148	148	148
Interruptible Sales and Transport	808	740	930	900	900	900	900	900	900	900	900
Total	10,682	10,324	10,937	10,431	10,411	10,340	10,266	10,189	10,094	9,979	9,895

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	2,865	2,813	2,756	2,694	2,626	2,549	2,463	2,366	2,255	2,128
Small Commercial	1,860	1,821	1,782	1,744	1,706	1,668	1,631	1,594	1,558	1,524
Large Commercial, Small Industrial Sales and Other	1,236	1,236	1,236	1,236	1,236	1,236	1,236	1,236	1,236	1,236
Firm Transport	2,801	2,801	2,801	2,801	2,801	2,801	2,801	2,801	2,801	2,801
Company Use	148	148	148	148	148	148	148	148	148	148
Interruptible Sales and Transport	900	900	900	900	900	900	900	900	900	900
Total	9,808	9,718	9,623	9,522	9,415	9,302	9,178	9,044	8,897	8,736

Consolidated

Annual Demand (Decarbonization Accelerated) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	3,087	3,087	3,155	3,013	3,014	2,993	2,973	2,951	2,919	2,873	2,830
Small Commercial	2,145	2,087	2,145	2,061	2,041	2,015	1,987	1,960	1,926	1,889	1,854
Large Commercial, Small Industrial Sales and Other	1,816	1,438	1,523	1,291	1,291	1,280	1,269	1,258	1,247	1,236	1,236
Firm Transport	2,672	2,837	3,040	2,879	2,879	2,863	2,847	2,832	2,816	2,801	2,801
Company Use	153	135	142	140	140	139	139	139	138	138	138
Interruptible Sales and Transport	808	740	930	900	900	900	900	900	900	900	900
Total	10,682	10,324	10,935	10,283	10,264	10,190	10,115	10,039	9,945	9,836	9,757

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	2,783	2,733	2,680	2,622	2,559	2,490	2,412	2,325	2,225	2,113
Small Commercial	1,818	1,784	1,749	1,715	1,681	1,648	1,616	1,584	1,553	1,522
Large Commercial, Small Industrial Sales and Other	1,236	1,236	1,236	1,236	1,236	1,236	1,236	1,236	1,236	1,236
Firm Transport	2,801	2,801	2,801	2,801	2,801	2,801	2,801	2,801	2,801	2,801
Company Use	138	138	138	138	138	138	138	138	138	138
Interruptible Sales and Transport	900	900	900	900	900	900	900	900	900	900
Total	9,675	9,591	9,503	9,411	9,314	9,213	9,102	8,982	8,852	8,709

Consolidated

Annual Demand (Decarbonization Delayed) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	3,087	3,087	3,155	3,115	3,135	3,147	3,158	3,169	3,179	3,195	3,207
Small Commercial	2,145	2,087	2,145	2,159	2,167	2,172	2,175	2,179	2,183	2,187	2,192
Large Commercial, Small Industrial Sales and Other	1,816	1,438	1,523	1,565	1,585	2,026	2,048	2,070	2,070	2,018	2,018
Firm Transport	2,672	2,837	3,040	2,898	2,966	3,524	3,555	3,586	3,586	3,586	3,586
Company Use	153	135	144	162	164	181	182	183	183	181	181
Interruptible Sales and Transport	808	740	930	900	900	900	900	900	900	900	900
Total	10,682	10,324	10,937	10,798	10,916	11,949	12,017	12,086	12,100	12,067	12,083

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	3,219	3,232	3,246	3,249	3,252	3,258	3,263	3,267	3,271	3,274
Small Commercial	2,197	2,204	2,212	2,215	2,219	2,229	2,239	2,248	2,258	2,267
Large Commercial, Small Industrial Sales and Other	2,018	2,018	2,018	2,018	2,018	2,018	2,018	2,018	2,018	2,018
Firm Transport	3,586	3,586	3,586	3,586	3,586	3,586	3,586	3,586	3,586	3,586
Company Use	181	181	180	180	180	180	180	180	180	180
Interruptible Sales and Transport	900	900	900	900	900	900	900	900	900	900
Total	12,101	12,121	12,143	12,148	12,156	12,171	12,186	12,199	12,213	12,225

~~**Consolidated**~~

~~**Annual Demand (Decarbonization Delayed) TJ**~~

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	3,087	3,087	3,155	3,066	3,087	3,098	3,108	3,119	3,129	3,147	3,160
Small Commercial	2,145	2,087	2,145	2,143	2,152	2,157	2,161	2,166	2,170	2,175	2,180
Large Commercial, Small Industrial Sales and Other	1,816	1,438	1,523	1,565	1,585	2,026	2,048	2,070	2,070	2,018	2,018
Firm Transport	2,672	2,837	3,040	2,898	2,966	3,524	3,555	3,586	3,586	3,586	3,586
Company Use	153	135	147	152	154	171	172	173	173	171	171
Interruptible Sales and Transport	808	740	930	900	900	900	900	900	900	900	900
Total	10,682	10,324	10,940	10,724	10,843	11,875	11,943	12,013	12,028	11,996	12,014

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	3,173	3,188	3,204	3,212	3,222	3,236	3,247	3,258	3,268	3,276
Small Commercial	2,186	2,194	2,203	2,207	2,211	2,222	2,232	2,242	2,253	2,262
Large Commercial, Small Industrial Sales and Other	2,018	2,018	2,018	2,018	2,018	2,018	2,018	2,018	2,018	2,018
Firm Transport	3,586	3,586	3,586	3,586	3,586	3,586	3,586	3,586	3,586	3,586
Company Use	171	171	170	170	170	170	170	170	170	170
Interruptible Sales and Transport	900	900	900	900	900	900	900	900	900	900
Total	12,034	12,056	12,080	12,093	12,108	12,132	12,153	12,174	12,194	12,212

PNG-West

Annual Demand (Reference Scenario) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	1,190	1,251	1,223	1,193	1,193	1,187	1,181	1,175	1,169	1,163	1,155
Small Commercial	807	837	829	805	800	793	786	779	772	765	758
Large Commercial, Small Industrial Sales and Other	951	673	700	600	650	700	700	700	700	700	700
Firm Transport	1,157	1,438	1,503	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455
Company Use	88	65	80	89	91	92	92	92	92	92	92
Interruptible Sales and Transport	808	740	930	900	900	900	900	900	900	900	900
Total	5,001	5,003	5,265	5,042	5,088	5,127	5,114	5,101	5,088	5,074	5,060

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	1,147	1,139	1,130	1,120	1,110	1,100	1,088	1,074	1,059	1,041
Small Commercial	752	746	740	734	728	725	721	717	713	708
Large Commercial, Small Industrial Sales and Other	700	700	700	700	700	700	700	700	700	700
Firm Transport	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455
Company Use	92	92	92	92	92	92	92	92	92	92
Interruptible Sales and Transport	900	900	900	900	900	900	900	900	900	900
Total	5,046	5,031	5,017	5,001	4,985	4,971	4,955	4,938	4,918	4,896

PNG-West

Annual Demand (Reference Scenario) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	1,190	1,251	1,223	1,171	1,170	1,163	1,155	1,148	1,141	1,135	1,128
Small Commercial	807	837	829	790	785	779	773	767	760	754	748
Large Commercial, Small Industrial Sales and Other	951	673	700	600	650	700	700	700	700	700	700
Firm Transport	1,157	1,438	1,503	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455
Company Use	88	65	80	79	81	82	82	82	82	82	82
Interruptible Sales and Transport	808	740	930	900	900	900	900	900	900	900	900
Total	5,001	5,003	5,265	4,994	5,041	5,079	5,064	5,051	5,038	5,026	5,013

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	1,120	1,113	1,105	1,097	1,089	1,081	1,071	1,060	1,047	1,032
Small Commercial	743	737	732	727	722	720	717	714	710	707
Large Commercial, Small Industrial Sales and Other	700	700	700	700	700	700	700	700	700	700
Firm Transport	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455
Company Use	82	82	82	82	82	82	82	82	82	82
Interruptible Sales and Transport	900	900	900	900	900	900	900	900	900	900
Total	4,999	4,987	4,974	4,961	4,948	4,937	4,924	4,910	4,894	4,876

PNG-West

Annual Demand (Decarbonization Accelerated) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	1,190	1,251	1,223	1,188	1,184	1,176	1,166	1,157	1,143	1,123	1,104
Small Commercial	807	837	829	799	789	778	765	753	739	723	708
Large Commercial, Small Industrial Sales and Other	951	673	700	569	569	569	569	569	569	569	569
Firm Transport	1,157	1,438	1,503	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455
Company Use	88	65	80	88	88	88	88	88	88	88	88
Interruptible Sales and Transport	808	740	930	900	900	900	900	900	900	900	900
Total	5,001	5,003	5,265	4,999	4,984	4,965	4,943	4,921	4,893	4,857	4,824

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	1,084	1,064	1,041	1,017	991	963	932	898	860	817
Small Commercial	694	679	664	650	636	622	608	594	581	568
Large Commercial, Small Industrial Sales and Other	569	569	569	569	569	569	569	569	569	569
Firm Transport	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455
Company Use	88	88	88	88	88	88	88	88	88	88
Interruptible Sales and Transport	900	900	900	900	900	900	900	900	900	900
Total	4,789	4,754	4,717	4,678	4,638	4,596	4,551	4,503	4,452	4,396

~~PNG-West~~

~~Annual Demand (Decarbonization Accelerated) TJ~~

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	1,190	1,251	1,223	1,161	1,157	1,146	1,135	1,124	1,110	1,091	1,072
Small Commercial	807	837	829	776	767	756	745	734	720	706	692
Large Commercial, Small Industrial Sales and Other	951	673	700	569	569	569	569	569	569	569	569
Firm Transport	1,157	1,438	1,503	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455
Company Use	88	65	80	78	78	78	78	78	78	78	78
Interruptible Sales and Transport	808	740	930	900	900	900	900	900	900	900	900
Total	5,001	5,003	5,265	4,938	4,925	4,903	4,881	4,859	4,831	4,798	4,766

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	1,053	1,033	1,012	990	966	941	913	882	849	811
Small Commercial	679	665	652	639	627	614	602	590	579	567
Large Commercial, Small Industrial Sales and Other	569	569	569	569	569	569	569	569	569	569
Firm Transport	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455
Company Use	78	78	78	78	78	78	78	78	78	78
Interruptible Sales and Transport	900	900	900	900	900	900	900	900	900	900
Total	4,733	4,700	4,666	4,630	4,594	4,557	4,516	4,474	4,429	4,379

PNG-West

Annual Demand (Decarbonization Delayed) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	1,190	1,251	1,223	1,198	1,200	1,200	1,198	1,197	1,195	1,196	1,195
Small Commercial	807	837	829	809	808	805	802	800	797	795	793
Large Commercial, Small Industrial Sales and Other	951	673	700	652	727	1,146	1,146	1,146	1,146	1,094	1,094
Firm Transport	1,157	1,438	1,503	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455
Company Use	88	65	80	91	93	106	106	106	106	104	104
Interruptible Sales and Transport	808	740	930	900	900	900	900	900	900	900	900
Total	5,001	5,003	5,265	5,105	5,183	5,611	5,606	5,602	5,599	5,543	5,540

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	1,194	1,193	1,194	1,191	1,188	1,186	1,183	1,181	1,177	1,173
Small Commercial	792	791	791	790	789	790	791	792	794	794
Large Commercial, Small Industrial Sales and Other	1,094	1,094	1,094	1,094	1,094	1,094	1,094	1,094	1,094	1,094
Firm Transport	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455
Company Use	104	104	104	104	104	104	104	104	104	104
Interruptible Sales and Transport	900	900	900	900	900	900	900	900	900	900
Total	5,538	5,537	5,537	5,532	5,529	5,529	5,527	5,525	5,523	5,520

PNG-West

Annual Demand (Decarbonization Delayed) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	1,190	1,251	1,223	1,179	1,181	1,180	1,178	1,177	1,175	1,176	1,176
Small Commercial	807	837	829	801	799	797	794	792	790	788	787
Large Commercial, Small Industrial Sales and Other	951	673	700	652	727	1,146	1,146	1,146	1,146	1,094	1,094
Firm Transport	1,157	1,438	1,503	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455
Company Use	88	65	80	81	83	96	96	96	96	94	94
Interruptible Sales and Transport	808	740	930	900	900	900	900	900	900	900	900
Total	5,001	5,003	5,265	5,067	5,145	5,573	5,568	5,565	5,561	5,507	5,505

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	1,175	1,176	1,177	1,176	1,176	1,177	1,177	1,177	1,176	1,174
Small Commercial	786	786	786	785	785	787	788	790	792	793
Large Commercial, Small Industrial Sales and Other	1,094	1,094	1,094	1,094	1,094	1,094	1,094	1,094	1,094	1,094
Firm Transport	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455
Company Use	94	94	94	94	94	94	94	94	94	94
Interruptible Sales and Transport	900	900	900	900	900	900	900	900	900	900
Total	5,503	5,504	5,505	5,503	5,503	5,506	5,508	5,509	5,510	5,509

Fort St. John

Annual Demand (Reference Scenario) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	1,180	1,150	1,194	1,185	1,193	1,192	1,191	1,189	1,187	1,185	1,181
Small Commercial	850	780	838	853	853	849	844	840	835	831	826
Large Commercial, Small Industrial Sales and Other	614	539	545	522	545	545	545	567	567	567	567
Firm Transport	427	368	434	396	427	427	427	458	458	458	458
Company Use	13	8	12	12	12	12	12	13	13	13	13
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	3,085	2,845	3,022	2,968	3,030	3,025	3,019	3,067	3,060	3,053	3,045

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	1,176	1,171	1,165	1,158	1,149	1,140	1,129	1,115	1,100	1,081
Small Commercial	821	817	812	808	803	801	798	795	792	789
Large Commercial, Small Industrial Sales and Other	567	567	567	567	567	567	567	567	567	567
Firm Transport	458	458	458	458	458	458	458	458	458	458
Company Use	13	13	13	13	13	13	13	13	13	13
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	3,036	3,026	3,015	3,003	2,990	2,979	2,965	2,948	2,930	2,908

Fort St. John

Annual Demand (Reference Scenario) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	1,180	1,150	1,194	1,159	1,167	1,164	1,162	1,159	1,156	1,155	1,151
Small Commercial	850	780	838	835	836	833	830	826	823	819	815
Large Commercial, Small Industrial Sales and Other	614	539	545	522	545	545	545	567	567	567	567
Firm Transport	427	368	434	396	427	427	427	458	458	458	458
Company Use	13	8	12	12	12	12	12	13	13	13	13
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	3,085	2,845	3,022	2,924	2,987	2,981	2,975	3,023	3,017	3,011	3,004

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	1,147	1,143	1,138	1,132	1,126	1,118	1,109	1,098	1,085	1,069
Small Commercial	811	808	804	801	797	796	794	792	790	788
Large Commercial, Small Industrial Sales and Other	567	567	567	567	567	567	567	567	567	567
Firm Transport	458	458	458	458	458	458	458	458	458	458
Company Use	13	13	13	13	13	13	13	13	13	13
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	2,996	2,989	2,980	2,971	2,961	2,952	2,941	2,928	2,913	2,895

PNG PACIFIC NORTHERN GAS

Fort St. John

Annual Demand (Decarbonization Accelerated) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	1,180	1,150	1,194	1,180	1,184	1,181	1,176	1,171	1,161	1,144	1,128
Small Commercial	850	780	838	845	838	827	816	805	791	775	760
Large Commercial, Small Industrial Sales and Other	614	539	545	522	522	511	500	489	478	467	467
Firm Transport	427	368	434	396	396	380	364	349	333	318	318
Company Use	13	8	12	12	12	11	11	11	10	10	10
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	3,085	2,845	3,022	2,954	2,952	2,911	2,868	2,825	2,773	2,713	2,682

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	1,110	1,091	1,070	1,046	1,019	989	954	914	868	815
Small Commercial	745	729	714	699	684	669	654	639	625	611
Large Commercial, Small Industrial Sales and Other	467	467	467	467	467	467	467	467	467	467
Firm Transport	318	318	318	318	318	318	318	318	318	318
Company Use	10	10	10	10	10	10	10	10	10	10
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	2,649	2,615	2,578	2,539	2,497	2,452	2,402	2,347	2,287	2,220

Fort St. John

Annual Demand (Decarbonization Accelerated) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	1,180	1,150	1,194	1,150	1,154	1,148	1,143	1,136	1,125	1,109	1,093
Small Commercial	850	780	838	817	810	801	791	781	768	754	741
Large Commercial, Small Industrial Sales and Other	614	539	545	522	522	511	500	489	478	467	467
Firm Transport	427	368	434	396	396	380	364	349	333	318	318
Company Use	13	8	12	12	12	11	11	11	10	10	10
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	3,085	2,845	3,022	2,896	2,895	2,852	2,809	2,766	2,715	2,658	2,629

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	1,077	1,058	1,038	1,016	991	963	932	895	854	807
Small Commercial	727	714	700	687	674	661	648	635	622	610
Large Commercial, Small Industrial Sales and Other	467	467	467	467	467	467	467	467	467	467
Firm Transport	318	318	318	318	318	318	318	318	318	318
Company Use	10	10	10	10	10	10	10	10	10	10
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	2,598	2,567	2,533	2,498	2,459	2,418	2,374	2,325	2,271	2,212

Fort St. John

Annual Demand (Decarbonization Delayed) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	1,180	1,150	1,194	1,192	1,205	1,214	1,223	1,232	1,241	1,251	1,260
Small Commercial	850	780	838	859	866	872	877	882	887	892	897
Large Commercial, Small Industrial Sales and Other	614	539	545	599	545	567	589	611	611	611	611
Firm Transport	427	368	434	396	427	458	489	520	520	520	520
Company Use	13	8	12	13	12	13	14	14	14	14	14
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	3,085	2,845	3,022	3,059	3,055	3,124	3,192	3,260	3,274	3,289	3,303

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	1,269	1,278	1,288	1,291	1,295	1,300	1,305	1,309	1,314	1,318
Small Commercial	902	907	913	916	919	925	930	935	941	946
Large Commercial, Small Industrial Sales and Other	611	611	611	611	611	611	611	611	611	611
Firm Transport	520	520	520	520	520	520	520	520	520	520
Company Use	14	14	14	14	14	14	14	14	14	14
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	3,317	3,332	3,346	3,354	3,361	3,371	3,381	3,391	3,401	3,411

Fort St. John

Annual Demand (Decarbonization Delayed) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	1,180	1,150	1,194	1,172	1,185	1,194	1,203	1,212	1,220	1,232	1,240
Small Commercial	850	780	838	854	861	867	873	878	883	888	893
Large Commercial, Small Industrial Sales and Other	614	539	545	599	545	567	589	611	611	611	611
Firm Transport	427	368	434	396	427	458	489	520	520	520	520
Company Use	13	8	12	13	12	13	14	14	14	14	14
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	3,085	2,845	3,022	3,034	3,030	3,099	3,167	3,236	3,249	3,266	3,280

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	1,250	1,260	1,270	1,276	1,282	1,289	1,296	1,302	1,308	1,314
Small Commercial	898	904	910	913	916	922	928	933	939	944
Large Commercial, Small Industrial Sales and Other	611	611	611	611	611	611	611	611	611	611
Firm Transport	520	520	520	520	520	520	520	520	520	520
Company Use	14	14	14	14	14	14	14	14	14	14
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	3,294	3,310	3,325	3,335	3,344	3,357	3,370	3,381	3,393	3,404

Dawson Creek

Annual Demand (Reference Scenario) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	637	608	656	640	642	641	640	638	636	634	632
Small Commercial	443	432	435	442	441	438	435	432	429	426	423
Large Commercial, Small Industrial Sales and Other	234	194	240	183	183	183	183	183	183	183	183
Firm Transport	379	341	410	357	357	357	357	357	357	357	357
Company Use	5	4	4	4	4	4	4	4	4	4	4
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	1,698	1,579	1,745	1,627	1,627	1,624	1,619	1,614	1,609	1,605	1,599

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	629	626	622	618	613	608	602	595	586	576
Small Commercial	420	417	414	412	409	408	406	405	403	401
Large Commercial, Small Industrial Sales and Other	183	183	183	183	183	183	183	183	183	183
Firm Transport	357	357	357	357	357	357	357	357	357	357
Company Use	4	4	4	4	4	4	4	4	4	4
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	1,593	1,587	1,581	1,574	1,567	1,560	1,553	1,544	1,534	1,522

PNG PACIFIC NORTHERN GAS

Dawson Creek

Annual Demand (Reference Scenario) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	637	608	656	628	631	628	626	624	622	621	619
Small Commercial	443	432	435	434	433	431	428	425	423	420	417
Large Commercial, Small Industrial Sales and Other	234	194	240	183	183	183	183	183	183	183	183
Firm Transport	379	341	410	357	357	357	357	357	357	357	357
Company Use	5	4	4	4	4	4	4	4	4	4	4
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	1,698	1,579	1,745	1,607	1,608	1,603	1,598	1,594	1,589	1,585	1,580

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	616	614	611	607	604	600	595	590	582	574
Small Commercial	415	412	410	408	406	405	404	403	402	401
Large Commercial, Small Industrial Sales and Other	183	183	183	183	183	183	183	183	183	183
Firm Transport	357	357	357	357	357	357	357	357	357	357
Company Use	4	4	4	4	4	4	4	4	4	4
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	1,575	1,570	1,565	1,559	1,554	1,549	1,544	1,537	1,528	1,519

Dawson Creek

Annual Demand (Decarbonization Accelerated) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	637	608	656	637	638	636	633	629	623	613	604
Small Commercial	443	432	435	439	434	428	422	415	407	399	390
Large Commercial, Small Industrial Sales and Other	234	194	240	183	183	183	183	183	183	183	183
Firm Transport	379	341	410	339	339	339	339	339	339	339	339
Company Use	5	4	4	4	4	4	4	4	4	4	4
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	1,698	1,579	1,745	1,602	1,598	1,590	1,580	1,570	1,556	1,538	1,520

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	595	584	572	559	545	528	510	489	464	436
Small Commercial	382	374	366	358	349	342	334	326	318	311
Large Commercial, Small Industrial Sales and Other	183	183	183	183	183	183	183	183	183	183
Firm Transport	339	339	339	339	339	339	339	339	339	339
Company Use	4	4	4	4	4	4	4	4	4	4
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	1,502	1,484	1,464	1,443	1,420	1,396	1,370	1,340	1,308	1,273

Dawson Creek

Annual Demand (Decarbonization Accelerated) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	637	608	656	624	624	621	617	613	606	598	589
Small Commercial	443	432	435	425	420	415	409	403	396	388	381
Large Commercial, Small Industrial Sales and Other	234	194	240	183	183	183	183	183	183	183	183
Firm Transport	379	341	410	339	339	339	339	339	339	339	339
Company Use	5	4	4	4	4	4	4	4	4	4	4
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	1,698	1,579	1,745	1,575	1,571	1,561	1,552	1,542	1,528	1,512	1,495

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	579	569	558	546	532	518	501	482	459	434
Small Commercial	373	366	359	351	344	337	330	324	317	311
Large Commercial, Small Industrial Sales and Other	183	183	183	183	183	183	183	183	183	183
Firm Transport	339	339	339	339	339	339	339	339	339	339
Company Use	4	4	4	4	4	4	4	4	4	4
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	1,478	1,461	1,442	1,423	1,402	1,381	1,357	1,331	1,302	1,271

Dawson Creek

Annual Demand (Decarbonization Delayed) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	637	608	656	644	648	652	654	657	660	665	668
Small Commercial	443	432	435	446	448	449	450	452	453	455	456
Large Commercial, Small Industrial Sales and Other	234	194	240	183	183	183	183	183	183	183	183
Firm Transport	379	341	410	339	375	902	902	902	902	902	902
Company Use	5	4	4	4	4	8	8	8	8	8	8
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	1,698	1,579	1,745	1,615	1,658	2,194	2,198	2,202	2,206	2,212	2,217

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	671	675	679	681	683	685	687	690	692	694
Small Commercial	458	460	462	463	465	467	470	473	475	478
Large Commercial, Small Industrial Sales and Other	183	183	183	183	183	183	183	183	183	183
Firm Transport	902	902	902	902	902	902	902	902	902	902
Company Use	8	8	8	8	8	8	8	8	8	8
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	2,222	2,228	2,234	2,237	2,240	2,245	2,251	2,255	2,260	2,265

Dawson Creek

Annual Demand (Decarbonization Delayed) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	637	608	656	635	640	643	646	649	652	656	660
Small Commercial	443	432	435	444	446	447	448	450	451	453	454
Large Commercial, Small Industrial Sales and Other	234	194	240	183	183	183	183	183	183	183	183
Firm Transport	379	341	410	339	375	902	902	902	902	902	902
Company Use	5	4	4	4	4	8	8	8	8	8	8
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	1,698	1,579	1,745	1,604	1,648	2,183	2,187	2,191	2,196	2,202	2,207

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	663	667	672	675	678	683	687	691	694	698
Small Commercial	456	458	460	462	463	466	469	471	474	477
Large Commercial, Small Industrial Sales and Other	183	183	183	183	183	183	183	183	183	183
Firm Transport	902	902	902	902	902	902	902	902	902	902
Company Use	8	8	8	8	8	8	8	8	8	8
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	2,213	2,218	2,225	2,229	2,235	2,242	2,249	2,255	2,261	2,268

PNG PACIFIC NORTHERN GAS

Tumbler Ridge

Annual Demand (Reference Scenario) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	80	79	82	81	81	81	81	81	81	81	81
Small Commercial	45	38	43	45	45	45	44	44	44	44	44
Large Commercial, Small Industrial Sales and Other	18	32	39	50	50	50	50	50	50	50	50
Firm Transport	709	690	693	699	699	699	699	699	699	699	699
Company Use	47	58	48	48	48	48	48	48	48	48	48
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	899	897	905	923	923	923	923	923	922	922	922

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	81	81	81	81	81	81	81	81	81	81
Small Commercial	44	44	44	43	43	43	44	44	44	44
Large Commercial, Small Industrial Sales and Other	50	50	50	50	50	50	50	50	50	50
Firm Transport	699	699	699	699	699	699	699	699	699	699
Company Use	48	48	48	48	48	48	48	48	48	48
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	922	922	922	922	922	922	922	922	922	922

Tumbler Ridge

Annual Demand (Reference Scenario) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	80	79	82	80	80	80	80	80	80	80	80
Small Commercial	45	38	43	44	45	44	44	44	44	44	44
Large Commercial, Small Industrial Sales and Other	18	32	39	50	50	50	50	50	50	50	50
Firm Transport	709	690	693	699	699	699	699	699	699	699	699
Company Use	47	58	48	48	48	48	48	48	48	48	48
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	899	897	905	922	922	922	922	922	921	921	922

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	80	80	80	80	80	81	81	81	81	81
Small Commercial	44	44	44	43	43	44	44	44	44	44
Large Commercial, Small Industrial Sales and Other	50	50	50	50	50	50	50	50	50	50
Firm Transport	699	699	699	699	699	699	699	699	699	699
Company Use	48	48	48	48	48	48	48	48	48	48
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	921	921	921	921	921	922	922	922	922	923

Tumbler Ridge

Annual Demand (Decarbonization Accelerated) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	80	79	82	80	80	80	80	79	78	77	77
Small Commercial	45	38	43	44	44	43	43	42	42	41	40
Large Commercial, Small Industrial Sales and Other	18	32	39	17	17	17	17	17	17	17	17
Firm Transport	709	690	693	689	689	689	689	689	689	689	689
Company Use	47	58	48	46	46	46	46	46	46	46	46
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	899	897	905	876	876	875	874	874	872	870	869

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	75	74	73	72	71	69	67	66	63	61
Small Commercial	39	39	38	37	37	36	36	35	34	34
Large Commercial, Small Industrial Sales and Other	17	17	17	17	17	17	17	17	17	17
Firm Transport	689	689	689	689	689	689	689	689	689	689
Company Use	46	46	46	46	46	46	46	46	46	46
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	867	865	864	862	860	858	855	853	850	847

Tumbler Ridge

Annual Demand (Decarbonization Accelerated) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	80	79	82	79	79	78	78	78	77	76	75
Small Commercial	45	38	43	43	43	43	42	42	41	40	40
Large Commercial, Small Industrial Sales and Other	18	32	39	17	17	17	17	17	17	17	17
Firm Transport	709	690	693	689	689	689	689	689	689	689	689
Company Use	47	58	46	46	46	46	46	46	46	46	46
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	899	897	903	874	874	873	872	872	870	869	867

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	74	73	72	71	70	69	67	65	63	61
Small Commercial	39	38	38	37	37	36	36	35	34	34
Large Commercial, Small Industrial Sales and Other	17	17	17	17	17	17	17	17	17	17
Firm Transport	689	689	689	689	689	689	689	689	689	689
Company Use	46	46	46	46	46	46	46	46	46	46
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	865	864	862	860	859	857	855	852	850	847

Tumbler Ridge

Annual Demand (Decarbonization Delayed) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	80	79	82	81	81	82	82	83	83	84	84
Small Commercial	45	38	43	45	45	45	45	45	45	46	46
Large Commercial, Small Industrial Sales and Other	18	32	39	130	130	130	130	130	130	130	130
Firm Transport	709	690	693	709	709	709	709	709	709	709	709
Company Use	47	58	48	54	54	54	54	54	54	54	54
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	899	897	905	1,019	1,020	1,020	1,021	1,021	1,022	1,023	1,023

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	85	85	86	86	87	87	87	88	88	89
Small Commercial	46	46	46	46	47	47	47	47	48	48
Large Commercial, Small Industrial Sales and Other	130	130	130	130	130	130	130	130	130	130
Firm Transport	709	709	709	709	709	709	709	709	709	709
Company Use	54	54	53	53	53	53	53	53	53	53
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	1,024	1,025	1,025	1,025	1,026	1,027	1,027	1,028	1,028	1,029

Tumbler Ridge

Annual Demand (Decarbonization Delayed) TJ

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	80	79	82	80	81	81	82	82	82	83	84
Small Commercial	45	38	43	45	45	45	45	45	45	46	46
Large Commercial, Small Industrial Sales and Other	18	32	39	130	130	130	130	130	130	130	130
Firm Transport	709	690	693	709	709	709	709	709	709	709	709
Company Use	47	58	51	54	54	54	54	54	54	54	54
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	899	897	908	1,018	1,019	1,020	1,020	1,021	1,021	1,022	1,023

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	84	85	86	86	87	87	88	88	89	90
Small Commercial	46	46	47	47	47	47	47	48	48	48
Large Commercial, Small Industrial Sales and Other	130	130	130	130	130	130	130	130	130	130
Firm Transport	709	709	709	709	709	709	709	709	709	709
Company Use	54	54	53	53	53	53	53	53	53	53
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	1,023	1,024	1,025	1,025	1,026	1,027	1,028	1,029	1,029	1,031

Appendix F: Design Day Demand Tables

This appendix provides the design day demand by scenario, region, and customer type.

Consolidated

Design Day Demand (Reference Scenario) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	37,626	37,698	38,454	37,766	37,881	37,791	37,683	37,563	37,425	37,301	37,132
Small Commercial	22,594	22,041	22,617	22,582	22,512	22,368	22,208	22,055	21,899	21,740	21,586
Large Commercial, Small Industrial Sales and Other	12,472	11,587	12,434	10,432	12,777	12,777	12,777	12,856	12,856	12,856	12,856
Firm Transport	12,868	12,191	12,599	12,205	12,317	12,317	12,317	12,428	12,428	12,428	12,428
Company Use	1,205	1,146	1,209	1,171	1,261	1,261	1,261	1,264	1,264	1,264	1,264
Interruptible Sales and Transport	10,415	9,380	10,586	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	97,180	94,043	97,899	95,038	97,629	97,395	97,127	97,048	96,755	96,471	96,149

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	36,943	36,736	36,505	36,246	35,961	35,662	35,307	34,891	34,408	33,838
Small Commercial	21,433	21,288	21,147	21,009	20,877	20,798	20,712	20,619	20,529	20,430
Large Commercial, Small Industrial Sales and Other	12,856	12,856	12,856	12,856	12,856	12,856	12,856	12,856	12,856	12,856
Firm Transport	12,428	12,428	12,428	12,428	12,428	12,428	12,428	12,428	12,428	12,428
Company Use	1,264	1,264	1,264	1,264	1,264	1,264	1,264	1,264	1,264	1,264
Interruptible Sales and Transport	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	95,807	95,454	95,082	94,686	94,268	93,891	93,449	92,940	92,367	91,699

PNG PACIFIC NORTHERN GAS

Consolidated

Design Day Demand (Reference Scenario) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	37,626	37,698	38,454	38,536	38,641	38,457	38,290	38,128	37,957	37,835	37,654
Small Commercial	22,594	22,041	22,617	22,641	22,575	22,442	22,293	22,151	22,006	21,858	21,718
Large Commercial, Small Industrial Sales and Other	12,472	11,587	12,434	10,432	12,777	12,777	12,777	12,856	12,856	12,856	12,856
Firm Transport	12,868	12,191	12,599	12,205	12,317	12,317	12,317	12,428	12,428	12,428	12,428
Company Use	1,205	1,146	1,209	1,171	1,261	1,261	1,261	1,264	1,264	1,264	1,264
Interruptible Sales and Transport	10,415	9,380	10,586	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	97,180	94,043	97,899	95,867	98,452	98,135	97,819	97,710	97,394	97,124	96,803

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	37,460	37,259	37,046	36,815	36,566	36,310	35,998	35,631	35,205	34,702
Small Commercial	21,578	21,445	21,317	21,194	21,075	21,013	20,942	20,865	20,791	20,709
Large Commercial, Small Industrial Sales and Other	12,856	12,856	12,856	12,856	12,856	12,856	12,856	12,856	12,856	12,856
Firm Transport	12,428	12,428	12,428	12,428	12,428	12,428	12,428	12,428	12,428	12,428
Company Use	1,264	1,264	1,264	1,264	1,264	1,264	1,264	1,264	1,264	1,264
Interruptible Sales and Transport	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	96,469	96,135	95,794	95,440	95,072	94,754	94,371	93,927	93,427	92,842

Consolidated

Design Day Demand (Decarbonization Accelerated) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	37,626	37,698	38,454	37,596	37,605	37,424	37,215	36,981	36,596	36,018	35,474
Small Commercial	22,594	22,041	22,617	22,402	22,169	21,865	21,543	21,221	20,829	20,400	19,989
Large Commercial, Small Industrial Sales and Other	12,472	11,587	12,434	9,473	9,473	9,434	9,394	9,354	9,315	9,275	9,275
Firm Transport	12,868	12,191	12,599	11,753	11,753	11,698	11,292	11,236	11,180	11,124	11,124
Company Use	1,205	1,146	1,209	1,101	1,101	1,099	1,084	1,082	1,080	1,078	1,078
Interruptible Sales and Transport	10,415	9,380	10,586	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	97,180	94,043	97,899	93,207	92,984	92,401	91,410	90,757	89,882	88,777	87,823

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	34,888	34,256	33,567	32,810	31,976	31,050	30,003	28,820	27,478	25,938
Small Commercial	19,577	19,170	18,764	18,359	17,956	17,562	17,169	16,778	16,404	16,039
Large Commercial, Small Industrial Sales and Other	9,275	9,275	9,275	9,275	9,275	9,275	9,275	9,275	9,275	9,275
Firm Transport	11,124	11,124	11,124	11,124	11,124	11,124	11,124	11,124	11,124	11,124
Company Use	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078
Interruptible Sales and Transport	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	86,825	85,786	84,691	83,529	82,291	80,971	79,532	77,958	76,242	74,337

Consolidated

Design Day Demand (Decarbonization Accelerated) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	37,626	37,698	38,454	38,236	38,227	37,945	37,668	37,380	36,951	36,363	35,794
Small Commercial	22,594	22,041	22,617	22,174	21,942	21,649	21,343	21,035	20,662	20,252	19,862
Large Commercial, Small Industrial Sales and Other	12,472	11,587	12,434	9,473	9,473	9,434	9,394	9,354	9,315	9,275	9,275
Firm Transport	12,868	12,191	12,599	11,753	11,753	11,698	11,292	11,236	11,180	11,124	11,124
Company Use	1,205	1,146	1,209	1,101	1,101	1,099	1,084	1,082	1,080	1,078	1,078
Interruptible Sales and Transport	10,415	9,380	10,586	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	97,180	94,043	97,899	93,619	93,378	92,706	91,662	90,969	90,070	88,975	88,016

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	35,190	34,550	33,862	33,121	32,315	31,430	30,437	29,320	28,065	26,641
Small Commercial	19,471	19,087	18,706	18,326	17,951	17,590	17,229	16,878	16,540	16,208
Large Commercial, Small Industrial Sales and Other	9,275	9,275	9,275	9,275	9,275	9,275	9,275	9,275	9,275	9,275
Firm Transport	11,124	11,124	11,124	11,124	11,124	11,124	11,124	11,124	11,124	11,124
Company Use	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078
Interruptible Sales and Transport	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	87,021	85,997	84,928	83,807	82,626	81,380	80,026	78,558	76,965	75,209

Consolidated

Design Day Demand (Decarbonization Delayed) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	37,626	37,698	38,454	37,955	38,193	38,335	38,460	38,589	38,708	38,901	39,034
Small Commercial	22,594	22,041	22,617	22,734	22,812	22,861	22,886	22,926	22,964	23,000	23,049
Large Commercial, Small Industrial Sales and Other	12,472	11,587	12,434	13,165	15,816	16,738	16,817	16,897	16,897	16,033	16,033
Firm Transport	12,868	12,191	12,599	12,196	12,308	12,419	12,531	12,643	12,643	12,643	12,643
Company Use	1,205	1,146	1,209	1,343	1,460	1,495	1,499	1,502	1,502	1,470	1,470
Interruptible Sales and Transport	10,415	9,380	10,586	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	97,180	94,043	97,899	98,276	101,472	102,731	103,076	103,438	103,596	102,928	103,109

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	39,170	39,326	39,496	39,523	39,560	39,627	39,682	39,730	39,774	39,803
Small Commercial	23,103	23,173	23,254	23,285	23,323	23,425	23,523	23,616	23,715	23,807
Large Commercial, Small Industrial Sales and Other	16,033	16,033	16,033	16,033	16,033	16,033	16,033	16,033	16,033	16,033
Firm Transport	12,643	12,643	12,643	12,643	12,643	12,643	12,643	12,643	12,643	12,643
Company Use	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470
Interruptible Sales and Transport	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	103,300	103,526	103,777	103,834	103,910	104,080	104,232	104,373	104,517	104,638

PNG PACIFIC NORTHERN GAS

~~Consolidated~~

~~Design Day Demand (Decarbonization Delayed) GJ/D~~

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	37,626	37,698	38,454	38,888	39,126	39,238	39,346	39,462	39,574	39,774	39,910
Small Commercial	22,594	22,041	22,617	23,062	23,141	23,193	23,220	23,260	23,301	23,338	23,389
Large Commercial, Small Industrial Sales and Other	12,472	11,587	12,434	13,165	15,816	16,738	16,817	16,897	16,897	16,033	16,033
Firm Transport	12,868	12,191	12,599	12,196	12,308	12,419	12,531	12,643	12,643	12,643	12,643
Company Use	1,205	1,146	1,209	1,343	1,460	1,495	1,499	1,502	1,502	1,470	1,470
Interruptible Sales and Transport	10,415	9,380	10,586	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	97,180	94,043	97,899	99,537	102,733	103,966	104,295	104,646	104,799	104,139	104,326

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	40,053	40,217	40,398	40,481	40,585	40,727	40,848	40,955	41,056	41,136
Small Commercial	23,445	23,517	23,600	23,631	23,673	23,778	23,878	23,973	24,076	24,170
Large Commercial, Small Industrial Sales and Other	16,033	16,033	16,033	16,033	16,033	16,033	16,033	16,033	16,033	16,033
Firm Transport	12,643	12,643	12,643	12,643	12,643	12,643	12,643	12,643	12,643	12,643
Company Use	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470
Interruptible Sales and Transport	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	104,525	104,761	105,025	105,139	105,285	105,532	105,753	105,955	106,159	106,333

PNG-West

Design Day Demand (Reference Scenario) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	15,334	16,114	15,757	15,371	15,362	15,295	15,219	15,141	15,057	14,977	14,882
Small Commercial	9,064	9,394	9,306	9,036	8,978	8,902	8,821	8,744	8,667	8,588	8,514
Large Commercial, Small Industrial Sales and Other	5,620	5,141	5,689	4,006	6,272	6,272	6,272	6,272	6,272	6,272	6,272
Firm Transport	6,012	5,745	5,854	5,650	5,650	5,650	5,650	5,650	5,650	5,650	5,650
Company Use	834	786	820	777	862	862	862	862	862	862	862
Interruptible Sales and Transport	10,415	9,380	10,586	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	47,278	46,560	48,012	45,721	48,007	47,863	47,707	47,552	47,390	47,232	47,062

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	14,780	14,672	14,557	14,431	14,300	14,168	14,012	13,837	13,639	13,407
Small Commercial	8,441	8,371	8,305	8,239	8,177	8,138	8,093	8,048	8,002	7,952
Large Commercial, Small Industrial Sales and Other	6,272	6,272	6,272	6,272	6,272	6,272	6,272	6,272	6,272	6,272
Firm Transport	5,650	5,650	5,650	5,650	5,650	5,650	5,650	5,650	5,650	5,650
Company Use	862	862	862	862	862	862	862	862	862	862
Interruptible Sales and Transport	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	46,886	46,709	46,529	46,336	46,144	45,972	45,772	45,551	45,308	45,026

PNG-West

Design Day Demand (Reference Scenario) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	15,334	16,114	15,757	15,574	15,562	15,460	15,357	15,261	15,164	15,084	14,984
Small Commercial	9,064	9,394	9,306	9,018	8,960	8,886	8,808	8,733	8,658	8,582	8,510
Large Commercial, Small Industrial Sales and Other	5,620	5,141	5,689	4,006	6,272	6,272	6,272	6,272	6,272	6,272	6,272
Firm Transport	6,012	5,745	5,854	5,650	5,650	5,650	5,650	5,650	5,650	5,650	5,650
Company Use	834	786	820	777	862	862	862	862	862	862	862
Interruptible Sales and Transport	10,415	9,380	10,586	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	47,278	46,560	48,012	45,907	48,188	48,012	47,831	47,660	47,488	47,332	47,160

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	14,880	14,777	14,673	14,560	14,447	14,337	14,201	14,049	13,878	13,675
Small Commercial	8,440	8,373	8,310	8,247	8,189	8,153	8,112	8,071	8,028	7,983
Large Commercial, Small Industrial Sales and Other	6,272	6,272	6,272	6,272	6,272	6,272	6,272	6,272	6,272	6,272
Firm Transport	5,650	5,650	5,650	5,650	5,650	5,650	5,650	5,650	5,650	5,650
Company Use	862	862	862	862	862	862	862	862	862	862
Interruptible Sales and Transport	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	46,986	46,816	46,649	46,473	46,302	46,156	45,979	45,786	45,572	45,324

PNG-West

Design Day Demand (Decarbonization Accelerated) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	15,334	16,114	15,757	15,302	15,250	15,144	15,025	14,899	14,717	14,463	14,223
Small Commercial	9,064	9,394	9,306	8,974	8,861	8,730	8,594	8,459	8,297	8,121	7,954
Large Commercial, Small Industrial Sales and Other	5,620	5,141	5,689	4,006	4,006	4,006	4,006	4,006	4,006	4,006	4,006
Firm Transport	6,012	5,745	5,854	5,261	5,261	5,261	4,910	4,910	4,910	4,910	4,910
Company Use	834	786	820	762	762	762	749	749	749	749	749
Interruptible Sales and Transport	10,415	9,380	10,586	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	47,278	46,560	48,012	45,187	45,022	44,785	44,166	43,905	43,561	43,131	42,724

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	13,969	13,700	13,414	13,103	12,769	12,409	12,006	11,565	11,076	10,524
Small Commercial	7,787	7,622	7,460	7,297	7,137	6,981	6,825	6,671	6,523	6,377
Large Commercial, Small Industrial Sales and Other	4,006	4,006	4,006	4,006	4,006	4,006	4,006	4,006	4,006	4,006
Firm Transport	4,910	4,910	4,910	4,910	4,910	4,910	4,910	4,910	4,910	4,910
Company Use	749	749	749	749	749	749	749	749	749	749
Interruptible Sales and Transport	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	42,303	41,869	41,421	40,947	40,453	39,937	39,378	38,783	38,145	37,448

PNG-West

Design Day Demand (Decarbonization Accelerated) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	15,334	16,114	15,757	15,445	15,388	15,246	15,098	14,952	14,754	14,496	14,249
Small Commercial	9,064	9,394	9,306	8,850	8,735	8,605	8,471	8,337	8,178	8,006	7,842
Large Commercial, Small Industrial Sales and Other	5,620	5,141	5,689	4,006	4,006	4,006	4,006	4,006	4,006	4,006	4,006
Firm Transport	6,012	5,745	5,854	5,261	5,261	5,261	4,910	4,910	4,910	4,910	4,910
Company Use	834	786	820	762	762	762	749	749	749	749	749
Interruptible Sales and Transport	10,415	9,380	10,586	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	47,278	46,560	48,012	45,206	45,034	44,762	44,116	43,836	43,479	43,049	42,638

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	13,991	13,723	13,441	13,141	12,825	12,488	12,112	11,702	11,252	10,746
Small Commercial	7,679	7,519	7,361	7,204	7,050	6,903	6,757	6,616	6,480	6,346
Large Commercial, Small Industrial Sales and Other	4,006	4,006	4,006	4,006	4,006	4,006	4,006	4,006	4,006	4,006
Firm Transport	4,910	4,910	4,910	4,910	4,910	4,910	4,910	4,910	4,910	4,910
Company Use	749	749	749	749	749	749	749	749	749	749
Interruptible Sales and Transport	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	42,217	41,789	41,349	40,892	40,422	39,938	39,416	38,865	38,279	37,639

PNG-West

Design Day Demand (Decarbonization Delayed) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	15,334	16,114	15,757	15,434	15,462	15,452	15,431	15,415	15,398	15,404	15,389
Small Commercial	9,064	9,394	9,306	9,086	9,069	9,040	9,006	8,978	8,952	8,924	8,905
Large Commercial, Small Industrial Sales and Other	5,620	5,141	5,689	5,051	8,449	9,291	9,291	9,291	9,291	8,427	8,427
Firm Transport	6,012	5,745	5,854	5,650	5,650	5,650	5,650	5,650	5,650	5,650	5,650
Company Use	834	786	820	816	945	977	977	977	977	944	944
Interruptible Sales and Transport	10,415	9,380	10,586	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	47,278	46,560	48,012	46,918	50,456	51,292	51,236	51,194	51,150	50,231	50,198

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	15,376	15,372	15,375	15,335	15,301	15,279	15,245	15,207	15,166	15,110
Small Commercial	8,890	8,882	8,884	8,867	8,858	8,873	8,885	8,898	8,910	8,920
Large Commercial, Small Industrial Sales and Other	8,427	8,427	8,427	8,427	8,427	8,427	8,427	8,427	8,427	8,427
Firm Transport	5,650	5,650	5,650	5,650	5,650	5,650	5,650	5,650	5,650	5,650
Company Use	944	944	944	944	944	944	944	944	944	944
Interruptible Sales and Transport	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	50,169	50,157	50,162	50,106	50,062	50,056	50,033	50,008	49,979	49,933

PNG-West

Design Day Demand (Decarbonization Delayed) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	15,334	16,114	15,757	15,683	15,710	15,689	15,658	15,637	15,617	15,625	15,614
Small Commercial	9,064	9,394	9,306	9,143	9,126	9,099	9,066	9,040	9,014	8,988	8,971
Large Commercial, Small Industrial Sales and Other	5,620	5,141	5,689	5,051	8,449	9,291	9,291	9,291	9,291	8,427	8,427
Firm Transport	6,012	5,745	5,854	5,650	5,650	5,650	5,650	5,650	5,650	5,650	5,650
Company Use	834	786	820	816	945	977	977	977	977	944	944
Interruptible Sales and Transport	10,415	9,380	10,586	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	47,278	46,560	48,012	47,225	50,761	51,588	51,524	51,477	51,431	50,516	50,488

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	15,605	15,607	15,617	15,598	15,593	15,606	15,599	15,590	15,579	15,547
Small Commercial	8,957	8,951	8,954	8,939	8,931	8,949	8,963	8,977	8,992	9,004
Large Commercial, Small Industrial Sales and Other	8,427	8,427	8,427	8,427	8,427	8,427	8,427	8,427	8,427	8,427
Firm Transport	5,650	5,650	5,650	5,650	5,650	5,650	5,650	5,650	5,650	5,650
Company Use	944	944	944	944	944	944	944	944	944	944
Interruptible Sales and Transport	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882	10,882
Total	50,465	50,461	50,474	50,440	50,427	50,458	50,465	50,470	50,474	50,454

Fort St. John

Design Day Demand (Reference Scenario) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	13,849	13,497	14,020	13,916	14,009	13,999	13,984	13,963	13,933	13,908	13,862
Small Commercial	8,580	7,872	8,457	8,602	8,604	8,565	8,520	8,477	8,430	8,382	8,336
Large Commercial, Small Industrial Sales and Other	4,734	4,100	4,278	3,780	3,859	3,859	3,859	3,939	3,939	3,939	3,939
Firm Transport	2,064	1,705	1,996	1,790	1,902	1,902	1,902	2,013	2,013	2,013	2,013
Company Use	126	103	111	104	107	107	107	111	111	111	111
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	29,354	27,277	28,862	28,191	28,481	28,431	28,372	28,502	28,426	28,352	28,261

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	13,811	13,750	13,676	13,592	13,492	13,383	13,254	13,096	12,910	12,690
Small Commercial	8,287	8,241	8,194	8,151	8,106	8,080	8,053	8,022	7,994	7,961
Large Commercial, Small Industrial Sales and Other	3,939	3,939	3,939	3,939	3,939	3,939	3,939	3,939	3,939	3,939
Firm Transport	2,013	2,013	2,013	2,013	2,013	2,013	2,013	2,013	2,013	2,013
Company Use	111	111	111	111	111	111	111	111	111	111
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	28,161	28,054	27,933	27,806	27,660	27,525	27,369	27,181	26,967	26,713

Fort St. John

Design Day Demand (Reference Scenario) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	13,849	13,497	14,020	14,309	14,399	14,348	14,310	14,270	14,226	14,198	14,145
Small Commercial	8,580	7,872	8,457	8,669	8,673	8,640	8,601	8,565	8,523	8,481	8,442
Large Commercial, Small Industrial Sales and Other	4,734	4,100	4,278	3,780	3,859	3,859	3,859	3,939	3,939	3,939	3,939
Firm Transport	2,064	1,705	1,996	1,790	1,902	1,902	1,902	2,013	2,013	2,013	2,013
Company Use	126	103	111	104	107	107	107	111	111	111	111
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	29,354	27,277	28,862	28,652	28,940	28,856	28,779	28,897	28,811	28,741	28,649

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	14,091	14,030	13,958	13,882	13,790	13,690	13,574	13,430	13,262	13,063
Small Commercial	8,400	8,360	8,320	8,285	8,246	8,229	8,209	8,187	8,167	8,143
Large Commercial, Small Industrial Sales and Other	3,939	3,939	3,939	3,939	3,939	3,939	3,939	3,939	3,939	3,939
Firm Transport	2,013	2,013	2,013	2,013	2,013	2,013	2,013	2,013	2,013	2,013
Company Use	111	111	111	111	111	111	111	111	111	111
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	28,553	28,452	28,340	28,229	28,098	27,981	27,845	27,679	27,491	27,268

Fort St. John

Design Day Demand (Decarbonization Accelerated) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	13,849	13,497	14,020	13,850	13,904	13,862	13,811	13,749	13,627	13,427	13,238
Small Commercial	8,580	7,872	8,457	8,525	8,456	8,349	8,235	8,122	7,977	7,818	7,667
Large Commercial, Small Industrial Sales and Other	4,734	4,100	4,278	3,780	3,780	3,740	3,701	3,661	3,621	3,582	3,582
Firm Transport	2,064	1,705	1,996	1,790	1,790	1,734	1,678	1,623	1,567	1,511	1,511
Company Use	126	103	111	104	104	102	100	98	97	95	95
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	29,354	27,277	28,862	28,048	28,033	27,787	27,526	27,252	26,889	26,433	26,093

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	13,034	12,809	12,557	12,279	11,963	11,606	11,200	10,731	10,191	9,564
Small Commercial	7,513	7,360	7,206	7,053	6,899	6,747	6,596	6,446	6,303	6,163
Large Commercial, Small Industrial Sales and Other	3,582	3,582	3,582	3,582	3,582	3,582	3,582	3,582	3,582	3,582
Firm Transport	1,511	1,511	1,511	1,511	1,511	1,511	1,511	1,511	1,511	1,511
Company Use	95	95	95	95	95	95	95	95	95	95
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	25,735	25,357	24,951	24,520	24,050	23,541	22,984	22,364	21,681	20,915

PNG PACIFIC NORTHERN GAS

~~Fort St. John~~

~~Design Day Demand (Decarbonization Accelerated) GJ/D~~

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	13,849	13,497	14,020	14,202	14,247	14,161	14,083	13,996	13,854	13,647	13,444
Small Commercial	8,580	7,872	8,457	8,475	8,408	8,308	8,203	8,097	7,963	7,814	7,674
Large Commercial, Small Industrial Sales and Other	4,734	4,100	4,278	3,780	3,780	3,740	3,701	3,661	3,621	3,582	3,582
Firm Transport	2,064	1,705	1,996	1,790	1,790	1,734	1,678	1,623	1,567	1,511	1,511
Company Use	126	103	111	104	104	102	100	98	97	95	95
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	29,354	27,277	28,862	28,351	28,329	28,045	27,765	27,475	27,102	26,649	26,306

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	13,231	12,999	12,743	12,465	12,153	11,805	11,413	10,963	10,453	9,868
Small Commercial	7,531	7,390	7,249	7,110	6,969	6,833	6,697	6,563	6,435	6,309
Large Commercial, Small Industrial Sales and Other	3,582	3,582	3,582	3,582	3,582	3,582	3,582	3,582	3,582	3,582
Firm Transport	1,511	1,511	1,511	1,511	1,511	1,511	1,511	1,511	1,511	1,511
Company Use	95	95	95	95	95	95	95	95	95	95
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	25,950	25,577	25,180	24,763	24,310	23,826	23,298	22,714	22,076	21,365

Fort St. John

Design Day Demand (Decarbonization Delayed) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	13,849	13,497	14,020	13,998	14,148	14,253	14,362	14,465	14,565	14,693	14,791
Small Commercial	8,580	7,872	8,457	8,668	8,740	8,800	8,848	8,904	8,951	8,999	9,052
Large Commercial, Small Industrial Sales and Other	4,734	4,100	4,278	4,606	3,859	3,939	4,018	4,097	4,097	4,097	4,097
Firm Transport	2,064	1,705	1,996	1,790	1,902	2,013	2,125	2,236	2,236	2,236	2,236
Company Use	126	103	111	119	107	111	114	118	118	118	118
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	29,354	27,277	28,862	29,182	28,756	29,115	29,467	29,820	29,968	30,143	30,294

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	14,899	15,010	15,118	15,163	15,207	15,263	15,320	15,372	15,427	15,479
Small Commercial	9,101	9,156	9,211	9,244	9,276	9,332	9,387	9,439	9,495	9,548
Large Commercial, Small Industrial Sales and Other	4,097	4,097	4,097	4,097	4,097	4,097	4,097	4,097	4,097	4,097
Firm Transport	2,236	2,236	2,236	2,236	2,236	2,236	2,236	2,236	2,236	2,236
Company Use	118	118	118	118	118	118	118	118	118	118
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	30,450	30,617	30,779	30,858	30,935	31,046	31,158	31,263	31,373	31,478

Fort St. John

Design Day Demand (Decarbonization Delayed) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	13,849	13,497	14,020	14,465	14,616	14,709	14,811	14,909	15,006	15,135	15,232
Small Commercial	8,580	7,872	8,457	8,862	8,934	8,994	9,044	9,099	9,147	9,195	9,248
Large Commercial, Small Industrial Sales and Other	4,734	4,100	4,278	4,606	3,859	3,939	4,018	4,097	4,097	4,097	4,097
Firm Transport	2,064	1,705	1,996	1,790	1,902	2,013	2,125	2,236	2,236	2,236	2,236
Company Use	126	103	111	119	107	111	114	118	118	118	118
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	29,354	27,277	28,862	29,843	29,418	29,765	30,112	30,459	30,604	30,781	30,931

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	15,341	15,453	15,563	15,628	15,689	15,762	15,838	15,904	15,971	16,034
Small Commercial	9,297	9,352	9,407	9,441	9,474	9,530	9,585	9,638	9,694	9,747
Large Commercial, Small Industrial Sales and Other	4,097	4,097	4,097	4,097	4,097	4,097	4,097	4,097	4,097	4,097
Firm Transport	2,236	2,236	2,236	2,236	2,236	2,236	2,236	2,236	2,236	2,236
Company Use	118	118	118	118	118	118	118	118	118	118
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	31,089	31,256	31,421	31,520	31,614	31,743	31,874	31,993	32,116	32,232

Dawson Creek

Design Day Demand (Reference Scenario) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	7,397	7,055	7,614	7,432	7,458	7,446	7,429	7,409	7,385	7,366	7,337
Small Commercial	4,540	4,426	4,461	4,533	4,519	4,491	4,459	4,426	4,397	4,365	4,334
Large Commercial, Small Industrial Sales and Other	1,905	1,905	1,905	1,905	1,905	1,905	1,905	1,905	1,905	1,905	1,905
Firm Transport	2,850	2,850	2,850	2,850	2,850	2,850	2,850	2,850	2,850	2,850	2,850
Company Use	46	44	46	46	46	46	46	46	46	46	46
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	16,738	16,281	16,876	16,766	16,778	16,738	16,688	16,636	16,583	16,532	16,472

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	7,303	7,265	7,222	7,174	7,119	7,062	6,992	6,909	6,809	6,692
Small Commercial	4,304	4,275	4,247	4,220	4,194	4,180	4,165	4,148	4,132	4,113
Large Commercial, Small Industrial Sales and Other	1,905	1,905	1,905	1,905	1,905	1,905	1,905	1,905	1,905	1,905
Firm Transport	2,850	2,850	2,850	2,850	2,850	2,850	2,850	2,850	2,850	2,850
Company Use	46	46	46	46	46	46	46	46	46	46
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	16,408	16,341	16,270	16,195	16,114	16,042	15,958	15,857	15,741	15,606

PNG PACIFIC NORTHERN GAS

~~Dawson Creek~~

~~Design Day Demand (Reference Scenario) GJ/D~~

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	7,397	7,055	7,614	7,585	7,609	7,580	7,554	7,527	7,499	7,483	7,454
Small Commercial	4,540	4,426	4,461	4,545	4,532	4,506	4,476	4,447	4,420	4,391	4,363
Large Commercial, Small Industrial Sales and Other	1,905	1,905	1,905	1,905	1,905	1,905	1,905	1,905	1,905	1,905	1,905
Firm Transport	2,850	2,850	2,850	2,850	2,850	2,850	2,850	2,850	2,850	2,850	2,850
Company Use	46	44	46	46	46	46	46	46	46	46	46
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	16,738	16,281	16,876	16,931	16,942	16,887	16,831	16,775	16,720	16,675	16,618

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	7,419	7,382	7,343	7,301	7,255	7,207	7,147	7,075	6,986	6,884
Small Commercial	4,336	4,311	4,285	4,262	4,239	4,229	4,218	4,204	4,192	4,178
Large Commercial, Small Industrial Sales and Other	1,905	1,905	1,905	1,905	1,905	1,905	1,905	1,905	1,905	1,905
Firm Transport	2,850	2,850	2,850	2,850	2,850	2,850	2,850	2,850	2,850	2,850
Company Use	46	46	46	46	46	46	46	46	46	46
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	16,556	16,494	16,429	16,364	16,295	16,237	16,166	16,080	15,979	15,863

Dawson Creek

Design Day Demand (Decarbonization Accelerated) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	7,397	7,055	7,614	7,401	7,408	7,380	7,344	7,304	7,231	7,120	7,017
Small Commercial	4,540	4,426	4,461	4,496	4,448	4,386	4,320	4,252	4,173	4,084	3,999
Large Commercial, Small Industrial Sales and Other	1,905	1,905	1,905	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479
Firm Transport	2,850	2,850	2,850	2,815	2,815	2,815	2,815	2,815	2,815	2,815	2,815
Company Use	46	44	46	41	41	41	41	41	41	41	41
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	16,738	16,281	16,876	16,232	16,191	16,101	15,999	15,891	15,739	15,540	15,351

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	6,903	6,778	6,642	6,491	6,324	6,135	5,920	5,672	5,386	5,057
Small Commercial	3,915	3,831	3,747	3,664	3,581	3,500	3,420	3,340	3,264	3,189
Large Commercial, Small Industrial Sales and Other	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479
Firm Transport	2,815	2,815	2,815	2,815	2,815	2,815	2,815	2,815	2,815	2,815
Company Use	41	41	41	41	41	41	41	41	41	41
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	15,152	14,944	14,724	14,490	14,239	13,970	13,675	13,347	12,985	12,580

Dawson Creek

Design Day Demand (Decarbonization Accelerated) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	7,397	7,055	7,614	7,531	7,535	7,487	7,440	7,390	7,311	7,200	7,092
Small Commercial	4,540	4,426	4,461	4,449	4,401	4,342	4,280	4,217	4,142	4,059	3,979
Large Commercial, Small Industrial Sales and Other	1,905	1,905	1,905	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479
Firm Transport	2,850	2,850	2,850	2,815	2,815	2,815	2,815	2,815	2,815	2,815	2,815
Company Use	46	44	46	41	41	41	41	41	41	41	41
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	16,738	16,281	16,876	16,315	16,271	16,164	16,055	15,942	15,788	15,594	15,406

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	6,974	6,847	6,711	6,564	6,402	6,221	6,017	5,783	5,514	5,209
Small Commercial	3,900	3,823	3,745	3,668	3,592	3,519	3,446	3,375	3,306	3,239
Large Commercial, Small Industrial Sales and Other	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479
Firm Transport	2,815	2,815	2,815	2,815	2,815	2,815	2,815	2,815	2,815	2,815
Company Use	41	41	41	41	41	41	41	41	41	41
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	15,209	15,005	14,791	14,567	14,329	14,075	13,798	13,493	13,155	12,783

Dawson Creek

Design Day Demand (Decarbonization Delayed) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	7,397	7,055	7,614	7,472	7,525	7,566	7,598	7,633	7,665	7,716	7,756
Small Commercial	4,540	4,426	4,461	4,567	4,588	4,605	4,616	4,627	4,644	4,657	4,671
Large Commercial, Small Industrial Sales and Other	1,905	1,905	1,905	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479
Firm Transport	2,850	2,850	2,850	2,815	2,815	2,815	2,815	2,815	2,815	2,815	2,815
Company Use	46	44	46	41	41	41	41	41	41	41	41
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	16,738	16,281	16,876	16,374	16,448	16,506	16,549	16,595	16,644	16,709	16,763

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	7,795	7,836	7,884	7,903	7,924	7,953	7,981	8,008	8,033	8,060
Small Commercial	4,690	4,711	4,732	4,746	4,760	4,789	4,817	4,843	4,872	4,898
Large Commercial, Small Industrial Sales and Other	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479
Firm Transport	2,815	2,815	2,815	2,815	2,815	2,815	2,815	2,815	2,815	2,815
Company Use	41	41	41	41	41	41	41	41	41	41
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	16,820	16,882	16,951	16,983	17,019	17,077	17,133	17,186	17,240	17,293

Dawson Creek

Design Day Demand (Decarbonization Delayed) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	7,397	7,055	7,614	7,664	7,718	7,754	7,784	7,817	7,848	7,902	7,943
Small Commercial	4,540	4,426	4,461	4,644	4,665	4,682	4,693	4,704	4,721	4,735	4,749
Large Commercial, Small Industrial Sales and Other	1,905	1,905	1,905	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479
Firm Transport	2,850	2,850	2,850	2,815	2,815	2,815	2,815	2,815	2,815	2,815	2,815
Company Use	46	44	46	41	41	41	41	41	41	41	41
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	16,738	16,281	16,876	16,643	16,718	16,771	16,812	16,856	16,904	16,972	17,027

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	7,982	8,024	8,074	8,107	8,146	8,194	8,239	8,281	8,318	8,357
Small Commercial	4,768	4,789	4,810	4,823	4,838	4,866	4,895	4,921	4,950	4,976
Large Commercial, Small Industrial Sales and Other	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479
Firm Transport	2,815	2,815	2,815	2,815	2,815	2,815	2,815	2,815	2,815	2,815
Company Use	41	41	41	41	41	41	41	41	41	41
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	17,085	17,148	17,219	17,265	17,319	17,395	17,469	17,537	17,603	17,668

Tumbler Ridge

Design Day Demand (Reference Scenario) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	1,046	1,033	1,063	1,048	1,051	1,051	1,051	1,051	1,050	1,050	1,051
Small Commercial	410	348	392	411	412	411	408	406	405	404	403
Large Commercial, Small Industrial Sales and Other	213	441	562	740	740	740	740	740	740	740	740
Firm Transport	1,942	1,891	1,899	1,915	1,915	1,915	1,915	1,915	1,915	1,915	1,915
Company Use	199	213	233	245	245	245	245	245	245	245	245
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	3,810	3,926	4,149	4,360	4,364	4,362	4,360	4,358	4,356	4,355	4,355

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	1,049	1,049	1,050	1,049	1,049	1,050	1,049	1,049	1,049	1,049
Small Commercial	402	401	401	399	399	400	401	401	401	403
Large Commercial, Small Industrial Sales and Other	740	740	740	740	740	740	740	740	740	740
Firm Transport	1,915	1,915	1,915	1,915	1,915	1,915	1,915	1,915	1,915	1,915
Company Use	245	245	245	245	245	245	245	245	245	245
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	4,352	4,351	4,352	4,349	4,350	4,351	4,351	4,351	4,351	4,353

Tumbler Ridge

Design Day Demand (Reference Scenario) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	1,046	1,033	1,063	1,068	1,071	1,069	1,069	1,070	1,068	1,070	1,071
Small Commercial	410	348	392	409	410	410	408	406	405	404	403
Large Commercial, Small Industrial Sales and Other	213	441	562	740	740	740	740	740	740	740	740
Firm Transport	1,942	1,891	1,899	1,915	1,915	1,915	1,915	1,915	1,915	1,915	1,915
Company Use	199	213	233	245	245	245	245	245	245	245	245
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	3,810	3,926	4,149	4,378	4,382	4,380	4,378	4,377	4,374	4,375	4,375

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	1,070	1,070	1,072	1,072	1,074	1,076	1,076	1,077	1,079	1,080
Small Commercial	402	401	402	400	401	402	403	403	404	405
Large Commercial, Small Industrial Sales and Other	740	740	740	740	740	740	740	740	740	740
Firm Transport	1,915	1,915	1,915	1,915	1,915	1,915	1,915	1,915	1,915	1,915
Company Use	245	245	245	245	245	245	245	245	245	245
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	4,373	4,372	4,375	4,373	4,376	4,379	4,380	4,381	4,384	4,386

Tumbler Ridge

Design Day Demand (Decarbonization Accelerated) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	1,046	1,033	1,063	1,043	1,043	1,039	1,035	1,030	1,021	1,008	996
Small Commercial	410	348	392	407	404	400	394	389	383	376	370
Large Commercial, Small Industrial Sales and Other	213	441	562	208	208	208	208	208	208	208	208
Firm Transport	1,942	1,891	1,899	1,888	1,888	1,888	1,888	1,888	1,888	1,888	1,888
Company Use	199	213	233	194	194	194	194	194	194	194	194
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	3,810	3,926	4,149	3,740	3,737	3,728	3,719	3,709	3,694	3,674	3,656

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	982	969	954	937	920	900	877	853	825	793
Small Commercial	363	357	352	345	339	334	328	321	316	310
Large Commercial, Small Industrial Sales and Other	208	208	208	208	208	208	208	208	208	208
Firm Transport	1,888	1,888	1,888	1,888	1,888	1,888	1,888	1,888	1,888	1,888
Company Use	194	194	194	194	194	194	194	194	194	194
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	3,636	3,616	3,596	3,572	3,549	3,524	3,495	3,464	3,430	3,394

~~Tumbler Ridge~~

~~Design Day Demand (Decarbonization Accelerated) GJ/D~~

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	1,046	1,033	1,063	1,058	1,057	1,051	1,047	1,042	1,032	1,020	1,009
Small Commercial	410	348	392	400	398	394	389	384	379	373	367
Large Commercial, Small Industrial Sales and Other	213	441	562	208	208	208	208	208	208	208	208
Firm Transport	1,942	1,891	1,899	1,888	1,888	1,888	1,888	1,888	1,888	1,888	1,888
Company Use	199	213	233	194	194	194	194	194	194	194	194
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	3,810	3,926	4,149	3,748	3,745	3,735	3,726	3,716	3,701	3,683	3,666

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	994	981	967	951	935	916	895	872	846	818
Small Commercial	361	355	351	344	340	335	329	324	319	314
Large Commercial, Small Industrial Sales and Other	208	208	208	208	208	208	208	208	208	208
Firm Transport	1,888	1,888	1,888	1,888	1,888	1,888	1,888	1,888	1,888	1,888
Company Use	194	194	194	194	194	194	194	194	194	194
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	3,645	3,626	3,608	3,585	3,565	3,541	3,514	3,486	3,455	3,422

Tumbler Ridge

Design Day Demand (Decarbonization Delayed) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	1,046	1,033	1,063	1,052	1,058	1,063	1,069	1,076	1,080	1,088	1,097
Small Commercial	410	348	392	412	415	417	416	416	418	419	420
Large Commercial, Small Industrial Sales and Other	213	441	562	2,029	2,029	2,029	2,029	2,029	2,029	2,029	2,029
Firm Transport	1,942	1,891	1,899	1,942	1,942	1,942	1,942	1,942	1,942	1,942	1,942
Company Use	199	213	233	367	367	367	367	367	367	367	367
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	3,810	3,926	4,149	5,802	5,811	5,818	5,824	5,830	5,835	5,845	5,855

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	1,101	1,109	1,119	1,122	1,127	1,132	1,137	1,142	1,148	1,155
Small Commercial	422	423	428	427	429	431	434	436	438	441
Large Commercial, Small Industrial Sales and Other	2,029	2,029	2,029	2,029	2,029	2,029	2,029	2,029	2,029	2,029
Firm Transport	1,942	1,942	1,942	1,942	1,942	1,942	1,942	1,942	1,942	1,942
Company Use	367	367	367	367	367	367	367	367	367	367
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	5,860	5,870	5,884	5,887	5,894	5,902	5,909	5,916	5,924	5,934

Tumbler Ridge

Design Day Demand (Decarbonization Delayed) GJ/D

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	1,046	1,033	1,063	1,076	1,082	1,086	1,093	1,099	1,103	1,112	1,121
Small Commercial	410	348	392	413	416	418	417	417	419	420	421
Large Commercial, Small Industrial Sales and Other	213	441	562	2,029	2,029	2,029	2,029	2,029	2,029	2,029	2,029
Firm Transport	1,942	1,891	1,899	1,942	1,942	1,942	1,942	1,942	1,942	1,942	1,942
Company Use	199	213	233	367	367	367	367	367	367	367	367
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-	-
Total	3,810	3,926	4,149	5,827	5,836	5,842	5,848	5,854	5,860	5,870	5,880

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Residential	1,125	1,133	1,144	1,148	1,157	1,165	1,172	1,180	1,188	1,198
Small Commercial	423	425	429	428	430	433	435	437	440	443
Large Commercial, Small Industrial Sales and Other	2,029	2,029	2,029	2,029	2,029	2,029	2,029	2,029	2,029	2,029
Firm Transport	1,942	1,942	1,942	1,942	1,942	1,942	1,942	1,942	1,942	1,942
Company Use	367	367	367	367	367	367	367	367	367	367
Interruptible Sales and Transport	-	-	-	-	-	-	-	-	-	-
Total	5,886	5,896	5,911	5,914	5,925	5,936	5,945	5,955	5,966	5,979

APPENDIX G: 2021 CONSERVATION POTENTIAL REVIEW

See attached PDF file: “Appendix G - PNG 2021 Conservation Potential Review”

APPENDIX H: 2023 – 2024 ECI PLAN

See attached PDF file: "Appendix H - PNG 2023-2024 ECI Funding Application"