



Liberty Utilities (EnergyNorth Natural Gas) Corp. d/b/a Liberty

Integrated Resource Plan,
2022/2023 through 2026/2027

October 3, 2022

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I. EXECUTIVE SUMMARY

This filing presents the 2022 Integrated Resource Plan (“IRP” or “2022 IRP”) for Liberty Utilities (EnergyNorth Natural Gas) Corp. d/b/a/ Liberty (hereinafter referred to as “Liberty” or the “Company”) for the five planning years¹ from 2022/2023 to 2026/2027 (the “Forecast Period”). The IRP assesses the Company’s resource strategies based on its current forecast of customer requirements and expected market conditions using currently accepted planning processes, standards, and methods. Liberty is submitting this IRP for review by the New Hampshire Public Utilities Commission (the “Commission”) pursuant to the statutory requirements of New Hampshire’s Revised Statutes Annotated (“RSA”) 378:37 through RSA 378:39 and in compliance with Commission Order No. 25,762 (Feb. 9, 2015) (the “2013 IRP Order”), Order No. 26,684 (Sep. 14, 2022) (the “2017 IRP Interim Order”),² and Order No. 26,551 (Nov. 12, 2021) (the “TGP Contract Order”). This IRP provides a complete description of the Company’s resource planning processes to enable the Commission to adequately review and to come to a full understanding of the methods used in practice and the results reached.

A. Key Findings

1. Introduction and Resource Planning Overview

Over 98,000 residents and businesses rely on Liberty to provide them with safe and reliable natural gas service, especially for their heating needs during the coldest periods of the year. Liberty’s resource planning process is designed to ensure that the Company has a reliable resource portfolio to meet the forecasted needs of its customers at the lowest reasonable cost. While the approach to resource planning is similar, Liberty separates its Keene Division for resource planning purposes as the City of Keene is not connected to the Company’s larger distribution system, and the results for the Keene Division are discussed separately below.

As discussed in Section II, Liberty’s planning process considers the current resource planning environment. As a regulated local distribution company (“LDC”), the New Hampshire statutes (RSA 378:37 through RSA 378:39) and the Commission’s prior orders provide guidance with respect to the analytical framework for the Company’s resource plans, which Liberty has incorporated in its 2022 IRP. In addition, the Company’s resource plans are influenced by the broader natural gas demand and supply issues in the New England region. Because of the Company’s unique position at the “end of the line” of the Tennessee Gas Pipeline Company, LLC (“Tennessee” or “TGP”) Concord Lateral, the availability and viability of alternative gas supply options for Liberty are limited and the associated price signals for those options are high and volatile, particularly during peak winter periods. Thus, Liberty’s resource strategy for a long-term resource portfolio and associated resource decisions must appropriately balance cost considerations with the Company’s planning objectives, such as reliability and supply security, contract and portfolio flexibility, and viability. Lastly, as market conditions change and evolve, the Company’s resource portfolio needs to have the flexibility to adapt to these new market conditions.

¹ A gas supply planning year or “split-year” is defined as the twelve-month period beginning November 1 and ending October 31.

² As of the date of this filing, the Commission has not issued a final order regarding the Company’s 2017 IRP in Docket No. DG 17-152.

2. Demand Forecast and Planning Standards

The first step in Liberty’s resource planning process is the development of a five-year natural gas demand forecast for those customers for whom Liberty must plan and acquire capacity (“Planning Load”). The Company’s Planning Load includes demand from firm sales customers and capacity-assigned transportation customers (i.e., firm transportation customers that are not exempt from capacity assignment requirements, as specified in the Terms and Conditions, Section 11.0 of the Company’s tariff). As discussed in Section III, using a similar methodology to the approach used in the 2013 and 2017 IRPs, the Planning Load requirements are derived from monthly econometric demand forecast models developed for the residential heating, residential non-heating, commercial and industrial (“C&I”) heating, and C&I non-heating customer segments, as well as for company used gas. The econometric models rely on causal variables, such as weather data, energy price data, as well as economic and demographic data from Moody’s Analytics (“Moody’s”), to determine the demand growth over the Forecast Period. In addition, out-of-model adjustments are included in the forecast to account for discrete load associated with two C&I customers. Finally, the Company’s Planning Load requirements are adjusted for unaccounted for gas and to account for demand reductions expected to be achieved through the implementation of its Commission-approved energy efficiency programs and translated into daily demand requirements. The results of the Company’s Base Case demand forecast indicate that, over the Forecast Period, Planning Load under normal weather conditions (“Normal Year”) is forecast to grow by an average of approximately 146,900 dekatherms (“Dth”) per year, or at a compound annual growth rate (“CAGR”) of 0.9 percent (see Table 1 below). As discussed in Section III.A, this increase is driven by growth in residential heating and C&I heating demand, which is consistent with the Company’s historical/actual growth in demand over the past five split-years.

To fulfill its obligation to provide reliable service to its customers, Liberty must meet customers’ demand under extreme weather conditions, specifically, during the coldest year (referred to as the “Design Year”) and on the coldest day (referred to as the “Design Day”). To that end, the next step in the Company’s resource planning process is to develop appropriate planning standards and forecast the daily Planning Load requirements. As discussed in Section III.B, Liberty defines a Design Year at 7,005 heating degree days (“HDD”) and a Design Day at 69.4 HDD. Combining the results of the design weather planning standards definition and the load forecasting process, the Company is projecting Design Year Planning Load to increase by an average of approximately 163,900 Dth per year, or at a CAGR of 0.9 percent, and Design Day Planning Load to increase by 6,051 Dth, or at a CAGR of 0.9 percent, over the Forecast Period. Table 1 below presents the results of the Company’s Base Case Planning Load forecasts.

Table 1: Summary of Base Case Planning Load Forecasts (Dth)

Split-Year (Nov-Oct)	Normal Year	Design Year	Design Day
2022/23	16,385,997	17,829,775	166,055
2023/24	16,626,560	18,084,862	167,688
2024/25	16,779,325	18,253,613	169,967
2025/26	16,886,246	18,379,955	171,133
2026/27	16,973,741	18,485,367	172,106
CAGR (2022/23- 2026/27)	0.9%	0.9%	0.9%

3. Resource Portfolio Analysis

The next step in Liberty’s resource planning process is to design a resource portfolio that has sufficient natural gas supply and capacity to reliably meet customers’ needs under a range of weather and growth scenarios. As detailed in Section IV.A, Liberty currently maintains a resource portfolio consisting of upstream pipeline transportation capacity, underground storage, and peaking resources. To determine incremental resource needs and inform its capacity renewal decisions, the Company compares its Planning Load forecast under design weather conditions to the supplies available from its current resource portfolio to identify any potential resource shortfalls over the Forecast Period. Table 2 below summarizes the forecasted Design Day Planning Load relative to the current resource portfolio and shows that, over the Forecast Period, the Company has sufficient deliverability to meet the Planning Load requirements on Design Day. Stated differently, given the current resource portfolio, Liberty does not require incremental resources to meet its forecasted Design Day Planning Load.

Table 2: Design Day Demand and Supply Resources (Dth)

Split-Year (Nov-Oct)	Design Day Planning Load	Design Day Resources	Reserve / (Deficiency)
2022/23	166,055	188,633	22,578
2023/24	167,688	188,633	20,945
2024/25	169,967	188,633	18,666
2025/26	171,133	188,633	17,500
2026/27	172,106	188,633	16,527

With respect to capacity renewal decisions, several of the Company’s upstream pipeline capacity contracts require notice of renewal or termination up to one year in advance. As discussed in Section IV.B, given the Planning Load forecast, Liberty intends to renew the existing capacity resources for which the Company has the Right of First Refusal (“ROFR”) or a rollover right that requires renewal during the Forecast Period because these contracts have provided competitively priced services and offer important supply diversity benefits to the Company’s resource portfolio. In addition, the renewal of these contracts is the only viable option currently available for the Company to continue to serve its customers reliably and flexibly at the lowest reasonable cost.

To analyze the ability of its resource portfolio to meet the forecasted daily Planning Load requirements, the Company uses the SENDOUT® portfolio optimization model. By using the SENDOUT® model, the Company can determine the least-cost, economic dispatch of its resources while taking into account the contractual and operating constraints. To evaluate the flexibility and adequacy of the resource portfolio under a range of potential conditions, the portfolio is assessed under Normal Year and Design Year weather conditions. As summarized in Section IV.C, the results of the Company’s SENDOUT® analyses demonstrate that the resource portfolio is sufficient to meet Normal Year, Design Year, and Design Day Planning Load requirements throughout the Forecast Period.

Liberty also tests the adequacy of its resource portfolio by evaluating how it would perform under High Growth and Low Growth demand scenarios.³ The results of the Company’s SENDOUT® analyses

³ As discussed in Section III, the Company developed High Growth and Low Growth demand scenarios using alternative forecasts of economic, demographic, and energy price data from Moody’s applied to the econometric models.

demonstrate that the resource portfolio is adequate under Normal Year, Design Year, and Design Day conditions in both growth scenarios.

Although the Company has determined that it will renew many of its existing upstream capacity contracts, there may be opportunities to re-evaluate the resource portfolio during the Forecast Period. The Company continuously monitors and evaluates new opportunities when they arise and uses an appropriate decision-making process to determine whether modifications to the current resource plan are appropriate. The Company notes that when making renewal, replacement, or incremental capacity decisions, it will employ the planning, supply, and capacity acquisition methods approved under this IRP to further ensure that the decision-making process used is reasonable and appropriate, and that the decision is based on the best information available to Liberty, at the time it is made.

4. Keene Division

Liberty currently serves approximately 1,200 gas customers in Keene, New Hampshire, via a 31-mile propane-air and natural gas distribution system. As discussed in Section V.A, the Company has prepared forecasts of Planning Load requirements for the Keene Division under various weather conditions, including Normal Year, Design Year, and Design Day. Because the Company has not historically seen growth in its Keene Division, the Planning Load forecasts, which were developed using the most recent weather normalized year of actual residential and commercial demand, were assumed to remain flat (i.e., zero growth) over the Forecast Period as shown in Table 3 below.

Table 3: Summary of Keene Division Planning Load Forecasts (Dth)

Split-Year (Nov-Oct)	Normal Year	Design Year	Design Day
2022/23	146,164	165,922	1,651
2023/24	146,164	165,922	1,651
2024/25	146,164	165,922	1,651
2025/26	146,164	165,922	1,651
2026/27	146,164	165,922	1,651
CAGR (2022/23-2026/27)	0.0%	0.0%	0.0%

Most of the Keene Division customers are served by propane, with a small number of the Keene Division customers being served by compressed natural gas (“CNG”). Liberty contracts for the trucking of propane on a year-to-year basis to meet its customers’ needs. In addition, the Company has a contract with Xpress Natural Gas, LLC for CNG deliveries to its system through June 30, 2024. As detailed in Section V.B, Liberty’s proposed Green Keene project will convert the existing propane-air facility and distribution network to CNG and liquefied natural gas (“LNG”). The Company is also evaluating the deployment of renewable energy solutions at the CNG/LNG site using renewable natural gas (“RNG”) and hydrogen as these fuels become more economically viable and easier to procure.

5. Distribution System Planning

Liberty has a fundamental obligation to maintain its distribution infrastructure in a manner that complies with applicable pipeline safety regulations and that will provide safe and reliable service to customers. As detailed in Section VI, over the next five years, Liberty has planned a significant number of capital projects that target things such as the replacement of leak-prone pipe; reliability projects to reinforce the gas system; and supply enhancement projects that will provide benefits to customers in the short-term and

the long-term. Overall, the Company's capital investments will improve the safety, reliability, and flexibility of the distribution system and provide additional capacity in areas that have experienced load growth.

B. Conclusion

In summary, Liberty's 2022 IRP demonstrates that the Company's resource planning processes are reasonable and appropriate and that the resource strategies described in this IRP are in the best interests of its customers and result in a long-range supply and capacity portfolio that will reliably meet the Company's forecasted Planning Load at the lowest reasonable cost. Furthermore, Liberty's planned capital investments in its distribution network over the next five years will improve the Company's ability to reliably serve its customers. Important aspects of Liberty's IRP are that it incorporates flexibility and reflects expected future conditions. Thus, it is a dynamic document in the sense that it continues to be refined as needed to reasonably respond to the changing requirements of the Company's customers and market conditions. Liberty respectfully requests the Commission's approval of its 2022 IRP that sets forth the resource plan and known capital projects that will enable the Company to continue to provide safe and reliable natural gas service to its customers at the lowest reasonable cost.

C. Organization of the 2022 IRP Filing

The remainder of this 2022 IRP is organized as follows:

- Section II provides an overview of Liberty and its resource planning process. This section also discusses the resource planning environment in which the Company operates, which includes a review of the statutory and regulatory requirements in New Hampshire that the Company has complied with and the current regional natural gas market trends that impact the Company's resource strategy and decisions;
- Section III summarizes the Company's econometric demand forecasting methodology, discusses the adjustments to the forecast for the Company's energy efficiency programs and other out-of-model adjustments, and provides a summary of the 2022 IRP demand forecast results with a comparison to the 2017 IRP results. This section also provides details on the approach to developing the Company's planning standards and discusses the allocation of the monthly forecast to a daily basis, which facilitates supply and capacity analysis;
- Section IV discusses the Company's current supply resource portfolio, its resource strategy and decisions, and the adequacy of its resource portfolio in terms of meeting forecasted daily demand requirements under various weather and growth scenarios;
- Section V summarizes the Company's resource planning for the Keene Division, which includes a review of the demand forecast and assessment of the supply resource portfolio for the gas customers in Keene; and
- Section VI provides a high-level description of the Company's distribution system planning and known capital projects planned for the next five years.

Additional information to support the 2022 IRP is provided in the following Appendices:

Appendix 1. Detailed Description of the Econometric Analysis

Appendix 2. Detailed Regression Results

Appendix 3. Energy Efficiency

Appendix 4. Detailed Description of the Planning Standards

Appendix 5. Detailed Description of the Daily Regression Analysis

Appendix 6. Existing Supply Resource Portfolio

Appendix 7. Detailed SENDOUT® Results

Appendix 8. Green Keene Project

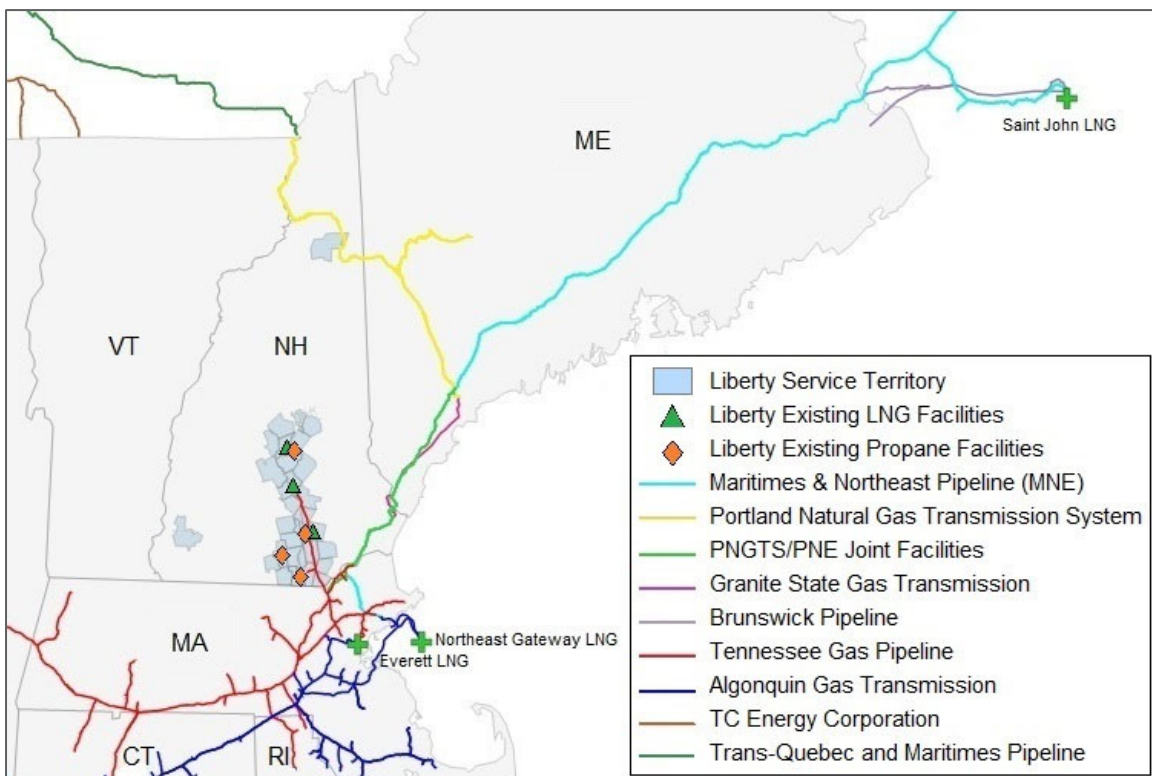
II. INTRODUCTION AND RESOURCE PLANNING OVERVIEW

A. Company Background

Liberty and its predecessors have been providing natural gas service to customers in New Hampshire for decades, and have served some locations for well over 100 years. As of April 2022, Liberty serves over 98,000 residential, commercial, and industrial customers in over 30 cities and towns in central and southern New Hampshire and the cities of Berlin and Keene. In terms of corporate structure, the Company was acquired in July 2012 by Liberty Energy Utilities (New Hampshire) Corp., a subsidiary of Liberty Utilities Co. (“Liberty Utilities”). Liberty Utilities conducts the regulated business of Algonquin Power & Utilities Corp. (“Algonquin Power”), and provides regulated water, electricity, and natural gas utility services to over one million customers in 13 U.S. states, one Canadian province, Bermuda, and Chile.

Liberty’s gas distribution system in New Hampshire consists of 1,444 miles of distribution pipeline that is served exclusively by the TGP Concord Lateral, with the exception of the city of Berlin, which is served by the Portland Natural Gas Transmission System (“PNGTS”) (see Figure 1 below). As discussed in Section IV, Liberty maintains a resource portfolio consisting of various upstream pipeline transportation capacity and underground storage, as well as peaking supplies from the Company’s three on-system LNG facilities in Concord, Manchester, and Tilton and four liquid propane facilities in Nashua, Manchester, Tilton, and Amherst.⁴

Figure 1: Map of Regional Gas Infrastructure and Liberty’s Service Territory⁵



⁴ As noted in Section IV, the “satellite” propane facility in Amherst is used solely for storage.

⁵ Source: S&P Global Market Intelligence.

Finally, Liberty separates its Keene Division for resource planning purposes as the City of Keene is not connected to the Company's larger distribution system. Liberty acquired the Keene Division from New Hampshire Gas Corporation in January 2015. As discussed in Section V, the Company owns and operates a 31-mile propane-air and natural gas distribution system in Keene, which delivers roughly 150,000 Dth annually to customers. Liberty currently relies on propane and CNG to serve the approximately 1,200 customers in the Keene Division.

B. Resource Planning Process

Liberty's resource planning process begins with the establishment of appropriate goals and objectives. The primary goal of Liberty's resource planning process is to ensure that the Company has a reliable resource portfolio to meet the forecasted needs of its customers at the lowest reasonable cost. The Company balances cost considerations with its resource planning objectives, which are:

1. To maintain reliability and supply security;
2. To provide diversity of resources and provide contract and portfolio flexibility; and
3. To promote the acquisition of viable resources.

In general, there are two categories of customers with respect to gas supply and capacity resource planning: those customers for whom Liberty must plan and acquire capacity (i.e., Planning Load, which includes sales and capacity-assigned transportation customers), and those who receive delivered supplies from competitive suppliers (i.e., capacity-exempt transportation customers). Liberty has an obligation to have gas delivered to its city-gate to meet its forecasted Planning Load requirements under extreme (i.e., cold) weather conditions. To ensure that the Company is able to obtain sufficient gas to meet its peak demand requirements consistent with its planning standards, the Company's long-term resource planning has historically been focused on the adequacy of upstream pipeline capacity, storage, and peaking resources.

In summary, Liberty's long-term resource planning process consists of the following steps:

1. Develop a natural gas demand forecast (as detailed in Section III.A);
2. Develop appropriate planning standards and determine daily Planning Load requirements (as detailed in Section III.B); and
3. Review and evaluate the adequacy of the supply resource portfolio to meet daily Planning Load requirements under various weather and growth scenarios consistent with its planning standards (as detailed in Section IV).

Prior to discussing each of these resource planning steps, the Company begins with appropriate background and context regarding the resource planning environment within which Liberty currently operates. Specifically, as detailed below, Liberty's resource planning considers the statutory and regulatory requirements for IRPs in the state of New Hampshire and the broader regional natural gas market trends.

C. Current Resource Planning Environment

1. Statutory and Regulatory Requirements

As a public utility operating in the state of New Hampshire, Liberty's resource planning is subject to statutory and regulatory requirements that are set forth in prior Commission orders that govern IRPs in New Hampshire. The specific statutory and regulatory requirements are discussed below, and the actions taken by the Company to ensure compliance with those requirements are summarized below and discussed throughout the balance of this IRP.

The New Hampshire statutes that govern IRPs consist of those sections of RSA Chapter 378 that fall under the heading "Least Cost Energy Planning," which are RSA 378:37 through RSA 378:39. The first statute in this subdivision, RSA 378:37, is the Legislature's articulation of the state's energy policy:

The general court declares that it shall be the energy policy of this state to [1] meet the energy needs of the citizens and businesses of the state at the lowest reasonable cost while [2] providing for the reliability and diversity of energy sources; [3] to maximize the use of cost effective energy efficiency and other demand side resources; and [4] to protect the safety and health of the citizens, the physical environment of the state, and the future supplies of resources, [5] with consideration of the financial stability of the state's utilities. [Numbers added.]

The second statute, RSA 378:38, contains the requirement that utilities must file IRPs with the Commission and lists the topics that the utilities must address in the IRPs, including:

- I. A forecast of future demand for the utility's service area.
- II. An assessment of demand-side energy management programs, including conservation, efficiency, and load management programs.
- III. An assessment of supply options including owned capacity, market procurements, renewable energy, and distributed energy resources.
- IV [omitted as it applies to electric utilities]
- V. An assessment of plan integration and impact on state compliance with the Clean Air Act of 1990, as amended, and other environmental laws that may impact a utility's assets or customers.
- VI. An assessment of the plan's long- and short-term environmental, economic, and energy price and supply impact on the state.
- VII. An assessment of plan integration and consistency with the state energy strategy under RSA 12-P. [Omitted sub-section IV pursuant to Order No. 26,225 (Mar. 13, 2019), which indicates that sub-section IV only applies to electric distribution utilities.]

The third substantive statute⁶ in this subdivision is RSA 378:39, which directs the Commission to "evaluate the consistency of each utility's plan with this subdivision."

The Commission's charge in this docket, therefore, is to evaluate whether Liberty's IRP is consistent with the state's energy policy as articulated in RSA 378:37. RSA 378:39 also provides the Commission with guidance in conducting its review: "In deciding whether or not to approve the utility's plan" (i.e., whether to find that Liberty's IRP is consistent with the State's energy policy as articulated in RSA 378:37), "the

⁶ RSA 378:38-a authorizes the Commission to extend the deadline for a utility to file its next IRP.

commission shall consider potential environmental, economic, and health-related impacts of each proposed option.” RSA 378:39 concludes with the following sentence:

Where the commission determines the options have equivalent financial costs, equivalent reliability, and equivalent environmental, economic, and health-related impacts, the following order of energy policy priorities shall guide the commission's evaluation: I. Energy efficiency and other demand-side management resources; II. Renewable energy sources; III. All other energy sources.

Liberty’s interpretation of this sentence is that, to the extent the Company has supply options for meeting its customers’ projected demand, and assuming those supply options are equal in terms of cost, reliability, and impact on the environment, economy, and health, then the Commission should determine whether the IRP chooses from those options in the order required by the statute. If, however, the supply options available to Liberty are not equivalent in the above respects, then the Commission must more generally determine whether the Company’s supply choices are consistent with the state energy policy contained in RSA 378:37, while considering the “potential environmental, economic, and health-related impacts of each proposed option,” RSA 378:39.

The Commission has provided Liberty with guidance on how to comply with these statutes in the 2013 IRP Order, the 2017 IRP Interim Order, and the TGP Contract Order.⁷ Those directives, and the actions taken by Liberty to comply with them, are described in Table 4 below.

⁷ As of the date of this filing, the Commission has not issued a final order regarding the Company’s 2017 IRP in Docket No. DG 17-152.

Table 4: Compliance with Commission Directives

Commission Directives	Liberty's Actions to Comply with Directives
<p><u>General Directives for 2022 IRP Filing:</u></p> <ul style="list-style-type: none"> • “Liberty’s next LCIRP should be clear and well-organized and should incorporate new material as discussed in this order.” (2017 IRP Interim Order, at 8) • The Commission “specifies that for the purposes of its October 3, 2022, filing, the Company should include: (1) a forecast of future demand, pursuant to RSA 378:38, I; (2) an assessment of demand-side energy management programs, pursuant to RSA 378:38, II; and (3) an assessment of supply options, pursuant to RSA 378:38, II.” The Commission also indicated that the Company “will have the opportunity to supplement this material” and “prepare the remaining statutory elements of its next LCIRP, and the other guide posted material discussed in this Order” by a later date. (2017 IRP Interim Order, at 9) 	<p>Liberty has included an executive summary as Section I which (i) outlines the overall structure and organization of the 2022 IRP (i.e., Sections II through VI) and (ii) summarizes the key findings from each of those sections for ease of review.</p> <p>For this initial October 3, 2022, IRP filing:</p> <ul style="list-style-type: none"> • Liberty has provided a detailed and comprehensive demand forecast for its larger distribution system in Section III; and for the Keene Division in Section V.A. • With respect to demand-side energy management programs, compliance with specific Commission directives is further detailed below. In general, Appendix 3 of this 2022 IRP describes Liberty’s energy efficiency programs, how these programs are integrated with those of other New Hampshire utilities, and how those programs benefit customers. Appendix 3 also details the savings achieved by the programs to date and that will be realized through their useful lives. Section III.A.4 of this 2022 IRP calculates how these programs reduce the Company’s demand forecast and demonstrates that the Company has reduced its demand forecast based on the savings that these programs are expected to realize going forward. • Liberty has provided an assessment of its resource portfolio and supply options for its larger distribution system in Section IV; and for the Keene Division in Section V.B. <p>Finally, the Company has incorporated new material consistent with the Commission’s specific directives from the 2017 IRP Interim Order as further detailed below.</p>

Commission Directives	Liberty's Actions to Comply with Directives
<p><u>Planning Standards:</u></p> <ul style="list-style-type: none"> The Commission refined how Liberty is to calculate its Design Day planning standards, stating that Liberty should “present design day analysis in its 2022 LCIRP based on 30 years of weather data.” (TGP Contract Order, at 2) 	<p>Liberty has modified its approach to developing its Design Year and Design Day standards to be based on the most recent 30 years of weather data as discussed in Section III.B.</p>
<p><u>Demand Side Energy Management Programs:</u></p> <ul style="list-style-type: none"> The Company should incorporate “Staff’s methodological suggestions”, which include “apply[ing] a more nuanced approach in evaluating its energy-efficiency options” and “apply[ing] a cross-check on a company-wide basis to its modelling outputs.” (2013 IRP Order, at 4-5) The Commission has stated that “Energy Efficiency (EE) is currently subsumed within the Energy Efficiency Resource Plans for both electric and natural gas utilities operating in New Hampshire...we do not expect the LCIRP process to conflict with that policy decision by exploring additional ratepayer funding sources for EE.” (2017 IRP Interim Order, at 6) “LCIRPs may consider C&I demand-side fuel switching programs focused on providing natural gas at the lowest possible cost on a project-by-project basis.” (2017 IRP Interim Order, at 6-7) 	<p>With respect to demand-side energy management programs, Liberty offers a portfolio of energy efficiency programs to residential, C&I, and municipal customers across the state, currently marketed under the statewide brand “NHSaves.” The Company has reduced its demand forecast to reflect the energy efficiency programs put forth in the 2021-2023 Triennial Energy Efficiency Plan developed and approved by the Commission in Docket No. DE 20-092, which was based on a comprehensive review of potential options and the reasonableness of implementation (see Section III.A.4 and Appendix 3).</p>
<p><u>Supply Options:</u></p> <ul style="list-style-type: none"> “Furthermore, under RSA 378:39, Liberty may include Renewable Natural Gas as a potential supply option.” (2017 IRP Interim Order, at 7) “In its next LCIRP, Liberty should further seek to identify opportunities to incorporate Non-Pipeline Alternatives (NPAs) that could avoid or defer reinforcement costs associated with distribution system infrastructure and seek to incorporate such opportunities as resource options are developed. NPAs should also include truck and rail transit of propane, CNG, and LNG, as well as storage options (utility-sited storage, and customer-sited storage).” (2017 IRP Interim Order, at 8) 	<p>Given Liberty’s current resource portfolio and the renewal of many of its existing upstream capacity contracts, the Company does not require incremental resources to meet its forecasted Planning Load requirements. However, there may be opportunities to re-evaluate the supply resource portfolio during the Forecast Period. As discussed in Section IV.B, Liberty will continue to monitor and evaluate opportunities, including RNG and non-pipeline alternatives, when they arise and use its resource planning and decision-making process to determine whether modifications to the current resource plan are appropriate.</p>

Commission Directives	Liberty's Actions to Comply with Directives
<p><u>Assessment of Environmental, Economic, and Health-related Impacts:</u></p> <ul style="list-style-type: none"> • “The Commission does not oppose analyses of the environmental impact of greenhouse gas emissions and finds such analyses would be within the LCIRP statute under RSA 378:38, VI and RSA 378:39. We understand this to include the leakage of natural gas and other pollutants from the Liberty distribution system in New Hampshire.” (2017 IRP Interim Order, at 7) • “Liberty should assess the health-related impacts of the emissions resulting from leakage (also known as "lost gas" or "unmetered gas") occurring in its distribution system in New Hampshire. Such an assessment would properly fall within the scope of an LCIRP under RSA 378:38, V and RSA 378:39.” (2017 IRP Interim Order, at 7) • “Liberty should assess the economic impacts of its distribution system operation and its system upgrades by reporting on direct jobs attributable to Liberty’s operations over the last 20 years. Such an assessment would be appropriate under RSA 378:38, VI and RSA 378:39.” (2017 IRP Interim Order, at 8) 	<p>Consistent with the Commission’s guidance in the 2017 IRP Interim Order, Liberty will prepare and present its analysis to address these statutory elements in its supplement to be filed by the May 1, 2023, deadline.</p>

Commission Directives	Liberty's Actions to Comply with Directives
<p><u>Distribution System Planning:</u></p> <ul style="list-style-type: none"> • “Going forward, we will consider how each utility’s capital investments align with its LCIRP” and “[f]or this evaluation, we are interested in two views, a functional view and a project view.” The Commission has stated that “Liberty’s summaries should include a supply and capital planning time horizon looking out ten years and history for the previous five years” and “Liberty’s load forecasts should continue to be 10-year forecasts and include the most recent five years of history.” (2017 IRP Interim Order, at 4-6) • Furthermore, “[a]s part of its capital planning process” the Commission has indicated that Liberty should conduct “assessments of proposed investments’ environmental, economic and health-related impact to ensure compliance with applicable state and federal laws.” (2017 IRP Interim Order, at 8) 	<p>Liberty has provided a summary of the Company’s known capital projects for the next five years⁸ in Section VI. Consistent with the Commission’s directives, Liberty has provided a functional view and project view for its planned distribution system investments. The Company will supplement this information to address the additional guidance from the 2017 IRP Interim Order by the May 1, 2023, deadline.</p> <p>The Company has provided a summary of its current five-year⁹ forecast of Planning Load demand and an analysis of its normalized actual demand over the past five split-years in Table 16 of Section III.A.7. A summary of the Company’s supply and capacity resource plan to meet the five-year Planning Load demand forecast is provided in Section IV.</p>

2. Regional Natural Gas Market Trends

The Company is actively involved in the natural gas marketplace ranging from conducting requests for proposals (“RFPs”) for natural gas supply and/or asset management arrangements, to monitoring and participating in Federal Energy Regulatory Commission (“FERC”) related activities, to reviewing trade and industry information. As a result of this market activity, there are several natural gas demand and supply trends that the Company is continuously monitoring. As these market conditions change and evolve, the Company’s resource portfolio needs to have the flexibility to adapt to these new market conditions, while maintaining reliability. Prior to the discussion of the Company’s specific resource plans, a broader review of the regional natural gas market issues will provide necessary context and background information. Specifically, Liberty’s resource planning is influenced by, and addresses, the regional trends in natural gas demand and supply, some of which are discussed below.

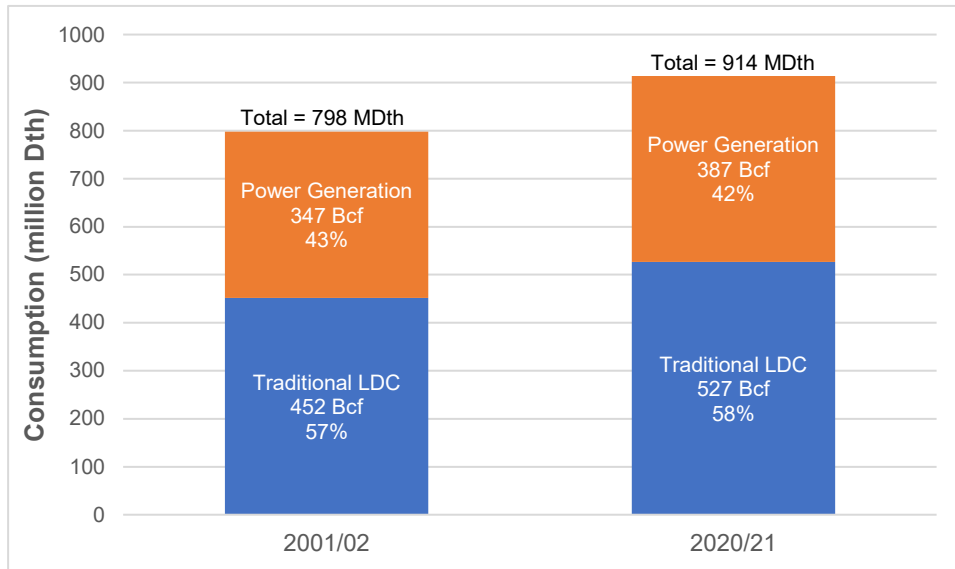
a. Regional Natural Gas Demand Trends

From a demand perspective, there has been significant growth in natural gas consumption in the New England region over the past 20 years. As illustrated by Figure 2, the total annual natural gas demand for the New England region has grown from approximately 798 million Dth (“MDth”) in 2001/02 to 914 MDth in 2020/21, an increase of 15 percent with both the LDC and power generation segments experiencing significant increases in natural gas consumption.

⁸ Liberty has provided a list of known capital projects for the next five years because the Company does not prepare ten-year capital plans.

⁹ Liberty has developed a five-year Planning Load forecast consistent with the five-year load forecasts provided in the 2010 IRP, 2013 IRP, and 2017 IRP filings.

Figure 2: Annual Natural Gas Consumption by Sector¹⁰



Focusing on the winter season, the New England region has seen an increase in natural gas consumption of nearly 30 percent, growing from approximately 388 MDth in the winter of 2001/02 to 496 MDth in the winter of 2020/21. Stated differently, the winter demand for natural gas in New England has grown by 108 MDth over the past 20 years, which is approximately 715,000 Dth/day of incremental natural gas demand.

b. Regional Natural Gas Supply Trends

From a gas supply perspective, the New England region faces certain challenges, including: (i) pipeline capacity constraints during the winter on the interstate natural gas pipelines; and (ii) reliance on LNG imports during the winter for supplemental gas supplies with significant uncertainty regarding the future availability of supply and service offerings and associated price signals.

As noted by the FERC, there are a limited number of natural gas pipelines serving the New England region, and natural gas availability to meet peak winter demand is a concern due to limited pipeline capacity.¹¹ This is expected to continue to be a challenge for future winters as there have been no major pipeline expansion projects announced or placed in service over the last several years that significantly increase the deliverability into the New England region.¹²

LNG imports continue to be a major supply source for the New England region, particularly during the winter period, via re-vaporized LNG from Repsol SA’s (“Repsol”) Saint John LNG facility (formerly known as the Canaport LNG facility) in Saint John, New Brunswick, Canada, and Constellation Energy

¹⁰ Source: U.S. Energy Information Administration, Natural Gas Consumption by End Use for Massachusetts, Connecticut, Rhode Island, New Hampshire, Vermont, and Maine, release date August 31, 2022. Data for certain months in 2020/21 are based on estimates.

¹¹ See, FERC, “Winter Energy Market and Reliability Assessment 2021-2022,” October 21, 2021, at 19.

¹² See, U.S. EIA, U.S. Natural Gas Pipeline Projects, release date July 29, 2022; FERC, “Winter Energy Market and Reliability Assessment 2021-2022,” October 21, 2021, at 19; and FERC, New England Winter Gas-Electric Forum website (<https://www.ferc.gov/news-events/events/new-england-winter-gas-electric-forum-09082022>).

Corporation’s (“Constellation”) LNG facility in Everett, Massachusetts. In addition, Excelerate Energy’s Northeast Gateway LNG facility in offshore Cape Ann, Massachusetts, which had no activity in the winters of 2019/20 or 2020/21, imported LNG to serve New England markets in winter 2021/22 as summarized in Table 5 below.

Table 5: Average Winter LNG Import Volumes (Dth/day)¹³

Winter (Nov-Mar)	Everett LNG	Northeast Gateway	Saint John LNG	Combined Total
2017/18	212.5	0.0	80.7	293.1
2018/19	177.2	34.1	112.9	324.2
2019/20	151.8	0.0	111.6	263.4
2020/21	133.2	0.0	143.1	276.3
2021/22	95.5	19.9	53.5	168.8

The Company continues to monitor developments regarding the Saint John and Everett LNG facilities. Specifically, Repsol became the sole owner of the Saint John LNG facility in late 2021 after acquiring the minority ownership interest of Irving Oil,¹⁴ and has expressed its commitment to “maximize the value of the terminal”, which may include the potential to add liquefaction capabilities to the existing Saint John LNG facility.¹⁵ In addition, the Everett LNG facility has been undergoing commercial changes, and operates under a new cost recovery framework since being acquired by Exelon Corporation (“Exelon”) in October 2018. While Exelon’s subsidiary, Constellation LNG, was responsible for purchasing and selling LNG to market participants in New England, Exelon announced plans in 2021 to separate from Constellation LNG and Exelon Generation and, in early 2022, the separation was completed and Constellation Energy Corporation was formed.¹⁶ The availability of supply and service offerings from the Saint John and Everett LNG facilities are also impacted by global LNG markets, with international demand and international LNG prices placing upward pressure on the price signals from these regional LNG facilities.

c. Natural Gas Price Trends

Due to the regional natural gas market issues, the New England region has experienced high natural gas price levels and significant price volatility in the winter period. As noted by the FERC in an April 2022 report, “Algonquin Citygates, a Boston area hub, averaged \$4.51/MMBtu in 2021 and saw its prices increase significantly late in 2021 during cold weather events. Due to constrained pipeline capacity into New England, segments of the region’s pipelines often reach their maximum capacity in winter. Prices at Algonquin Citygates frequently reflect winter scarcity as well as the region’s reliance on LNG imports to supplement pipeline supplies. As global demand for LNG increased, natural gas prices in New England also rose, reflecting the effects of the tight international market on the region.”¹⁷

¹³ Sources: U.S. Department of Energy, Office of Fossil Energy and Carbon Management, Monthly LNG Reports, accessed on July 20, 2022; and Canada Energy Regulator, Liquefied Natural Gas (LNG) – Imports and Exports, Data and Resources, LNG Exports and Imports Detail, accessed on July 20, 2022.

¹⁴ See, Repsol press release, “Repsol completes acquisition of LNG terminal,” November 15, 2021.

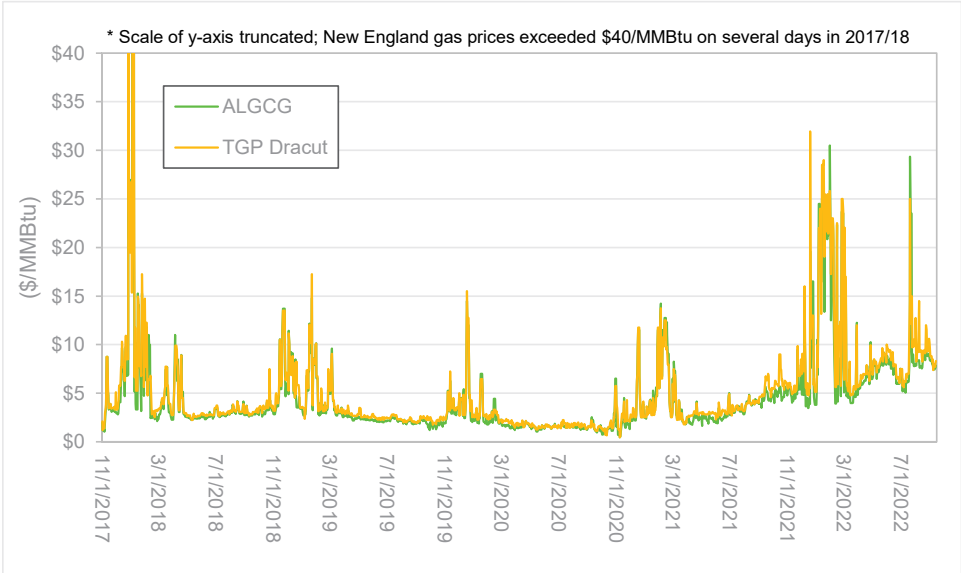
¹⁵ See, The Canadian Press, “Higgs says New Brunswick LNG facility could help Europe cut energy ties with Russia,” June 29, 2022.

¹⁶ See, Constellation press release, “Constellation Launches as Largest U.S. Clean Energy Company After Completing Separation from Exelon,” February 2, 2022.

¹⁷ See, FERC, “State of the Markets 2021, A Staff Report to the Commission,” April 21, 2022, at 3.

Figure 3 below illustrates the historical daily prices for the Algonquin Citygates (“ALGCG”) and the TGP Dracut price indices over the past five years. As illustrated, the ALGCG and TGP Dracut price indices spike during the winter period and reached a record peak of approximately \$83 per MMBtu and \$88 per MMBtu, respectively, in 2017/18.

Figure 3: Historical New England Natural Gas Prices¹⁸



d. Liberty’s Unique Challenges

In addition to being affected by the broader regional natural gas market issues, Liberty is further challenged by its unique position at the “end of the line” of the TGP Concord Lateral. As illustrated in Figure 1 above, Liberty, for all intents and purposes, relies on a single feed from TGP for delivery of gas supply to its distribution system. Table 6 below summarizes the Company’s existing firm transportation capacity by upstream gas supply source.

Table 6: Liberty’s Upstream Gas Supply Sources

Gas Supply Source	Contract MDQ (Dth/day) ¹⁹	% of Total
Canadian Supply	13,122	9%
Dracut	85,000 ²⁰	57%
Long-line	21,596	15%
Storage	28,115	19%
Total Firm Transportation	147,833	100%

As shown in Table 6 above, the transportation contracts from Dracut represent the single largest component of the Company’s total firm pipeline capacity. Stated differently, nearly 60% of Liberty’s total

¹⁸ Source: S&P Global Market Intelligence.

¹⁹ MDQ = maximum daily quantity

²⁰ An additional 5,000 Dth/day of Dracut capacity is used to transport the 5,000 Dth/day of firm Canadian supply from Dawn, Ontario, to PNGTS.

firm pipeline capacity originates at Dracut, and about 44% of the Company's entire Design Day resource portfolio (i.e., 85,000 Dth/day of 188,633 Dth/day) is at Dracut. Therefore, Liberty and its customers have significant exposure to Dracut supplies and its associated high winter price levels and price volatility. As illustrated in Figure 3 above and summarized in Table 7 below, the TGP Dracut price index has exceeded \$10 per MMBtu during each winter period and reached a record high of approximately \$88 per MMBtu during the winter of 2017/18.²¹

Table 7: TGP Dracut Winter Prices²²

Winter (Nov-Mar)	Average TGP Dracut Price (\$/MMBtu)	Max. TGP Dracut Winter Price (\$/MMBtu)	Winter HDD for Boston, MA	Winter HDD Difference from Normal²³
2017/18	\$8.71	\$88.30	4,449	88
2018/19	\$5.77	\$17.25	4,270	(91)
2019/20	\$3.46	\$15.50	3,876	(485)
2020/21	\$4.46	\$13.75	4,136	(225)
2021/22	\$11.68	\$31.96	4,198	(162)

In summary, the current natural gas supply challenges exacerbate the Company's concerns regarding the availability and long-term feasibility of certain natural gas supply options to serve the New England region in general and Liberty in particular, and associated price spikes and high volatility levels, particularly during peak winter periods. Nonetheless, Liberty will continue to monitor the marketplace for opportunities and evaluate whether the existing resource portfolio should be adjusted to adapt to the changing regional natural gas market dynamics.

²¹ Please note, since gas typically trades on Friday for delivery on Saturday, Sunday, and Monday, the TGP Dracut price was approximately \$88 per MMBtu on three consecutive dates (i.e., January 5, 2018, January 6, 2018, and January 7, 2018).

²² Source: S&P Global Market Intelligence; and U.S. NOAA National Centers for Environmental Information, Daily Summaries for Boston, MA.

²³ Boston, MA, has a total normal winter HDD of 4,360. A negative difference from normal indicates warmer-than-normal weather, and a positive difference from normal indicates a colder-than-normal winter. Source: U.S. NOAA National Centers for Environmental Information, Summary of Monthly Normals 1991-2020 for Boston, MA.

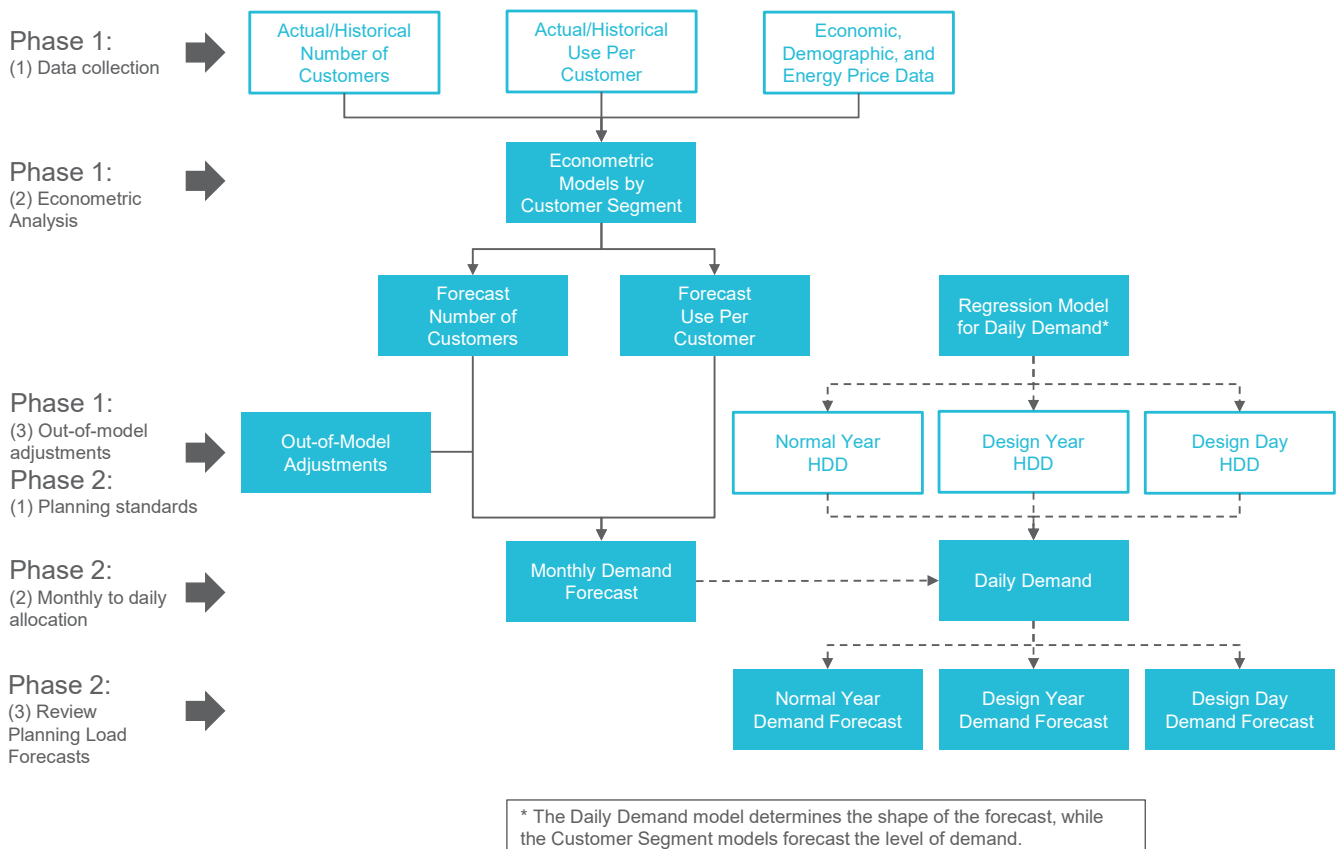
III. DEMAND FORECAST AND PLANNING STANDARDS

In the first step of the resource planning process, Liberty produces a forecast of natural gas demand for the customers in its service territory for which the Company must plan and acquire capacity for (i.e., Planning Load) for the five-year planning period 2022/23 through 2026/27. For planning purposes, the Company separates its Keene Division because the City of Keene is not connected to the larger distribution system. The demand forecast for the Keene Division is detailed in Section V.

The Company’s overall demand forecasting methodology used in this 2022 IRP is similar to the methodology used in the 2013 IRP and 2017 IRP. As illustrated in Figure 4 below, the Company’s demand forecast was developed in two phases:

- Phase 1 includes a comprehensive econometric analysis to forecast levels of natural gas demand for the Company’s service territory, with adjustments for (i) discrete loads that are calculated outside of the econometric models, (ii) energy efficiency, and (iii) unaccounted for gas.
- Phase 2 includes the development of planning standards and estimation of daily loads under various weather and growth scenarios to facilitate supply and capacity analysis.

Figure 4: Demand Forecast Methodology



A. Phase 1 – Development of Monthly Demand Requirements

In Phase 1 of the demand forecast process, Liberty developed econometric models by customer segment to forecast total monthly demand requirements. The purpose of the customer segment forecasts²⁴ is to develop long-term projections of Planning Load based on forecasted changes in economic and demographic conditions in the Company’s service territory. As noted, this approach is consistent with the methodology from the 2013 and 2017 IRPs. A summary of the econometric modeling process and results are provided below, with detailed descriptions and data provided in Appendix 1.

1. Econometric Modeling Process

The first step in developing the econometric forecast was to collect and review the appropriate data for use in the modeling process. The Company collected monthly billing data by rate class, weather data, economic and demographic data, and energy pricing data. The data was then reviewed for reasonableness to ensure that the demand forecast was based on appropriate data. To that end, the Company used monthly customer billing data (volume and number of customers) for the period January 2014 through March 2022 to define the dependent variables in its econometric modeling to ensure that the most reliable, consistent, and robust data was used in the models.

In the second step, econometric models by customer segment were developed to forecast the number of customers, use per customer, and volumes. To develop the forecasts, the Company’s 17 rate classes were combined into four customer segments for sales and capacity-assigned transportation customers: residential heating, residential non-heating, C&I heating, and C&I non-heating; and three customer segments for capacity-exempt customers (i.e., C&I heating, C&I non-heating, and C&I non-heating G-54T) as shown in Table 8.²⁵

Table 8: Customer Segments

Customer Segment	Rate Classes
Residential Non-Heating	R-1
Residential Heating	R-3, R-4
C&I Heating ²⁶	G-41, G-42, G-43, G-41T, G-42T, G-43T
C&I Non-Heating ²⁷	G-51, G-52, G-53, G-54, G-51T, G-52T, G-53T, G-54T
C&I Heating Capacity-Exempt	G-41T, G-42T, G-43T
C&I Non-Heating Capacity-Exempt Excl. G-54T	G-51T, G-52T, G-53T
C&I Non-Heating Capacity-Exempt ²⁸	G-54T

²⁴ All forecasts represent firm demand only (i.e., firm sales and capacity-assigned, and capacity-exempt transportation) and exclude interruptible and special contract demand.

²⁵ These sales and transportation categories were chosen since the Company maintains provider-of-last-resort responsibility for the sales and capacity-assigned transportation customers and, by including the capacity-exempt customers, total retail volumes can be correlated with total natural gas flow into the Company’s distribution system.

²⁶ The C&I heating customer segment includes C&I heating sales and capacity-assigned transportation customers.

²⁷ The C&I non-heating customer segment includes C&I non-heating sales and capacity-assigned transportation customers.

²⁸ A separate econometric model was developed for the G-54T capacity-exempt rate class because its seasonal usage pattern was different than the other C&I non-heating capacity exempt rate classes.

In addition, the Company developed an econometric model of company used gas. Appropriate causal drivers, such as weather, energy prices (e.g., natural gas prices), and economic and demographic variables, were tested in the development of each of the forecast models and each potential causal variable was tested and reviewed to develop models, which were robust, accurate, and consistent with economic theory.²⁹ All the econometric models were developed using regression analyses, proper and appropriate economic theory, and sound statistical practices and procedures.³⁰

Lastly, as described below, the results of the econometric model forecast were augmented by two out-of-model adjustments to account for discrete load associated with two C&I customers. The monthly volumetric results of the econometric models plus the out-of-model adjustments were reduced by energy efficiency savings and adjusted for unaccounted for gas to determine the Company’s net monthly demand requirements.

2. Customer Segment Forecasts

The majority of Liberty’s customers are residential heating and C&I heating customers having heat-sensitive demand (i.e., approximately 84 percent and 11 percent, respectively). On a volumetric basis in the 2020/21 split-year, the residential heating and C&I heating customer segments comprised approximately 42 percent and 44 percent of firm sendout, respectively.³¹ The C&I non-heating segment volumes represented approximately 13 percent, and the residential non-heating segment accounted for approximately 0.5 percent of firm sendout.

A summary of the results of the Company’s regression analysis for each customer segment is provided below in Tables 9 through 11. Detailed results of the regression analysis for each customer segment forecast are provided in Appendix 2.

Table 9: Number of Customers Forecast

Split-Year (Nov-Oct)	Residential Heating	Residential Non-Heating	C&I Heating	C&I Non-Heating
2022/23	83,631	3,246	11,298	1,684
2023/24	84,819	3,268	11,409	1,704
2024/25	85,958	3,288	11,544	1,719
2025/26	87,073	3,307	11,686	1,725
2026/27	88,085	3,323	11,827	1,733
CAGR (2022/23-2026/27)	1.3%	0.6%	1.2%	0.7%

²⁹ Each of the econometric models was tested for autocorrelation, heteroskedasticity, goodness of fit, significant values of the ‘F’ and ‘t’ statistics, and multicollinearity.

³⁰ All regression analyses for the customer segment models were conducted using the SPSS software package.

³¹ Calculated as the volumes associated with sales and capacity-assigned transportation customers.

Table 10: Use Per Customer Forecast (Dth/Customer)

Split-Year (Nov-Oct)	Residential Heating	Residential Non-Heating	C&I Heating	C&I Non-Heating
2022/23	80.2	24.0	615.4	1,241.7
2023/24	80.3	23.9	618.7	1,252.7
2024/25	79.9	23.8	617.1	1,256.2
2025/26	79.5	23.6	614.2	1,251.2
2026/27	79.0	23.4	610.9	1,244.6
CAGR (2022/23-2026/27)	-0.4%	-0.6%	-0.2%	0.1%

Table 11: Total Econometric Demand Forecast (Dth)³²

Split-Year (Nov-Oct)	Residential Heating	Residential Non-Heating	C&I Heating	C&I Non-Heating	Company Use	Total Econometric Forecast
2022/23	6,694,201	77,651	6,992,527	2,087,727	25,903	15,878,009
2023/24	6,788,827	77,912	7,095,100	2,129,813	25,717	16,117,369
2024/25	6,850,190	78,030	7,159,276	2,155,451	25,644	16,268,591
2025/26	6,903,704	77,884	7,212,532	2,154,746	25,614	16,374,480
2026/27	6,945,578	77,681	7,259,963	2,152,299	25,600	16,461,121
CAGR (2022/23-2026/27)	0.9%	0.0%	0.9%	0.8%	-0.3%	0.9%

As shown in Table 11, above, residential heating, C&I heating, and C&I non-heating demand are all expected to grow at approximately the same CAGR over the Forecast Period. The forecasted demand growth for these customer segments is primarily due to the growth in customers presented in Table 9 above. Customer growth for the residential customer segments is driven by Moody's forecast of the number of households, which is expected to consistently increase over the Forecast Period. Customer growth for the C&I heating and C&I non-heating customer segments are driven by Moody's forecasts of retail sales and employment, which are also expected to increase over the Forecast Period. While these customer segments have flat or declining use per customer over the Forecast Period as shown in Table 10 above, the forecasted declining use per customer is offset by the higher rate of customer growth for those segments.

3. Out-of-Model Adjustments

Liberty's demand forecast includes two out-of-model adjustments. The first out-of-model adjustment to the econometric forecast is to account for additional growth that was not reflected in the historical billing data. That out-of-model adjustment of approximately 45,000 Dth annually was related to a large C&I customer that returned to capacity-assigned service from capacity-exempt service in January 2022.

Consistent with the 2017 IRP, the second out-of-model adjustment to the econometric forecast is to account for a large C&I customer, Innovative Natural Gas, LLC ("iNATGAS"), a reseller of compressed

³² Represents the product of the number of customers and use per customer forecasts for each customer segment.

natural gas. For this out-of-model adjustment, it was assumed that iNATGAS would use 300,000 Dth annually and 4,251 Dth on the Design Day.³³

4. Energy Efficiency

The demand forecast was reduced by energy efficiency savings to determine the Company’s net demand requirements. The Company used a similar approach to apply energy efficiency savings to the demand forecast as the methodology in the 2017 IRP and presented and approved by the Commission in Docket No. DG 14-380. Specifically, Liberty estimates energy efficiency savings based on the Commission-approved energy efficiency programs put forth in the 2021-2023 Triennial Energy Efficiency Plan (“EE Plan”) in Docket No. DE 20-092. A detailed description of the various energy efficiency programs and savings associated with those programs is provided in Appendix 3. Table 12 below summarizes the Company’s current annual energy efficiency goals in the EE Plan, which is applied as a reduction to Liberty’s demand forecast.

Table 12: Calendar Year Energy Efficiency Goals (Dth)

Year	Residential	C&I
2022	65,839	71,985
2023	74,881	73,080

Because the EE Plan only extends through calendar year 2023, the Company assumed the percentage of residential energy efficiency volumes relative to residential firm demand continued to be equivalent to the 2023 levels through the end of the Forecast Period (i.e., 2027). The same assumption was made for energy efficiency volumes for C&I customers. The resulting calendar year energy efficiency reductions to the demand forecast are presented in Table 13 below.

Table 13: Calendar Year Energy Efficiency

Year	Residential		C&I	
	Energy Efficiency / Demand	Energy Efficiency (Dth)	Energy Efficiency / Demand	Energy Efficiency (Dth)
2022	1.02%	65,839	0.64%	71,985
2023	1.10%	74,881	0.63%	73,080
2024	1.10%	75,745	0.63%	73,914
2025	1.10%	76,405	0.63%	74,435
2026	1.10%	76,944	0.63%	74,723
2027	1.10%	77,379	0.63%	75,001

The monthly demand forecasts for the residential and C&I customer segments were multiplied by the percentages in Table 13 in each respective year to calculate the reduction to the demand forecast associated with energy efficiency. Although the percentage is held constant, the resulting volume associated with energy efficiency increases over the Forecast Period, thus the Company has assumed incremental energy efficiency savings in each year.

To determine if the adjustment for energy efficiency savings was appropriate over the Forecast Period, Liberty compared the historical energy efficiency savings to those over the Forecast Period. As shown in

³³ Those assumptions are consistent with the assumptions used in the Company’s recent cost-of-gas filings.

Figure 5, the forecasted energy efficiency savings are approximately equal to or above the historical levels. Because forecasted energy efficiency savings from the EE Plan are greater than historical savings, an adjustment to reflect additional energy efficiency savings is appropriate in certain years during the Forecast Period.

Figure 5: Energy Efficiency Savings Over Time (Dth)³⁴

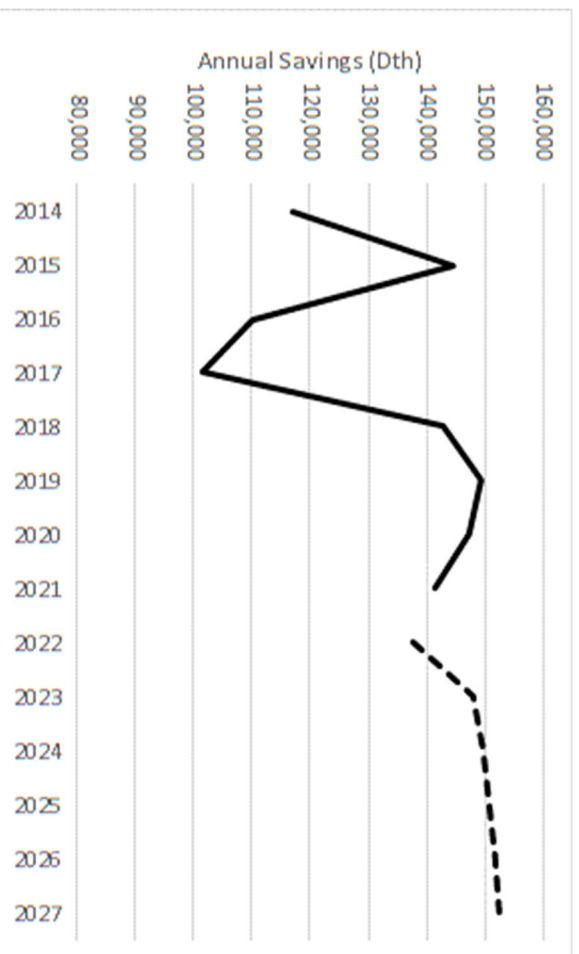


Table 14 below compares the historical actual energy efficiency savings over three recent periods to the Company's forecast of energy efficiency savings.

Table 14: Average Annual Energy Efficiency Savings (Dth)³⁵

2014-2021 (Actual)	2017-2021 (Actual)	2019-2021 (Actual)	2023-2027 (Forecast)
131,798	136,555	146,055	150,501

As noted above, the energy efficiency savings over the Forecast Period are on average above energy efficiency savings in the historical period. That difference suggests that an adjustment to reflect additional energy efficiency savings is reasonable. Because energy efficiency savings are already reflected in the historical period, the adjustment would include only the marginal change (i.e., the annual savings in the Forecast Period minus the average annual historical savings). However, the Company took a conservative approach in including additional energy efficiency savings by including a full year of energy efficiency savings in each year of the Forecast Period. As such, the demand forecast reflects the expected energy efficiency savings over the Forecast Period, as well as the potential for additional savings.

³⁴ Represents total energy efficiency savings (i.e., including sales, capacity-assigned transportation, and capacity-exempt customers).

³⁵ Represents total energy efficiency savings (i.e., including sales, capacity-assigned transportation, and capacity-exempt customers).

5. Unaccounted For Gas

Unaccounted for gas is the difference between the total system sendout as measured at the gate-station and the volumes recorded at customer meters in the Company’s billing system.³⁶ To calculate unaccounted for gas over the Forecast Period, an average percentage was calculated by dividing the eight-year (September 2009 through August 2017) sum of unaccounted for gas (total system sendout) by the eight-year sum of accounted for gas (billing data). The eight-year average of 2.03 percent was applied to the demand forecast on a monthly basis. Those volumes represent additional volumes not accounted for in the customer segment forecasts, but for which the Company must plan.

6. Demand Forecast Results

The results of the demand forecast after adjusting for the two out-of-model adjustments, energy efficiency savings, and unaccounted for gas are provided in Table 15 below.

Table 15: Demand Forecast Results (Dth)

Split-Year (Nov-Oct)	Total Econometric Forecast, including Out-of-Model Adjustments	Energy Efficiency	Unaccounted For Gas	Normal Year Planning Load
2022/23	16,223,124	130,823	293,695	16,385,997
2023/24	16,462,484	134,012	298,088	16,626,560
2024/25	16,613,706	135,257	300,877	16,779,325
2025/26	16,719,595	136,178	302,829	16,886,246
2026/27	16,806,236	136,921	304,426	16,973,741
CAGR (2022/23-2026/27)	0.9%	1.1%	0.9%	0.9%

As shown in Table 15, the results of the Company’s forecast indicate that the Planning Load is forecast to grow by an average of approximately 146,900 Dth per year, or at a CAGR of 0.9 percent over the Forecast Period under normal weather conditions.

7. Comparison of Demand Forecast to 2017 IRP

As illustrated in Table 16 below, the Planning Load CAGR over the Forecast Period in the 2022 IRP is below the forecasted growth rate in the 2017 IRP, but consistent with the Company’s actual load growth over the past five split-years.

³⁶ There are a variety of factors that contribute to unaccounted for gas. Those factors include: system loss, metering variances, theft of service, purging during construction activities, and third-party damages.

Table 16: Comparison of Planning Load (Dth)

Split-Year (Nov-Oct)	Weather Normalized Actual Load	2017 IRP (DG 17-152) – Forecasted Planning Load	2022 IRP – Forecasted Planning Load
2017/18	15,342,524	14,640,845	--
2018/19	15,405,544	15,235,354	--
2019/20	15,080,873	15,648,467	--
2020/21	15,722,193	16,150,273	--
2021/22	15,877,058	16,565,963	--
2022/23	--	--	16,385,997
2023/24	--	--	16,626,560
2024/25	--	--	16,779,325
2025/26	--	--	16,886,246
2026/27	--	--	16,973,741
CAGR (2017/18-2021/22)	0.9%	3.1% ³⁷	--
CAGR (2022/23-2026/27)	--	--	0.9%

As shown in Table 16 above, the forecasted growth in Planning Load in this 2022 IRP of 0.9 percent is consistent with the growth in Liberty’s normalized actual load over the period from 2017/18 to 2021/22. In addition, the normalized actual load was within +/- 5 percent of the Company’s forecasted Planning Load requirements from the 2017 IRP. Factors contributing to the lower than forecasted load over the 2019/20 through 2021/22 time period include actual usage by iNATGAS and the COVID-19 pandemic.

B. Phase 2 – Development of Planning Standards & Daily Planning Load Requirements

Liberty must plan to reliably meet Planning Load requirements under normal and extreme weather conditions; thus the Normal Year, Design Year, and Design Day planning standards reflect weather conditions that inform the level of firm volume that the Company must plan for to maintain reliable service.

Once the planning standards were determined, the Company then translated the monthly demand forecast into a forecast of daily requirements using a daily regression model. The resulting daily demand forecast was reviewed for reasonableness. That forecast represents the Company’s Planning Load on a daily basis and is used as an input into the SENDOUT® model to determine the adequacy of the resource portfolio.

1. Planning Standards

The approach to the development of Liberty’s planning standards is similar to the approach used in the 2017 IRP, with certain modifications to the approach to the Design Year and Design Day planning standards to incorporate the Settlement Agreement approved in Commission Order No. 26,551 (Nov. 12, 2021).

As detailed in Appendix 4, Liberty determined that the Normal Year standard of 6,232 HDD to reflect normal weather conditions based on the average annual HDD over the most recent 30 years from

³⁷ In the 2017 IRP, the CAGR excluding forecast demand associated with iNATGAS was approximately 2.3 percent.

January 1992 through December 2021. The Design Year standard, in conjunction with the Design Day standard, establishes the extreme (i.e., cold) weather conditions that inform the amount of firm volume that the Company must plan for to maintain reliable service, but is expected to occur infrequently. Liberty determined the Design Year and Design Day standards by applying two standard deviations to the average annual and peak day HDD, respectively,³⁸ over the most recent 30 years of weather data. Specifically, the 7,005 HDD Design Year standard was derived assuming an average annual HDD of 6,232 and the standard deviation of the annual HDD over the past 30 years of 386.³⁹ The Design Day standard of 69.4 HDD was derived assuming an average peak day HDD of 60.1 and the standard deviation of peak day HDD over the past 30 years of 4.7.⁴⁰

Table 17 below summarizes the Normal Year HDD and Design Year HDD by month.

Table 17: Normal Year and Design Year HDD

Month	Normal Year HDD	Design Year HDD
January	1,220	1,406
February	1,041	1,201
March	896	1,043
April	516	516
May	231	231
June	49	49
July	5	5
August	8	8
September	101	101
October	405	405
November	717	841
December	1,044	1,198
Total	6,232	7,005

2. Growth Scenarios

To determine the adequacy of the Company’s supply resource portfolio under a range of demand scenarios, the Company developed High Growth and Low Growth scenarios.

a. High Growth Scenario

To develop the High Growth scenario, high growth forecasts obtained from Moody’s were applied to the econometric customer segment models. Specifically, in addition to its base forecasts, Moody’s develops alternative scenario forecasts under various economic conditions. However, since the Moody’s alternative scenario forecasts are not available at the county level, the base and Low Oil Price scenarios for the causal variables in the customer segment models were obtained for the Manchester, New Hampshire, metropolitan statistical area (“MSA”), which is the closest MSA to Liberty’s service territory.

³⁸ Using the average plus two standard deviations to determine the Design Year and Design Day planning standards is consistent with the Company’s 2010 IRP, 2013 IRP, and 2017 IRP filings.

³⁹ 7,005 = 6,232 + 2 x 386 (differences due to rounding)

⁴⁰ 69.4 = 60.1 + 2 x 4.7 (differences due to rounding)

The percentage differences between the Manchester MSA level base and alternative scenario forecasts in each month were applied to the service territory level base forecasts to develop the forecast under the Low Oil Price scenario.

In addition, the base and alternative scenario forecasts for Henry Hub natural gas futures prices were obtained from Moody's; and the percentage differences between the base and Low Oil Price scenario forecasts in each quarter were applied to the customer segment natural gas price forecasts.

The calculated economic, demographic, and natural gas price forecasts were applied to the customer segment models to forecast Planning Load demand under a High Growth scenario. Those results are provided in Table 19 of Section III.C below.

b. Low Growth Scenario

To develop the Low Growth demand forecast, the economic and demographic variables under the 90th percentile Downside scenario from the Manchester MSA were obtained from Moody's. The variables were applied in the same manner as the High Growth scenario to generate the Low Growth Planning Load demand forecast. Those results are provided in Table 20 of Section III.C below.

3. Daily Regression Model

The daily regression model allows the Company to translate the monthly demand forecast into a forecast of daily requirements, which is used as an input into the SENDOUT® model to determine its resource adequacy under various weather and growth scenarios. The model develops the shape of the forecast and is calibrated on a daily basis to the Planning Load forecast developed by the customer segment models so that the annual sum of the daily regression forecast matches the annual Planning Load forecast. A detailed description of that analysis is provided in Appendix 5.

As described in Appendix 5, a process similar to the one used to develop the daily shape of the Normal Year was used to develop the daily shape of the Design Year.

C. Final Demand Forecast Results

The final Base Case, High Growth, and Low Growth Planning Load forecasts are presented below in Figures 8 and 9 and Tables 18 through 20. These forecast results are utilized to determine the Company's resource adequacy, as discussed in Section V. As noted above, the shapes of each of the growth scenarios are driven by Moody's forecasts of alternative scenarios. That is, the Base Case, High Growth, and Low Growth demand forecasts reflect differing assumptions of future economic conditions. As shown in Figures 8 and 9, below, the largest differences between the three growth scenarios occur at the beginning of the Forecast Period. By 2026/27 the differences between the scenarios are projected to narrow.

Figure 8: Annual Planning Load Results

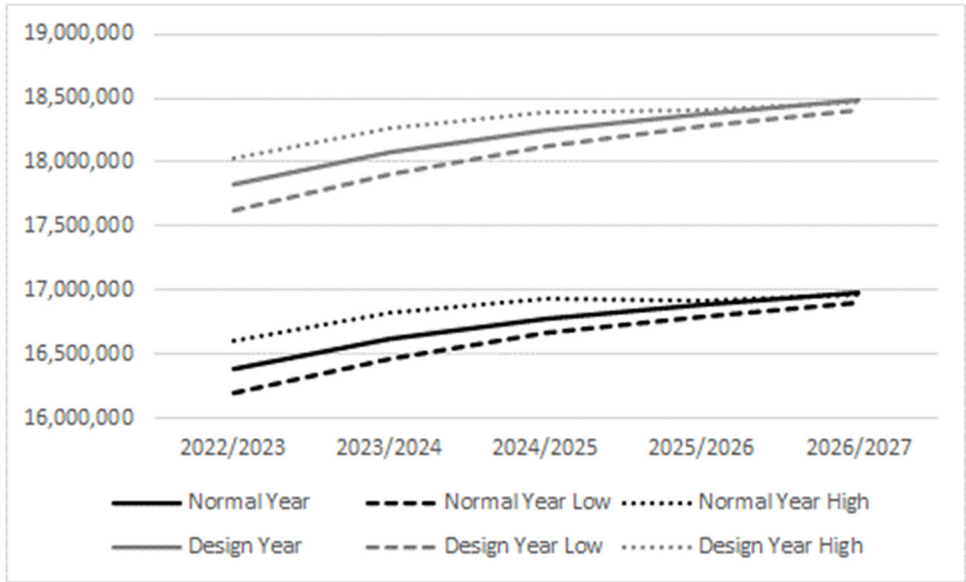


Figure 9: Design Day Planning Load Results

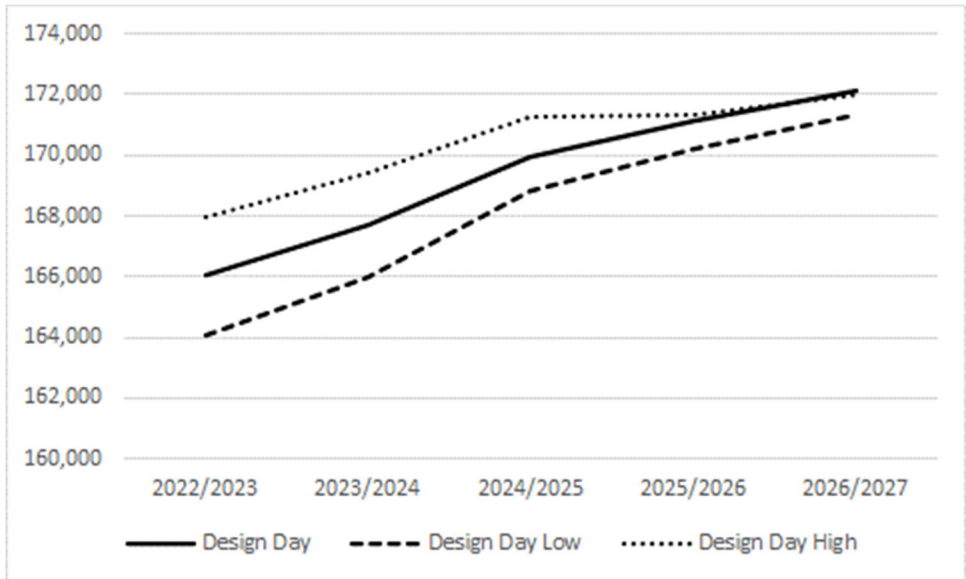


Table 18: Summary of Base Case Planning Load Forecasts (Dth)

Split-Year (Nov-Oct)	Normal Year	Design Year	Design Day
2022/23	16,385,997	17,829,775	166,055
2023/24	16,626,560	18,084,862	167,688
2024/25	16,779,325	18,253,613	169,967
2025/26	16,886,246	18,379,955	171,133
2026/27	16,973,741	18,485,367	172,106
CAGR (2022/23-2026/27)	0.9%	0.9%	0.9%

As shown in Table 18 above, in the Base Case demand scenario, Normal Year Planning Load is forecast to grow by an average of approximately 146,900 Dth per year (at a CAGR of 0.9 percent), Design Year Planning Load to forecast to increase by an average of approximately 163,900 Dth per year (at a CAGR of 0.9 percent), and Design Day Planning Load is forecast to increase by 6,051 Dth (at a CAGR of 0.9 percent) over the Forecast Period.

Table 19: Summary of High Growth Planning Load Forecasts (Dth)

Split-Year (Nov-Oct)	Normal Year	Design Year	Design Day
2022/23	16,601,018	18,034,195	167,941
2023/24	16,821,976	18,273,649	169,423
2024/25	16,927,726	18,394,833	171,270
2025/26	16,912,668	18,399,168	171,310
2026/27	16,971,958	18,475,075	172,011
CAGR (2022/23-2026/27)	0.6%	0.6%	0.6%

As shown in Table 19 above, in the High Growth demand scenario, Normal Year Planning Load is forecast to grow by an average of approximately 92,700 Dth per year (at a CAGR of 0.6 percent), Design Year Planning Load to forecast to increase by an average of approximately 110,200 Dth per year (at a CAGR of 0.6 percent), and Design Day Planning Load is forecast to increase by 4,070 Dth (at a CAGR of 0.6 percent) over the Forecast Period. The higher forecast in the High Growth case is driven in part by a lower forecast of natural gas prices relative to the Base Case in the first three years of the Forecast Period. The natural gas prices in the final two years of the Forecast Period are similar, which leads to the narrowing of the difference between the High Growth and Base Case demand forecasts.

Table 20: Summary of Low Growth Planning Load Forecasts (Dth)

Split-Year (Nov-Oct)	Normal Year	Design Year	Design Day
2022/23	16,192,526	17,616,550	164,086
2023/24	16,457,867	17,898,037	165,971
2024/25	16,668,270	18,130,945	168,834
2025/26	16,800,426	18,281,814	170,227
2026/27	16,906,477	18,404,837	171,362
CAGR (2022/23- 2026/27)	1.1%	1.1%	1.1%

As shown in Table 20 above, in the Low Growth demand scenario, Normal Year Planning Load is forecast to grow by an average of approximately 178,500 Dth per year (at a CAGR of 1.1 percent), Design Year Planning Load to forecast to increase by an average of approximately 197,000 Dth per year (at a CAGR of 1.1 percent), and Design Day Planning Load is forecast to increase by 7,276 Dth (at a CAGR of 1.1 percent) over the Forecast Period. The lower growth of the Low Growth scenario relative to the Base Case is driven by the more pessimistic forecast of the overall economy as reflected in lower levels of growth in the number of households, employment, and retail sales.

IV. ASSESSMENT OF SUPPLY RESOURCE PORTFOLIO

This Assessment of Supply Resource Portfolio section describes the general areas of Liberty's supply resource portfolio: (i) a review of the Company's current supply and capacity resource portfolio, (ii) a description of the Company's resource strategy and decisions, and (iii) an evaluation of the adequacy of the resource portfolio to meet the forecasted Planning Load requirements under various weather and growth scenarios using the SENDOUT® portfolio optimization model.⁴¹

A. Current Supply Resource Portfolio

Liberty's current resource portfolio is comprised of the following types of resources: (1) pipeline transportation; (2) underground storage; (3) peaking resources; and (4) gas supply contracts. Appendix 6 provides a schematic of the Company's transportation and underground storage contracts effective November 1, 2022, and a table listing and description of these contracts. As noted in the detailed summaries below, there have been several changes to the pipeline transportation and peaking resources in the Company's resource portfolio since the 2017 IRP.

1. Pipeline Transportation

The Company currently holds firm transportation contracts on Tennessee (146,833 Dth/day) and PNGTS (1,000 Dth/day) to provide a daily deliverability of 147,833 Dth/day to its city-gate stations. In addition to these city-gate delivery contracts, the Company also holds other transportation contracts further upstream on other pipelines that feed into the city-gate delivery transportation contracts. These capacity entitlements provide access to various supply sources that afford the Company a level of operational flexibility to ensure the reliable delivery of gas supplies at the lowest reasonable cost to its customers. These transportation contracts provide delivery of natural gas from three sources as discussed below.

First, the Company holds firm transportation contracts to allow for delivery of up to 13,122 Dth/day of Canadian supply. These consist of the following:

- The Company can receive up to 4,000 Dth/day of firm Canadian supply from Dawn, Ontario. This supply is delivered to the Company on Company-held firm transportation contracts on Enbridge Inc. (formally Union Gas Limited), ("Enbridge"), TC Energy Corporation (formally TransCanada Pipelines Limited) ("TC Energy"), Iroquois Gas Transmission System ("Iroquois"), and Tennessee.
- The Company can receive up to 5,000 Dth/day of firm Canadian supply from Dawn, Ontario. This supply is delivered to the Company on Company-held firm transportation contracts on Enbridge, TC Energy,⁴² PNGTS, and Tennessee. Subsequent to the filing of the 2017 IRP, the Commission acknowledged in Order No. 26,409 (Oct. 6, 2020) the addition of the firm transportation contracts on Enbridge, TC Energy, and PNGTS had been approved in the Company's 2018 cost-of-gas proceeding, Docket No. DG 18-137.
- The Company can receive up to 3,122 Dth/day of firm Canadian supply from the Canadian/New York border at Niagara Falls, NY. This supply is delivered to the Company on Company-held firm transportation contracts on Tennessee.

⁴¹ For planning purposes, the Company separates its Keene Division because the City of Keene is not connected to the Company's larger distribution system.

⁴² Please note, TC Energy's Mainline connects to the Trans-Québec and Maritimes Pipeline ("TQM"), which is jointly owned by TC Energy and Gaz Métro, and the TQM system connects to PNGTS at the Québec/New Hampshire border at East Hereford.

- The Company can receive up to 1,000 Dth/day of firm Canadian supply from a Company-held firm transportation contract PNGTS for delivery to its Berlin service territory.

Second, the Company holds the following firm transportation contracts to allow for delivery of up to 106,596 Dth/day of domestic supply from the producing and market areas within the United States.

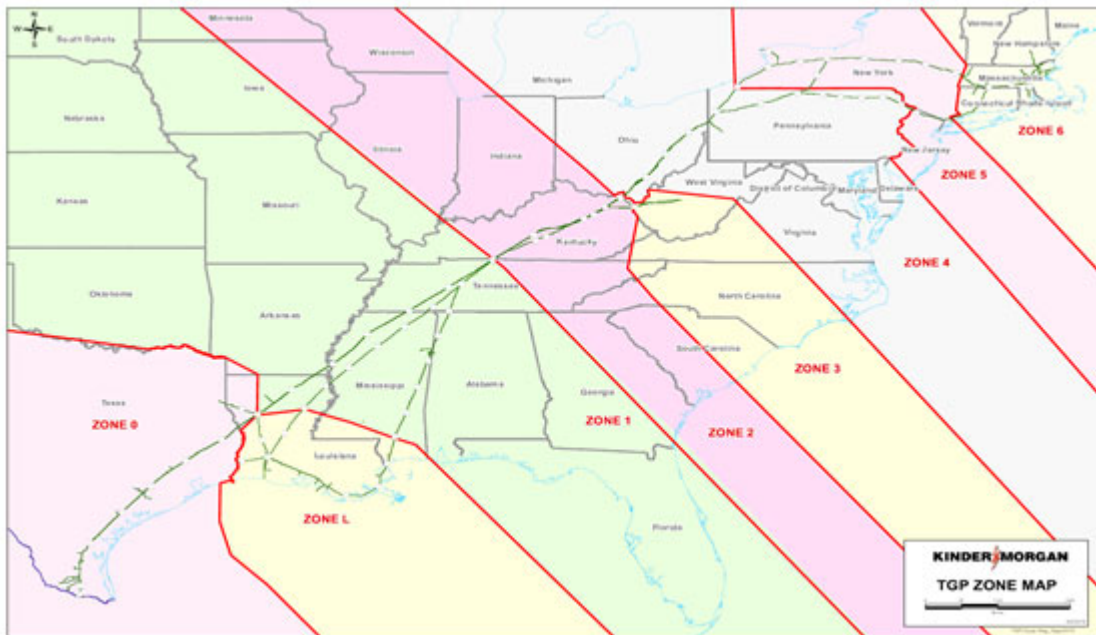
- The Company can receive up to 21,596 Dth/day of firm domestic supplies from the traditional production area (e.g., Gulf Coast, Texas, and Louisiana). These supplies are delivered to the Company on firm transportation contracts on Tennessee. As shown in Figure 10 below, in the traditional production area (e.g., Gulf Coast, Texas, and Louisiana), the Tennessee system splits into three legs: the 100 leg, the 800 leg, and the 500 leg. In addition to the supply legs, the Tennessee system is divided into six market zones, from Zone 0 and Zone 1 in Texas and Louisiana to Zone 6 in New England.
- The Company can receive up to 85,000⁴³ Dth/day of firm supply from Tennessee's Dracut receipt point located in Dracut, Massachusetts. This supply is delivered to the Company on three firm transportation contracts on Tennessee:
 - Contract entitlements of up to 20,000 Dth/day from Dracut, Massachusetts, located in Tennessee Zone 6 to the Company's city-gates;
 - Contract entitlements of up to 30,000 Dth/day from Dracut, Massachusetts, located in Tennessee Zone 6 to the Company's city-gates; and
 - Contract entitlements of up to 40,000 Dth/day from Dracut, Massachusetts, located in Tennessee Zone 6 to the Company's city-gates, which was recently approved by the Commission in Order No. 26,551 (Nov. 12, 2021).

Third, the Company holds the following firm transportation contracts to allow for delivery of up to 28,115 Dth/day of domestic supply from underground storage fields in the New York/Pennsylvania area or the purchase of flowing supply in or downstream of Tennessee Zones 4 and 5.

- The Company can receive up to 19,076 Dth/day of firm domestic supplies from its Tennessee FS-MA storage contract. These supplies are delivered to the Company on firm transportation contracts on Tennessee.
- The Company can receive up to 9,039 Dth/day of firm domestic supplies from its storage contracts with National Fuel Supply Corporation ("National Fuel"), Honeoye Storage Corporation ("Honeoye"), and Eastern Gas Transmission and Storage Inc. ("EGTS"). These supplies are delivered to the Company on a firm transportation contract on Tennessee.

⁴³ An additional 5,000 Dth/day of Dracut capacity is used to transport the previously described 5,000 Dth/day of firm Canadian supply from Dawn, Ontario, via Enbridge, TC Energy, and PNGTS.

Figure 10: Map of Tennessee Zone Locations



2. Underground Storage Resources

The Company's underground storage contracts provide Liberty with the ability to meet winter-season loads while avoiding the expense of adding 365-day long-haul transportation capacity. These contracts enable the Company to store approximately 2.5 million Dth of gas. These underground storage supplies allow Liberty to serve certain winter period requirements with gas injected during the off-peak period and to manage short-term fluctuations in demand during the winter period. It is the Company's practice to have storage inventories approximately 95 percent full as of November 1st of each year, thus leaving approximately 5 percent of the storage capacity available for balancing purposes.

The Company contracts with the following underground storage providers:

- Tennessee: Liberty has contract entitlements that provide 1,560,391 Dth of storage capacity, a withdrawal rate of up to 21,844 Dth/day, and an injection rate of 10,403 Dth/day.
- EGTS: The Company has contract entitlements that provide 102,700 Dth of storage capacity, a withdrawal rate of up to 934 Dth/day, and an injection rate of 571 Dth/day.
- Honeoye: Liberty has contract entitlements that provide 245,280 Dth of storage capacity, a withdrawal rate of up to 1,957 Dth/day, and an injection rate of 1,168 Dth/day.
- National Fuel: Under rate schedule FSS, Liberty has contract entitlements that provide 670,800 Dth of storage capacity, a withdrawal rate of up to 6,098 Dth/day, and an injection rate of 4,472 Dth/day. Along with this storage service, the Company also contracts for 365-day firm transportation under rate schedule FST to transport supply to and from the storage field.

3. Supplemental Peaking Resources

In addition to interstate pipeline and underground storage resources, Liberty utilizes on-system peaking supplies to reliably meet its Planning Load requirements. Peaking supplies are an important component

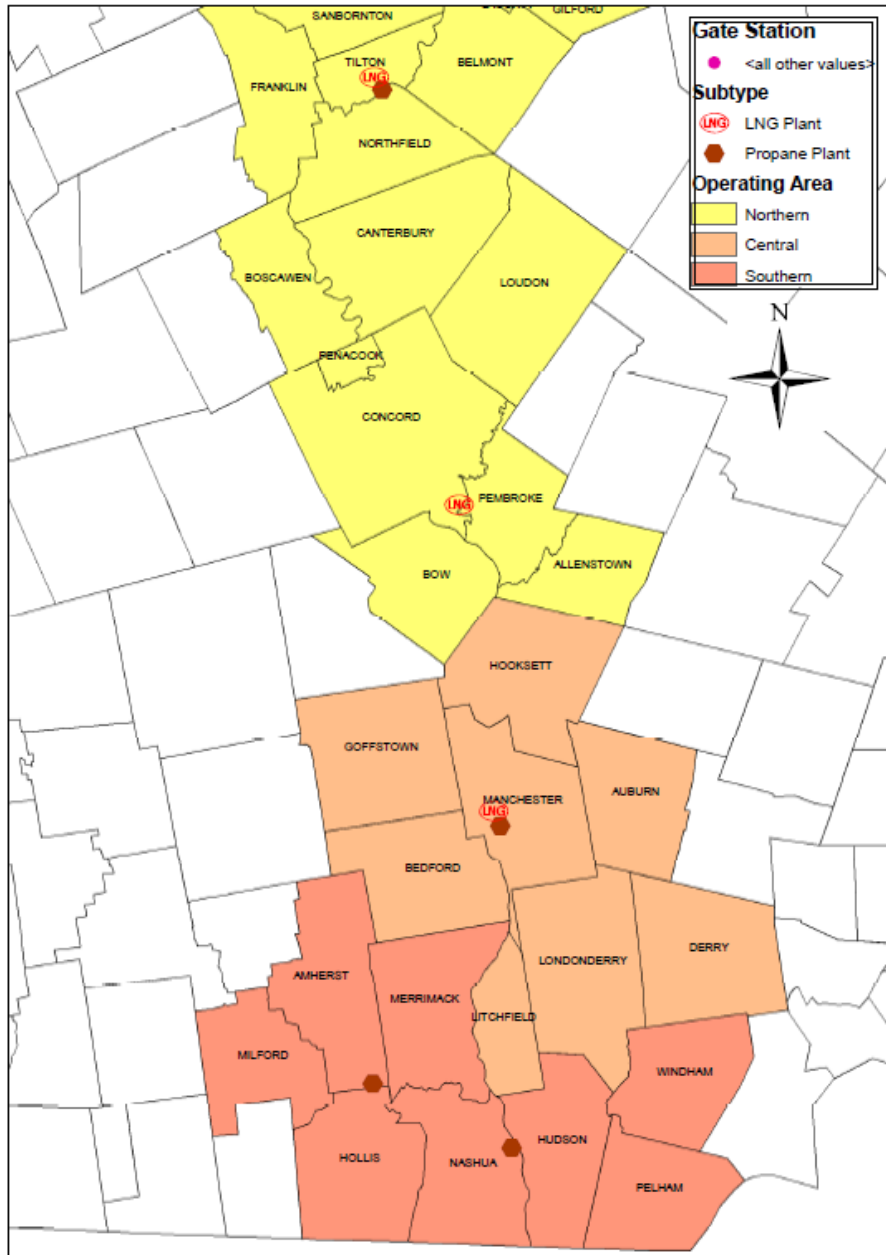
of the Company's resource mix because these supplies provide the Company with the ability to respond to fluctuations in weather, economics, and other factors. Liberty's peaking supplies include three LNG vaporization facilities located in Concord, Manchester, and Tilton. The Company's LNG facilities have a combined design vaporization rate of approximately 22,800 Dth/day, but they are limited operationally by the combined workable storage capacity of 12,600 Dth.

Additionally, the Company has propane facilities in Nashua, Manchester, and Tilton that are directly connected to the Company's distribution system, and a fourth "satellite" propane facility in Amherst. The Company's propane facilities have a combined workable storage capacity of approximately 122,590 Dth. However, the Company has allocated approximately 12,000 Dth of the Amherst propane storage capacity to its Keene Division (as discussed in Section V), leaving approximately 110,600 Dth of combined workable storage capacity for Liberty. Given the age of the Company's propane facilities,⁴⁴ Liberty recently conducted a study to determine the maximum operational vaporization capacity of the facilities. The propane study concluded that two of the three facilities could not vaporize to their design (or nameplate) capacity. For example, the Manchester propane facility, which has a design (or nameplate) vaporization capacity of 900 Dth/hour, could not perform at that capacity but could perform at 600 Dth/hour. Similarly, the Tilton propane facility has a nameplate maximum flow rate of 100 Dth/hour, but the study concluded that this facility could perform at a vaporization rate of 75 Dth/hour. The Nashua propane facility performed at the same level as years prior, which was 500 Dth/hour. In total, it was determined that the three propane facilities could not vaporize to the combined design (or nameplate) capacity of 34,600 Dth/day. Rather, the combined maximum operational vaporization rate in a single day is 28,200 Dth, which is 81.5 percent of the historical measure.

It is the Company's practice to have its on-system propane and LNG facilities full as of November 1 of each year. Liberty's on-system peaking facilities are distributed strategically across its service territory, which enhances service reliability and provides a source of supply for the entire distribution system. Figure 11 shows the locations of these peaking facilities. Because these resources can be brought online quickly, the on-system propane and LNG facilities can be used to meet hourly fluctuations in demand, maintain deliveries to customers, and balance pressures across portions of the distribution system during periods of high demand. Together, these LNG and propane facilities provide the Company and its customers with necessary system pressure support during peak days as well as a critical gas supply source to meet Design Day requirements. The Company's peaking resources provide approximately 25 percent of the gas supplies on the Design Day by contributing 40,800 Dth of supply, with the propane and LNG facilities representing approximately 70 percent and 30 percent, respectively, of that peaking supply.

⁴⁴ The Manchester and Nashua propane facilities have been in-service for approximately 75 years; and the Tilton propane facility has been operational for 50 years.

Figure 11: Map of Liberty's Supplemental Peaking Facilities



Pursuant to N.H. Code Admin. Rule Puc 506.03, the Company must maintain certain LNG and propane storage levels throughout the winter period. Thus, the availability of LNG and propane gas to refill the Company's local storage tanks throughout the winter season is a necessity. The Company typically contracts for dedicated LNG and propane refill throughout the winter season. In addition, the Company contracts for annual trucking services for the transportation of its LNG and propane supply contracts to its facilities with various carriers that it selects through a comprehensive RFP process on a year-to-year basis.

4. Gas Commodity

The Company contracts for quantities of gas to ensure sufficient supply to reliably meet design weather conditions and to account for daily and seasonal load variations. The Company's supply resource portfolio contains a variety of transportation contracts utilized to transport baseload and swing supplies, as well as underground storage and related transportation contracts – all with varying degrees of flexibility with respect to such features as no-notice requirements and nomination changes. These transportation contracts allow for nominations to be made throughout the day up until the last hour of the gas day (assuming there are no operational pipeline constraints), allowing the Company the ability to balance system load.

Supply contract durations are generally limited to a maximum term of one seasonal period. Baseload volumes are mainly one-month in duration, augmented with daily firm spot purchases allowing for the ability to respond to fluctuations in demand and maintain planned storage inventory targets. In the winter, the Company typically uses storage as the primary swing supply. However, since storage alone cannot account for all possible conditions, transportation capacity is often left open allowing for the flexibility to meet changing conditions (e.g., demand, weather, operational, storage inventory level, and/or price).

The Company's gas supply contracts are priced at various locations at market-based prices for both monthly and daily purchases. The Company uses North American Energy Standards Board ("NAESB") form standard contracts, which have been established with over one hundred qualified and reliable gas suppliers.

B. Resource Strategy and Decisions

As part of Liberty's assessment of its supply resource portfolio, the Company evaluates the existing supply resource portfolio in relation to the Planning Load requirements developed in Section III above. Based on a review of the demand requirements compared to its portfolio of existing supply resources, the Company makes a determination of incremental resource need. If incremental resources are required, the Company will identify the resource options available to meet the incremental requirements and procure a resource, or mix of resources, that maintains or enhances the reliability of the overall resource portfolio at the lowest reasonable cost for its customers. In evaluating the resource options, the Company analyzes both price and non-price factors. Examples of non-price factors include reliability, flexibility, viability, and diversity of supply source. Next, the Company looks at its currently available resources and determines if there are any "decision points" with respect to any of its contracts, such as expiration dates or options to increase or decrease volumes. If so, the Company determines whether to renew those supplies or replace them with an available alternative. Analysis of renewal or replacement of specific expiring resources, as well as the acquisition of an incremental resource, if required, must take place early in the planning process for Liberty to appropriately evaluate all alternatives. The overarching objective of the Company's gas supply resource portfolio, and the resource planning process used to develop that portfolio, is to meet projected customer requirements in a reliable manner at the lowest reasonable cost. Given the inherent uncertainty in forecasting (e.g., changing market conditions, adapting to federal and state policy and regulatory priorities, and responding to gas supply and pipeline projects), the Company, as part of its planning and evaluation process, values asset, and portfolio flexibility.

1. Resource Balance

To determine incremental resource needs and inform its capacity renewal decisions, the Company evaluates its Planning Load forecast under design weather conditions relative to the supplies available from its current resource portfolio to identify any potential resource shortfalls over the Forecast Period.

Table 21 below compares the Company’s current resource portfolio to the Design Day Planning Load forecast.

Table 21: Design Day Demand and Supply Resources (Dth)

Split-Year (Nov-Oct)	Design Day Planning Load	Design Day Resources⁴⁵	Reserve / (Deficiency)
2022/23	166,055	188,633	22,578
2023/24	167,688	188,633	20,945
2024/25	169,967	188,633	18,666
2025/26	171,133	188,633	17,500
2026/27	172,106	188,633	16,527

As shown in Table 21, the Company has sufficient deliverability to meet the forecasted Planning Load requirements on Design Day over the Forecast Period. Stated differently, given the current resource portfolio, Liberty does not require incremental resources to meet its forecasted Design Day Planning Load.

2. Contract Expiration and Renewal of Existing Resources

Over the next five years, Liberty will be faced with decisions regarding the expiration of many of its existing pipeline transportation and underground storage contracts. In all cases, Liberty will choose to renew existing contracts on a cost-effective basis to assure that there continues to be sufficient deliverability to meet customer requirements over the Forecast Period. The Company’s current strategies related to each of its existing upstream capacity and underground storage contracts are provided in Table 22 below.

⁴⁵ The 2022/23 Design Day resources include the new 40,000 Dth/day TGP contract, which was approved by the Commission in Order No. 26,551 (Nov. 12, 2021) in Docket No. DG 21-008. As Liberty indicated in that proceeding, the Company is investing in certain on-system distribution enhancement projects to optimize the incremental supplies associated with this TGP Contract. As discussed in Section VI, certain of these on-system distribution enhancement projects are expected to come on-line in 2023/24.

Table 22: Contract Expiration and Renewal of Existing Resources

Contract Entity	Rate Schedule	Contract Number	MDQ/ MDWQ (Dth)⁴⁶	Storage MSQ (Dth)⁴⁷	Expiration Date	Renew (Yes/No)
Pipeline Transportation						
Enbridge	M12	M12200	4,092	-	10/31/2024	Yes
Enbridge	M12	PXP	5,069	-	10/31/2040	No
TCPL	FT	41232	4,047	-	10/31/2026	Yes
TCPL	FT	PXP	5,009	-	10/31/2040	No
Iroquois	RTS	470-01	4,047	-	11/1/2027	Yes
PNGTS	FT	1999-001	1,000	-	11/30/2032	No
PNGTS	FT	PXP	5,000	-	10/31/2040	No
Tennessee	FT-A (Zone 5 to Zone 6)	95346	4,000	-	11/30/2022	Yes
Tennessee	FT-A (Zone 5 to Zone 6)	2302	3,122	-	10/31/2025	Yes
Tennessee	FT-A (Zones 0,1 to Zone 6)	8587	25,407	-	10/31/2025	Yes
Tennessee	FT-A (Zone 6 to Zone 6)	42076	20,000	-	10/31/2025	Yes
Tennessee	FT-A (Zone 6 to Zone 6)	72694	30,000	-	10/31/2029	Will evaluate
Tennessee	FT-A (Zone 6 to Zone 6)	358905	40,000	-	10/31/2041	No
Underground Storage and Associated Pipeline Transportation						
Tennessee	FS-MA	523	21,844	1,560,391	10/31/2025	Yes
Tennessee	FT-A (Zone 4 to Zone 6)	632	15,265	-	10/31/2025	Yes
Honeoye	SS-NY	11234	1,957	245,280	3/31/2024	Yes
Tennessee	FT-A (Zone 5 to Zone 6)	11234	1,957	-	10/31/2025	Yes
EGTS	GSS	300076	934	102,700	3/31/2026	Yes
Tennessee	FT-A (Zone 4 to Zone 6)	11234	932	-	10/31/2025	Yes
National Fuel	FSS	O02357	6,098	670,800	3/31/2024	Yes
National Fuel	FST	N02358	6,098	-	3/31/2024	Yes
Tennessee	FT-A (Zone 4 to Zone 6)	11234	6,150	-	10/31/2025	Yes

As shown in Table 22 above, many of the pipeline capacity and storage contracts currently held by the Company are scheduled to expire and require notice of renewal during the Forecast Period. Liberty will need to renew all of these existing capacity resources for which the Company has a ROFR or a rollover right, with the exception of contract number 72694, firm transportation from Dracut, Massachusetts, which the Company will evaluate based on market conditions at the time of renewal, consistent with

⁴⁶ MDQ = maximum daily quantity; MDWQ = maximum daily withdrawal quantity

⁴⁷ MSQ = maximum storage quantity

Commission Order No. 26,551 (Nov. 12, 2021). These capacity contracts are needed over the long-term to meet customer demand, they are competitively priced, and they offer important supply diversity benefits to the Company's portfolio. Therefore, in this filing, the Company is requesting that the Commission approve the renewal of those pipeline contracts designated as "Yes" in Table 22 above as these contracts have a renewal notice within three years of the filing of the IRP. The Company does not expect any material changes to the contracts as a result of renewal. In addition, renewing the contracts is in the public interest because the contracts are needed to adequately meet the Company's expected customer demands under the various planning standards outlined in Section IV.C below, and the renewal of these contracts is the only viable option currently available for the Company to serve its customers reliably and flexibly at the lowest reasonable cost.

3. Future Portfolio Decisions

Although the Company has determined that it will renew many of its existing upstream capacity contracts, there may be opportunities to re-evaluate the Company's supply resource portfolio during the Forecast Period. In addition to renewing existing contract resources, Liberty continuously monitors and evaluates new opportunities and makes adjustments to the portfolio if the Company determines that modifications are appropriate.

When faced with making renewal, replacement, or incremental capacity decisions, Liberty employs a three-step analysis to reach its conclusions regarding the appropriate resource option based on the best information available to the Company, at the time the decision is made. First, the Company evaluates the need to maintain the existing contract or resource as part of the overall supply portfolio in the context of current and expected future market conditions. Second, depending on the type of resource needed, the Company will canvas the marketplace, including on-system investments, to determine the availability of a replacement or new resource and, where appropriate, the Company will solicit competitive bids to determine the resource that is available at the lowest reasonable cost. Finally, the Company evaluates non-price factors associated with the available replacement or new resource option. Specifically, the Company will consider the reliability, flexibility, diversity, viability, and contract term to determine the most reliable option to meet the Company's resource need at the lowest reasonable cost. The Company also considers the potential environmental, economic, and health-related impacts of each proposed option consistent with the statutory requirements defined in RSA 378:38 and 378:39.

With respect to opportunities that are being monitored by the Company, the wide range of potential alternatives and resource options include, but are not limited to, the following:

- RNG and other non-fossil fuels
- Certified Gas
- Non-pipeline alternatives consistent with Commission's directives in the 2017 IRP Interim Order, such as:
 - Truck and rail transit of propane, LNG, and CNG
 - Storage options

a. RNG

Under New Hampshire RSA 362-I, New Hampshire natural gas utilities are allowed to procure RNG at quantities up to 5 percent of their total annual delivered volume through contracts with terms of up to 15-years, to recover the prudently incurred costs of procuring RNG, and to recover of and return on qualified

investments in RNG infrastructure, provided doing so is determined to be in the “public interest” under a new statutory balancing test. All utilities that elect to purchase renewable natural gas shall conduct a competitive bidding process through RFPs for renewable natural gas supply and shall consult with the New Hampshire Department of Energy (“DOE”) on all issues related to the RFPs. Liberty is currently in the process of issuing an RFP for RNG supply options for the Company’s supply portfolio and is in consultation with the DOE related to the RFP. RNG, as defined by the U.S. EIA is natural gas “derived through the decomposition of organic matter in an anaerobic environment, most often at landfills, wastewater treatment facilities or dedicated anaerobic digester units.”⁴⁸ As explained by the U.S. EIA, “RNG is cleaned and upgraded to achieve the characteristics of pipeline-quality natural gas, making it suitable to be injected into local natural gas distribution systems.” Liberty has identified three key areas when evaluating RNG supply options. These three key areas are:

- **Diversity of Supply:** As stated above, the Company considers non-price factors, such as diversity of fuel supply, when evaluating its supply resource portfolio. Traditionally, the Company has purchased natural gas through interstate pipelines delivered to Dracut, trucked LNG and propane resources, and vaporization services from the Everett LNG facility. RNG facilities have an ability to be located in non-traditional locations due to the various feedstock streams. As such, RNG could offer diverse, incremental resources from traditional pipeline deliveries, such as a trucked delivery in the form of CNG or potentially a direct connection to the local distribution system. For example, a local resource that may be a supply option in the future is RNG from woody biomass through forestry and logging industries. To that end, Liberty has commissioned Innovative Natural Resource Solutions (“INRS”) to perform a Feedstock Supply Assessment for RNG from woody biomass. Based upon the INRS analysis, four locations in northern New England may be able to produce approximately 17 Bcf annually, which is close to the annual delivered volumes of Liberty. Technology in this field is advancing while being supported in the Inflation Reduction Act, as well as the EPA Renewable Fuel Standard. The Company will continue to monitor developments, as well as availability and pricing, associated with this feedstock as a future option for locally sourced RNG.
- **System Resiliency/Redundancy:** As stated previously, RNG can be produced wherever organic matter breaks down in an anaerobic environment. This could lead to RNG facilities being located within the Liberty service territory with an opportunity to be directly connected to the local distribution system. In addition, RNG produced from facilities not located near an LDC or an interstate pipeline could be compressed and delivered to an on-system decompression facility. These options could lead to pressure support and redundant supply opportunities at a potentially lower cost than pipe alternatives.
- **Cost/Pricing:** Liberty assesses price and non-price factors when evaluating its supply portfolio options. Liberty anticipates RNG RFP responses to include molecular RNG with environmental attributes (“EA”)/credits attached and separated. Depending on feedstock, facility locations, carbon intensity scores, term and EA type/volume, prices could vary widely. The Company will evaluate forward credit price markets and transportation/delivery costs to determine if RNG as a supply option is in the public interest.

The Company will continue to monitor market trends and will evaluate all opportunities and options available when making supply resource portfolio decisions using its resource planning process.

⁴⁸ Available at: https://www.eia.gov/naturalgas/weekly/archivenew_ngwu/2020/01_23/

C. Adequacy of the Supply Resource Portfolio

As part of Liberty's assessment of its supply resource portfolio, the Company tests the ability of its resource portfolio to meet the projected Planning Load requirements in each year of the forecast using an optimization model. Specifically, using the SENDOUT® model (described below), the Company is able to (1) determine the least-cost portfolio that will meet forecasted customer demand, and (2) test the sensitivity of the portfolio to key inputs and assumptions, as well as its ability to meet all of the Company's planning standards and contingencies. Based on the results of this analysis, Liberty is able to make preliminary decisions on the adequacy of the resource portfolio and its ability to meet system requirements.

1. SENDOUT® Model

Since 1996, the Company has been using the SENDOUT® model owned by Hitachi Energy (formerly ABB/Ventyx) as its primary analytical tool in the portfolio design process. The SENDOUT® model is widely used by energy companies for their gas supply planning and portfolio optimization process. The SENDOUT® model is a linear-programming optimization software tool capable of developing least-cost solutions to complex supply requirements to assist in evaluating, selecting, and explaining long-term portfolio strategies. The SENDOUT® model can accommodate a number of resources allowing the Company to model these options more realistically and receive more meaningful information via the output reports. In that regard, the SENDOUT® model can be used to determine the best use of a given portfolio of supply, capacity, and storage contracts to meet a specified demand. That is, it can solve for the dispatch of resources that minimizes the cost of serving the specified daily demand over the planning horizon given the existing resource and system-operating constraints. The SENDOUT® model dispatches resources based on the lowest variable cost to meet daily demand, assuming that demand charges are fixed.

2. Analytical Assumptions

The SENDOUT® model was used to evaluate Liberty's resource portfolio over various weather (i.e., Normal Year, and Design Year with Design Day) and growth scenarios (i.e., Base Case, Low Growth, and High Growth), which were described in Section III. The examination of these various scenarios enables the Company to test the adequacy and flexibility of its resource portfolio.

The SENDOUT® model calculates the least-cost dispatch of resources within the portfolio to meet the forecasted Planning Load requirements subject to the constraints contained in the resource contracts.⁴⁹ The inputs to the SENDOUT® model included (1) the Company's Planning Load requirements under the various weather and growth scenarios, and (2) resource-specific data elements (e.g., capacity cost; fuel and variable cost; gas commodity cost; and MDQ and annual contract quantity) associated with the Company's existing portfolio. To perform the analysis, the Company incorporated several key assumptions:

- First, the Company assumed that, throughout the Forecast Period, there is no change in the Company's service obligation to plan for the capacity requirements of firm sales and capacity-assigned customers (i.e., Planning Load).
- Second, the Company's analysis assumed that all legacy contracts expiring during the Forecast

⁴⁹ The SENDOUT® model is an economic dispatch model which optimizes the dispatch of resources over the planning horizon. The optimized dispatch may differ from the actual resource dispatch, as actual circumstances may not reflect the model inputs.

Period (see Table 22 above) would be renewed with no change in rates/tolls, quantities, or operating characteristics.

- Third, the Company used natural gas prices and/or basis values based on closing settlement prices on September 1, 2022, provided by Intercontinental Exchange for the length of the Forecast Period.
- Fourth, gas supplies were assumed to be available at Dracut, with the daily price for those supplies reflective of the weather pattern (i.e., colder weather days will have higher daily prices at the Dracut point).

The SENDOUT® model produces an optimization solution for each scenario according to a least-cost economic dispatch of supplies, given the constraints on supply availability, storage or transportation capacity, which are always honored to avoid penalties and to ensure reliability of supply.

3. SENDOUT® Model Results

Table 23 below identifies the location of the detailed SENDOUT® results for each weather and growth scenario in Appendix 7.

Table 23: Location of Summary Results

Growth Scenario	Weather Condition	Location
Base Case	Normal Year	Appendix 7.1
Base Case	Design Year	Appendix 7.2
Base Case	Design Day	Appendix 7.3
High Growth	Normal Year	Appendix 7.4
High Growth	Design Year	Appendix 7.5
High Growth	Design Day	Appendix 7.6
Low Growth	Normal Year	Appendix 7.7
Low Growth	Design Year	Appendix 7.8
Low Growth	Design Day	Appendix 7.9

The summary results regarding the adequacy of the Company’s resources to meet the projected Planning Load requirements for each of the weather and growth scenarios are provided below.

Base Case

Given the rollover and renewal of all of Liberty’s existing pipeline transportation and storage capacity contracts that expire in the near-term (see Table 22 above), the Company’s SENDOUT® analyses demonstrates that the current resource portfolio is adequate to meet both Normal Year and Design Year Planning Load requirements throughout the Forecast Period (see Appendix 7.1 and Appendix 7.2).

Liberty relies on all of its available resources to meet customer requirements on a Design Day. As previously illustrated in Table 21, and demonstrated in Appendix 7.3, the Company is able to meet its Design Day Planning Load requirements over the Forecast Period.

High Growth

The Company's SENDOUT® analyses demonstrates that the current resource portfolio, with the rollover and renewal of all of Liberty's existing pipeline transportation and storage capacity contracts that expire in the near term (see Table 22 above), is adequate under Normal Year, Design Year, and Design Day conditions in the High Growth demand scenario throughout the Forecast Period (see Appendices 7.4, 7.5, 7.6, respectively).

Low Growth

The results of the Company's SENDOUT® analyses show that with the rollover and renewal of all of Liberty's existing pipeline transportation and storage capacity contracts that expire in the near term (see Table 22 above), the resource portfolio is adequate under Normal Year, Design Year, and Design Day conditions in the Low Growth demand scenario throughout the Forecast Period (see Appendices 7.7, 7.8, 7.9, respectively).

V. KEENE DIVISION

Liberty owns and operates a 31-mile propane-air and natural gas distribution system in Keene, New Hampshire, which delivers roughly 150,000 Dth annually to customers. As discussed above, Liberty's Keene Division is not connected to the Company's larger distribution system. Liberty currently serves approximately 1,200 gas customers in the City of Keene. A discussion of the resource planning process and associated results for the Keene Division are provided below.

A. Demand Forecast and Planning Standards

The process for developing Liberty's demand forecast for the Keene Division is consistent with the methodology used in the Company's cost-of-gas filings.⁵⁰ Similar to the approach discussed in Section III above, the Company has prepared forecasts of Planning Load requirements for the Keene Division under various weather conditions, including Normal Year, Design Year, and Design Day.

1. Demand Forecast

To develop the demand forecast for the Keene Division, the Company relies on an analysis of the most recent year of actual residential and commercial customer demand to estimate the baseload and heatload levels of demand for each customer segment. Baseload demand represents the level of demand independent of the effect of weather; and heatload demand represents the variable level of demand associated with the effects of weather. That is, baseload demand remains the same under all weather conditions, while heatload demand increases as the temperature decreases (i.e., colder weather). For residential and commercial customers, baseload demand was defined as the average demand in July and August 2021 for the months of September 2021 through April 2021 and the average demand in July and August 2020 for the months of May 2020 and June 2020. To determine the heatload demand, the actual usage was divided by the actual HDD in each month. The resulting slope was then multiplied by the Normal Year weather and added to the baseload demand to determine the weather normalized demand for the period May 2021 through April 2022.

Because the Company has not historically seen growth in its Keene Division, Liberty assumed that each year of the Forecast Period was equal to demand from the most recent weather normalized year. That assumption is consistent with the Company's cost-of-gas filings. These results are summarized in Table 25 below.

2. Planning Standards

To establish the Normal Year standard for the Keene Division, the average annual number of HDD was calculated based on weather from Keene for the period January 2001 through December 2021, which represented the available historical dataset.

The Design Year standard, in conjunction with the Design Day standard, establishes the extreme (i.e., cold) weather conditions that inform the amount of firm volume that the Company must plan for to maintain reliable service, but is expected to occur infrequently. The 8,417 HDD Design Year standard for

⁵⁰ The demand forecast in this IRP varies slightly from the demand forecast presented in Liberty's most recent winter cost-of-gas filing for the Keene Division (Docket No. DG 22-057). Although the overall methodology to forecast demand remains the same, there were certain modifications to the planning standards for the Keene Division to be consistent with the approach described in Section III.B.1 and Appendix 4 of this IRP.

the Keene Division was derived based on applying two standard deviations⁵¹ to the Normal Year annual HDDs of 7,108 HDD. That is, assuming an average HDD of 7,108 and the standard deviation of the annual HDDs over the past 21 years of 654, the Design Year HDDs are 8,417.⁵² The 69.2 HDD Design Day standard was derived based on applying two standard deviations⁵³ to the average peak day HDDs of 60.1 HDD over the most recent 21 years. That is, assuming an average HDD of 60.1 and the standard deviation of peak day HDDs over the past 21 years of 4.6, the Design Day HDDs are 69.2.⁵⁴

The monthly HDDs for the Normal Year and the Design Year are provided in Table 24, below.

Table 24: Keene Division – Normal Year and Design Year HDD

Month	Normal Year HDD	Design Year HDD
January	1,279	1,565
February	1,084	1,350
March	82	1,269
April	606	606
May	301	301
June	102	102
July	27	27
August	43	43
September	196	16
October	538	538
November	833	1,072
December	1,117	1,348
Total	7,108	8,417

3. Daily Demand Forecast

The Design Day forecast was developed using a baseload and heatload analysis similar to the Normal Year and Design Year forecast. The daily baseload demand was assumed to be equal to the average daily demand in July and August 2021. To determine the heatload demand, the actual usage on January 2, 2018,⁵⁵ was divided by the actual HDD on that day. The resulting slope was then multiplied by the Design Day HDDs and added to the baseload demand to determine the Design Day demand. The Design Day demand was assumed to be the same in each year of the Forecast Period. These results are summarized in Table 25 below.

4. Demand Forecast Results

The demand forecast results for the Keene Division are provided in Table 25, below.

⁵¹ The standard deviation was calculated based on the annual HDDs from 2001 through 2021.

⁵² $8,417 = 7,108 + 2 \times 654$ (differences due to rounding)

⁵³ The standard deviation was calculated based on the daily peak HDDs from 2001 through 2021.

⁵⁴ $69.2 = 60.1 + 2 \times 4.6$ (differences due to rounding)

⁵⁵ January 2, 2018, was chosen because it represented the highest slope associated with a significant cold snap in December 2017 and January 2018, which ensures that the Design Day represents a significant weather event.

Table 25: Summary of Keene Division Planning Load Forecasts (Dth)

Split-Year (Nov-Oct)	Normal Year	Design Year	Design Day
2022/23	146,164	165,922	1,651
2023/24	146,164	165,922	1,651
2024/25	146,164	165,922	1,651
2025/26	146,164	165,922	1,651
2026/27	146,164	165,922	1,651
CAGR (2022/23- 2026/27)	0.0%	0.0%	0.0%

B. Assessment of Supply Resource Portfolio

1. Current Resource Portfolio

Most of the Keene Division customers are served by propane. The propane-air plant was commissioned in 1969 and is located at 207 Emerald Street in Keene and prior to 1969, the plant operated as a butane air facility. The plant currently receives odorized liquid propane from trucks, stores the propane for future use, then manufactures the propane-air mixture for customer end-use with an approximate heating value of 740 British Thermal Units/Standard Cubic Foot (“BTU/SCF”). The plant provides baseload propane-air to residential and commercial gas customers throughout Keene via an underground distribution system. The Company has net storage capacity at its plant in Keene of approximately 7,100 Dth (75,000 gallons) of propane. Additionally, the Keene Division has approximately 11,800 Dth (129,800 gallons) of propane storage capacity at the Amherst storage facility located approximately 50 miles from the Keene plant.⁵⁶ The Company contracts for annual trucking service for the transportation of propane from the Amherst storage facility to the Keene plant with various carriers that it selects through a comprehensive RFP process on a year-to-year basis.

In the spring of 2017, Liberty obtained approval from the City of Keene to set up a natural gas decompression facility on Production Avenue, which services a portion of the demand of the Keene Division. Keene has approximately 8,000 buildings, facilities, and homes requiring thermal energy with the existing Liberty system serving over 1,200 of these customers. While the propane-air mixture accounts for most of Liberty’s customers, the Company began serving some customers with CNG in October 2019. The service territory for CNG is currently limited to the Monadnock Marketplace (“Marketplace”) and a small portion of Key Road. The Company has contracted with Xpress Natural Gas, LLC for CNG deliveries to its system through June 30, 2024.

2. Future Portfolio Decisions

The Company’s propane-air system is nearing the end of its useful service life and will require major upgrades and/or replacement of major infrastructure to continue servicing the City of Keene. Liberty proposes to replace the major infrastructure with a new, safer, more reliable, and economic solution that will benefit its utility, the plant staff, and most importantly, the City of Keene – hereinafter referred to as the Green Keene project.

⁵⁶ As noted in Section IV, the storage capacity at the Amherst propane facility is partially shared between the Keene Division and Liberty.

The objective of this proposed Green Keene project is to transition the Keene Division's aging propane-air facility and distribution network to a safe, reliable, clean, economic fuel and gas system for Keene customers. Liberty has identified that the best path forward for this transition would be to develop a supply and implementation strategy for a conversion to CNG and LNG. This solution has been chosen partly due to the presence of the already converted "Marketplace" but has also been determined by consultants, GHD, as the most economical way of delivering a safer, cleaner, and more reliable fuel based on an alternate fuel supply assessment that has been evaluated. It is also Liberty's intention to investigate the development and deployment of renewable energy solutions at the CNG/LNG site using RNG and hydrogen as these fuels become more economically viable and easier to procure.

To date, Liberty has engaged consultants, evaluated and selected a future supply option for the Keene Division, and developed an Opinion of Probable Construction costs for a CNG/LNG facility. Liberty is also identifying required distribution infrastructure upgrades and is beginning to investigate the effects on end user equipment, along with evaluating the future deployment of hydrogen-ready equipment.

Additional information regarding Liberty's Green Keene project is provided in Appendix 8.

VI. DISTRIBUTION SYSTEM PLANNING

Liberty's distribution system planning included in this 2022 IRP provides a high-level presentation of projects associated with the Company-owned distribution infrastructure that is used to ultimately deliver gas from city-gates to all customers on its distribution system. Consistent with the Commission's directives in the 2017 IRP Interim Order, the Company has provided a "functional view" and a "project view" for its planned capital projects; specifically:

- For the functional view: planned investments in supply portfolio options coupled with any necessary capital investments, including maintenance, system improvements (meters, main replacements, etc.), system expansion, new capacity (pipeline, storage), and any other major category.
- For the project view: planned supply contracts as well as capital projects costing \$200,000 or more as well as aggregated project listings by asset type for smaller investments.

Liberty's fundamental obligation is to maintain its distribution infrastructure in a manner that complies with applicable pipeline safety regulations and that will provide safe and reliable service to customers. The Company presents the following list of known capital projects over the coming five years based on the Company's good faith efforts and on the facts presently available. The Company presents this list with the understanding that it is subject to change as dictated by system needs, the availability of capital, the completion of additional engineering, and by circumstances and events not currently known. Thus, the Company presents this list of known capital projects planned to the Commission for its informational purposes and not for the purpose of requesting approval. The Company will update the list annually as directed by the Commission in Order No. 26,684 (Sept. 14, 2022). The Company further notes that this list of known capital projects does not include every necessary capital project that may occur over the next five years and is subject to potential future changes. Over the next five years, Liberty has planned known capital projects that target the replacement of leak-prone pipe ("LPP"); reliability projects to reinforce the gas system; and supply enhancement projects that will provide benefits to customers. With respect to its Keene Division, Liberty is committed to undertaking a methodical approach to converting the system from propane/air to natural gas.⁵⁷ The known capital projects for the Keene Division are included in a separate section below. In total, under the Company's list of known capital projects, the Company will invest approximately \$386 million over the next five years, improving the safety, reliability, and flexibility of the distribution system and providing additional capacity in areas that have experienced load growth (see Table 26 below). Certain of the known capital projects are discussed in greater detail below.

⁵⁷ The costs to convert the Keene Division away from the existing propane-air system are not known at this time. The Company will update the Commission on those projected costs as the engineering matures and the construction timeline comes into view. Note also that, in compliance with Order No. 26,122 (Apr. 27, 2018) and Order No. 26,294 (Sept. 25, 2019), the Company will seek advance Commission approval of each phase of the Keene conversion pursuant to the process set forth in those orders.

Table 26: Liberty's List of Known Capital Projects (\$000)

Project Category	2023	2024	2025	2026	2027
Leak-Prone Pipe/City State	\$28,250	\$28,560	\$27,900	\$20,600	\$17,960
System Enhancements	\$13,200	\$17,500	\$10,000	\$3,500	\$0
Gas System Planning & Reliability	\$3,000	\$3,900	\$4,900	\$10,400	\$10,400
Integrity	\$5,170	\$5,270	\$5,370	\$5,370	\$5,370
Instrumentation & Regulation	\$550	\$550	\$550	\$550	\$550
Service/Meter Upgrades	\$6,220	\$6,320	\$11,325	\$8,775	\$6,525
Keene Division ⁵⁸	\$1,820	\$410	\$410	\$410	\$400
Growth	\$12,950	\$13,250	\$13,450	\$13,450	\$14,450
Facility	\$5,940	\$6,640	\$2,630	\$1,430	\$1,430
Information Technology	\$615	\$615	\$615	\$615	\$615
Corporate	\$2,385	\$3,085	\$3,550	\$3,500	\$3,500
Equipment, Tools & Fleet	\$1,900	\$1,900	\$1,800	\$1,800	\$1,800
TOTAL	\$82,000	\$88,000	\$82,500	\$70,400	\$63,000

A. Known Capital Projects**1. Leak-Prone Pipe/City State**

This LPP/City State category includes projects completed to address LPP in the gas distribution system, as well as direct conflicts between any existing gas infrastructure and state or municipal construction. The LPP/City State category consists of the five separate categories of projects listed in Table 27 below. The planned spending for each category over the next five years is also broken down in this table.

Table 27: Leak-Prone Pipe/City State Projects (\$000)

Project Name	2023	2024	2025	2026	2027
Main Replacement LPP	\$20,000	\$20,000	\$19,000	\$12,000	\$10,500
Main Replacement Fitting LPP	\$1,400	\$1,400	\$1,400	\$1,500	\$260
Main Replacement LPP- Restoration	\$4,200	\$4,200	\$4,200	\$3,500	\$3,500
Main Replacement City/State Construction	\$2,500	\$2,800	\$3,100	\$3,400	\$3,500
Service Replacement Fitting City/State Construction	\$150	\$160	\$200	\$200	\$200
TOTAL	\$28,250	\$28,560	\$27,900	\$20,600	\$17,960

Main Replacement LPP – The scope of work of this project is for prioritized replacement of cast iron and bare steel gas mains and services in Liberty's gas distribution system. The LPP program replaces aging gas infrastructure proactively to reduce the risk of a pipeline safety related problem. To accomplish these safety improvements on an ongoing multi-year basis, the Company continually assesses asset condition and defects within its system. At the end of 2022, Liberty will have approximately 32 miles of LPP remaining in its system. Table 28 below is a breakdown of the mileage Liberty intends to replace in each

⁵⁸ The costs to convert the Keene Division away from the existing propane-air system are not known at this time and not included in the known capital projects planned.

of the next five years. Maintaining this rate of replacement will allow for the completion of LPP replacement in the Northern and Southern divisions by the end of 2025 and the completion of LPP replacement in the Central division by 2027.

Table 28: Main Replacement LPP

Main Replacement LPP	2023	2024	2025	2026	2027
Mileage	8.00 miles	7.85 miles	7.50 miles	4.66 miles	4.25 miles

Main Replacement Fitting LPP – This project covers the upgrade or replacement of meter sets that are directly related to LPP replacement jobs. At each service within the scope of an LPP project, the meter set is assessed and either upgraded to a high pressure meter set if necessary or replaced due to integrity concerns.

LPP Main Restoration – This project is utilized to capture the final restoration costs associated with work completed under the previous year’s LPP replacement program. Typically, final paving restoration is not completed for main replacement jobs completed later in the construction season due to cold weather and the decreased availability of asphalt. Restoration is completed by our contractors and in accordance with City specifications and schedule.

Main Replacement City/State Construction – City/State construction is the response to third-party construction activity which threatens the integrity of Liberty’s gas facilities. Typical third-party construction that impacts those facilities includes new water, sewer, and drainage infrastructure, street reconstruction, road realignment, and bridge replacement. Efforts are made to work with the City or State to avoid forcing a relocation of gas facilities, but in the event has a relocation is unavoidable, Liberty coordinates to ensure that relocations alleviate conflicts and meet company policies.

Service Replacement Fitting City State Construction - This project covers the upgrade or replacement of meter sets that are directly related to City/State Construction jobs. At each service within the scope of a City/State Construction project, the meter set is assessed and either upgraded to a high pressure meter set if necessary or replaced due to integrity concerns.

2. System Enhancements

The System Enhancements category consists of projects that support an increase in supply from the TGP system. The projects identified to support the System Enhancements are listed in Table 29 below along with an estimated cost and planned year of construction.

Table 29: System Enhancements Projects (\$000)

Project Name	2023	2024	2025	2026	2027
Candia Road Gate Station Replacement	\$1,000	\$0	\$0	\$0	\$0
New Londonderry Meter & Regulating Station	\$2,700	\$0	\$0	\$0	\$0
12-inch 185 PSIG Pipeline, Londonderry-Manchester	\$9,000	\$0	\$0	\$0	\$0
Brown Avenue District Regulator Station	\$500	\$0	\$0	\$0	\$0
12-inch 185 PSIG Pipeline, Manchester-Merrimack	\$0	\$17,500	\$10,000	\$0	\$0
Raymond Wieczorek Bridge Crossing	\$0	\$0	\$0	\$3,500	\$0
Total	\$13,200	\$17,500	\$10,000	\$3,500	\$0

Candia Road Gate Station Replacement - The purpose of this project is to replace the existing gate station on Candia Road by Interstate I-93 in Manchester with a new gate station, suitable to meet the Company's current capacity requirements, as well as additional capacity to be provided off TGP. The existing conditions feature a building, which houses metering and custody transfer, followed by two redundant regulator runs, which cut the high pressure gas from TGP (the Concord Lateral has a maximum allowable operating pressure, or MAOP, of 750 PSIG) to 130 PSIG. Within the fence at Candia Road is also a regulator vault, which cuts the pressure again from 130 PSIG to 60 PSIG. The new station will bring both pressure cuts into a new building at the same site. Relief valves will be included for each pressure cut as a tertiary layer of overpressure protection.

New Londonderry Meter & Regulating Station – This project will tap off the existing 16-inch 750 PSIG pipeline feeding the Granite Ridge power plant to provide a feed for a new meter and regulating station in Londonderry. The station will cut the gas pressure to an MAOP of 185 PSIG, which will be delivered and connected into the existing gas distribution system through subsequent projects. The equipment for metering and regulating will be housed in a building. The station will feature two redundant regulator runs and a pressure relief valve as a tertiary layer of overpressure protection.

12-inch 185 PSIG Pipeline, Londonderry-Manchester – From the new meter and regulating station in Londonderry, approximately 1.8 miles of 12-inch coated steel 185 PSIG pipeline will be extended along Harvey Road, Pettengill Road, and Raymond Wieczorek Drive. This phase of pipeline installation will terminate at Brown Avenue in Manchester.

Brown Avenue District Regulator Station – Off the new 185 PSIG pipeline, a district regulator station will be built on Brown Avenue in Manchester to cut the pressure from 185 PSIG to 60 PSIG. The outlet of the station will be tied into the existing 60 PSIG gas system on Brown Avenue, providing pressure support in southern Manchester and Litchfield.

12-inch 185 PSIG Pipeline, Manchester-Merrimack – From Brown Avenue in Manchester, the 185 PSIG pipeline installation will continue south, approximately 6.6 miles into Litchfield. A horizontal direction drill will be executed to cross the Merrimack River into the town of Merrimack. Once the pipeline crosses the river, it will extend another mile south along Daniel Webster Highway and tie into the existing 185 PSIG line that terminates in Merrimack. This will complete the reinforcement for the Nashua distribution system.

Raymond Wieczorek Bridge Crossing – From the outlet of the new regulator station on Brown Avenue, 12-inch coated steel 60 PSIG main will be extended north and west. This extension will continue west, hanging on the Raymond Wieczorek Bridge, across the Merrimack River, and into Bedford. The new main will tie into the existing 60 PSIG system in Bedford, providing pressure support in this area.

3. Gas System Planning & Reliability

The gas system planning and reliability program includes projects that provide operational benefits to our customers by improving and providing better system pressure in areas identified based on SCADA system data and hydraulic analysis as having poor pressure during cold weather conditions. It also includes strategic main connections designed to allow for large low to high pressure projects to occur. Types of work in this category may include:

- Eliminating single-feed distribution systems, including the elimination of a district regulator and the elimination of non-standard pressure systems.
- Reinforcements to boost gas pressures in winter conditions at locations where there are known pressure deficiencies.
 - The minimum allowable pressure in the 60 PSIG system is 10 PSIG.
- Integrating distribution reliance on LNG facilities and/or equipment for pressure-balancing the distribution system during peak conditions.
- Relocation of pressure-regulating equipment to safer and more reliable locations.
- Improving the ability and flexibility to receive pipeline gas at supply facilities.

Liberty has identified constructable projects to best improve the reliability of the gas system over the next five years. The projects identified are listed in Table 30 below, with an estimated cost and planned year of construction provided as well. Projects have been prioritized to address the more urgent areas in need of improvement sooner in the five-year plan.

Table 30: Gas System Planning & Reliability Projects (\$000)

Project Name	2023	2024	2025	2026	2027
Laconia Rd 8-inch main, Tilton Plant to Manville Rd, Tilton	\$1,750	\$0	\$0	\$0	\$0
Daniel Webster Highway, Nashua	\$1,000	\$0	\$0	\$0	\$0
Upgrading of 130 PSIG Pipeline to 185 PSIG, Manchester	\$250	\$0	\$0	\$0	\$0
Hooksett Take Station Outlet Upgrade	\$0	\$1,300	\$0	\$0	\$0
Mosquito Bridge Crossing, Sanbornton & Belmont	\$0	\$1,100	\$0	\$0	\$0
River Crossing at Suncook Take Station, Hooksett/Bow	\$0	\$1,500	\$0	\$0	\$0
12-inch 60 PSIG Highway Crossing, Tilton to Franklin	\$0	\$0	\$600	\$0	\$0
12-inch main on Will St & Bike Path, Nashua	\$0	\$0	\$1,000	\$0	\$0
8-inch main on Mountain Rd, Concord/Penacook	\$0	\$0	\$1,300	\$0	\$0
Upgrading of Airport Rd to 200 PSIG, Concord	\$0	\$0	\$1,000	\$0	\$0
Laconia Rd Regulator Station, Upgrade to 125 PSIG, Tilton/Belmont	\$0	\$0	\$1,000	\$0	\$0
12-inch 200 PSIG Concord-Tilton High Line Replacement	\$0	\$0	\$0	\$10,400	\$10,400
TOTAL	\$3,000	\$3,900	\$4,900	\$10,400	\$10,400

Laconia Road 8-inch main, Tilton Plant to Manville Road, Tilton – From the end of the main installed in 2019 by Manville Rd, extend approximately 1 mile of 8-inch plastic main, parallel to the existing 8-inch coated steel main, on Route 3 (Laconia Road). This new main will terminate at the plant at 130 Tilton Road. The main will initially run at 60 PSIG MAOP but will be tested for a future MAOP of 125 PSIG.

Daniel Webster Highway, Nashua – New 8-inch plastic 60 PSIG MAOP main totaling 2,225 feet will be installed on Daniel Webster Highway in Nashua. This new main will provide a significant reinforcement for the 60 PSIG system in the Southern Nashua area, boosting the pressure at the southernmost end of the system from 13 PSIG to 22 PSIG on a design day. This increase will allow for more growth in the area while greatly reducing the risk of the system reaching the minimum allowed pressure of 10 PSIG.

Upgrading of 130 PSIG Pipeline to 185 PSIG, Manchester – The 130 PSIG pipeline in Manchester, which spans between the gate station at 700 Candia Road and the plant at 130 Elm Street, will be upgraded to 185 PSIG to provide increased capacity for the Manchester system.

Hooksett Gate Station Outlet Upgrade – The existing 60 PSIG piping from the outlet of the Gate Station in Hooksett heading north on Londonderry Turnpike is only 4-inch diameter. Relaying this piping with approximately 5,000 feet of new 8-inch piping will increase the pressure in the lowest point of the system on Pheasant Hill Road from 20 PSIG to 41 PSIG.

Mosquito Bridge Crossing, Sanbornton & Belmont – As part of the reinforcement on Route 3 from the Tilton Plant to Belmont, new 8-inch plastic main will be extended north from previously installed 8-inch plastic on Route 3 (Laconia Road) in Tilton. The new main in this phase will cross Lake Winnisquam at Mosquito Bridge between Sanbornton and Belmont. The main will initially run at 60 PSIG MAOP but will be tested for a future MAOP of 125 PSIG.

River Crossing at Suncook Take Station, Hooksett/Bow – To provide a reinforcement to the 60 PSIG system in Bow, the Merrimack River will be crossed from the Suncook Take Station on Ferry Street in Allenstown and tied into the existing 60 PSIG system on River Road in Bow. This crossing will improve pressures from their lowest point on Westgate Drive in Bow from 27 PSIG to 38 PSIG.

12-inch 60 PSIG Highway Crossing, Tilton to Franklin – By crossing Interstate I-93 by Exit 20 in Tilton with new 12-inch steel piping, and replacing the existing 6-inch steel piping, the pressure at the lowest point in Franklin on Industrial Park Drive improves from 22 PSIG to 32 PSIG.

12-inch main on Will Street & Bike Path, Nashua – To provide a reinforcement for the 60 PSIG system in southwest Nashua, 2500 feet of 12-inch plastic is to be installed in or along the bike path from Twelve Street to Simon Street, then north to the existing 12-inch highway crossing at Ledge Street. This crossing will provide additional capacity for the southwest Nashua 60 PSIG system.

8-inch main on Mountain Road, Concord/Penacook – To boost the pressure in the 60 PSIG system in Penacook, approximately 2 miles of 8-inch plastic 60 PSIG main will be extended on Mountain Road from the Eastside Drive rotary north towards Penacook. This crossing will improve pressures from their lowest point on Main Street in Boscawen from 19 PSIG to 29 PSIG.

Upgrading of Airport Road to 200 PSIG, Concord – The 100 PSIG system in Concord, which spans from the gate station at 10 Broken Bridge to the regulator station on Airport Road at Loudon Road, will be upgraded to 200 PSIG to provide increased capacity for the Concord system.

Laconia Road Regulator Station, Uprate to 125 PSIG, Tilton/Belmont – Once the remaining sections on 8-inch plastic main on Route 3 between Tilton and Belmont are completed, the pressure in the 8-inch plastic can be increased from 60 PSIG to 125 PSIG. A regulator station will be installed on the east side of the Lake Winnisquam crossing in Belmont, cutting pressure from 125 PSIG to 60 PSIG and tying into the existing 60 PSIG in Belmont heading to Laconia. The completion of the entirety of work along Route 3 from Tilton to Belmont will increase pressures in Laconia from the present day low of 13 PSIG to 44 PSIG.

12-inch 200 PSIG Concord-Tilton High Line Replacement – In 2016, five miles of the Concord to Tilton High Line in Loudon was relayed with new 12-inch coated steel 200 PSIG main. The remaining 10 miles, which spans from Loudon to Tilton, will be replaced with 12-inch coated steel 200 PSIG main over two construction seasons. The completion of this main replacement would eliminate the need for LNG supply at the Tilton Plant.

4. Integrity

The Integrity category consists of projects that address active or potential integrity issues in Liberty's gas distribution system. The projects in this category include the maintenance of cathodic protection systems, the repair of active leaks, and the replacement of defective valves and couplings prone to leakage. The category also provides for the replacement of piping considered under the LPP replacement program but could potentially leak due to known material issues. Types of piping replaced under the Integrity category

would include Aldyl-A, an older vintage plastic pipe, and coated steel mains that are not cathodically protected.

A list of the projects included in this category, along with the planned spending on each project over the next five years, is shown in Table 31 below.

Table 31: Integrity Projects (\$000)

Project Name	2023	2024	2025	2026	2027
Cathodic Protection Program	\$800	\$800	\$800	\$800	\$800
Leak Repairs	\$1,300	\$1,300	\$1,400	\$1,400	\$1,400
Reserve for Unidentified Mandated Projects	\$200	\$200	\$200	\$200	\$200
Valve Installation & Replacement	\$70	\$70	\$70	\$70	\$70
Dresser Coupling Replacement Program	\$500	\$500	\$500	\$500	\$500
Pre-Code Steel Pipe Protection Program	\$500	\$500	\$500	\$500	\$500
Aldyl-A Replacement Program	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100
Main Replacement Reactive	\$700	\$800	\$800	\$800	\$800
TOTAL	\$5,170	\$5,270	\$5,370	\$5,370	\$5,370

Cathodic Protection Program - The Cathodic Protection Program blanket provides funding necessary to complete known capital projects required to maintain and operate the cathodic protection system in accordance with 42 C.F.R. Part 192, Subpart I, Requirements for Corrosion Control. Capital projects include:

- New and replacement test stations
- New and replacement rectifiers
- Installation of bond wires
- Recoating of pipes
- Installation of insulators

Leak Repairs – This project covers the repairs required for leaks found in the gas distribution system throughout the entire calendar year. Leaks are assigned Grades 1, 2, or 3 upon discovery. The severity of the leak determines the timeframe within which a leak must be repaired.

Reserve for Unidentified Projects – This blanket is a budget contingency planned for unknown projects that arise during the year based on the system requirements needed to move into the known capital projects.

Valve Installation/Replacement - This project will provide for the installation or replacement of gas valves. It will help facilitate maintenance and pipe replacement activities on associated distribution piping. Ensuring all critical valves are properly maintained and operable is a key safety function and critical to effective operation of our gas distribution system. Federal and State regulations require Liberty to install, inspect and maintain and operate critical pipeline valves on all gas distribution systems. Valve installation or replacement is necessary to facilitate the rapid shutdown of distribution piping during gas emergencies such as third-party damage, water intrusion, or for other operational reasons.

Dresser Coupling Replacement Program – This project will replace leaking dresser couplings with a new welded section of pipe. Dresser couplings are joints that are prone to leakage during the winter months when contraction of the gaskets can occur. Most of these couplings are found on the 60 PSIG system, therefore in most cases, rather than tighten the coupling, it is more sensible to replace the fitting and eliminate the potential for a future leak.

Pre-Code Steel Pipe Protection Program - This project aims to replace coated steel pipe that was installed before corrosion requirements took effect in 1971. Much of the pre-code pipe has been placed under cathodic protection. Most of the remaining unprotected pre-code pipe left is unprotectable due to poor coatings. This pipe is at risk for corrosion leaks and therefore should be replaced, and this project provides the ability to replace it.

Aldyl-A Replacement Program - Aldyl-A is a brand name PE plastic pipe material installed prior to 1989. Aldyl-A pipe installed between the 1960s and early 1980s can be subject to premature cracking due to its composition. Aldyl-A is also commonly known to fail at joints due to poor construction practices which include improper surface heating temperatures and interfacial pressures. Due to the potential risk of failure, Aldyl-A pipe should be replaced, and this project provides the ability to replace it.

Main Replacement Reactive - This Main Replacement Reactive blanket provides for the replacement of gas mains and services during urgent or emergency situations that fall outside the normal scope of integrity, reinforcement, reliability and public works blankets. Situations arise where a field decision may be required to replace a segment of pipe or service, and this project provides the ability to replace it.

5. Instrumentation & Regulation (“I&R”)

Ensuring the high quality and condition of the pressure regulation, production, and associated controls in the gas distribution system is vital for the continued safe and reliable delivery of gas service to Liberty’s customers. The I&R category consists of several projects designed to complete improvements and upgrades to such systems as deemed necessary by those inspecting and operating the equipment. Table 32 below shows the projects contributing to I&R improvements and the planned spending over the next five years:

Table 32: I&R Projects (\$000)

Project Name	2023	2024	2025	2026	2027
District Regulator Facilities Improvements	\$300	\$300	\$300	\$300	\$300
LNG/LPG Capital Improvements	\$110	\$110	\$110	\$110	\$110
RTU Replacement Program	\$60	\$60	\$60	\$60	\$60
SCADA Capital Improvements	\$80	\$80	\$80	\$80	\$80
TOTAL	\$550	\$550	\$550	\$550	\$550

District Regulator Facilities Improvements - This blanket project is associated with regulating facilities that have been designed for specific flows to maintain continuity of supply during normal and critical periods of gas demand. The blanket project will replace obsolete equipment, vaults with structural issues, regulator stations consisting of two regulators inside one vault (susceptible to over-pressurization of the system), and obsolete or inadequate valves. Factors for replacement consideration may also include inadequate bypass piping, inadequate accessibility, or inadequate maintainability. The project also supports installing third layers of protection, such as relief valves, at existing or new regulator stations.

LNG/LPG Capital Improvements – This project consists of upgrades, improvements, and replacement of equipment associated with provided LNG and liquid petroleum gas (“LPG”) in the gas distribution system, which become necessary during winter months to meet demand.

RTU Replacement Program – This project supports the replacement of Remote Terminal Units (“RTU”) at Liberty’s existing gate and regulator stations. The need for replacement is evaluated based on age and condition.

SCADA Capital Improvements – This project supports improvements and upgrades to the hardware and software associated with the SCADA system. SCADA enables Gas Control to monitor and, in some locations, control the physical processes at Liberty’s gas facilities. The need for replacement is evaluated based on age and condition.

6. Service/Meter Upgrades

This category focuses on upgrades and improvements made to existing services and meter sets designed to enhance the safety and reliability of gas delivery to Liberty’s customers. Table 33 below outlines the projects under this category that contribute to such upgrades along with the planned spending over the next five years.

Table 33: Service/Meter Upgrades Projects (\$000)

Project Name	2023	2024	2025	2026	2027
Corrosion & Miscellaneous Fitting	\$100	\$100	\$100	\$100	\$100
Meter Protection Program	\$300	\$300	\$300	\$300	\$300
Meter Work Project (Meter Purchases)	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200
Replacement Services Random (Due to Leaks)	\$750	\$750	\$750	\$750	\$750
Replacement Services Random (Non Leaks)	\$600	\$600	\$600	\$600	\$600
Inactive Service Program	\$70	\$70	\$75	\$75	\$75
K Meter Replacement Program	\$3,200	\$3,300	\$3,500	\$3,500	\$3,500
C1 SAP - AMI	\$0	\$0	\$4,800	\$2,250	\$0
TOTAL	\$6,220	\$6,320	\$11,325	\$8,775	\$6,525

Corrosion & Miscellaneous Fitting – This project is for replacing corroded fittings located at customer meter sets. Replacing corroded fittings greatly reduces the risk of a leak at a meter set, thus enhancing the safety and reliability of gas service to customers.

Meter Protection Program – This project provides protection to meter sets that, due to their location, could be subject to vehicle collisions. Under this program, bollards are installed to protect such meter sets from being hit by a vehicle, preventing the destruction of meter sets and the resulting hazardous gas leaks.

Meter Work Project (Meter Purchases) – This project represents the annual purchase and receipt of customer service meters and Automated Meter Reading (“AMR”) devices. Liberty has an obligation to select randomly generated meter accounts and reform testing on accuracy of the meters. In addition, gas meters older than 30 years are targeted for retirement and replacement to remain within the tolerance in

the pick for test program. This project also funds any new meters required due to sales growth which occurs during the year.

Replacement Services Random (Due to Leaks) – The project supports the replacement of services that are not within the scope of another capital project but should be replaced due to leak history.

Replacement Services Random (Non Leaks) – The project supports the replacement of services that are not within the scope of another capital project but should be replaced composed due to the presence of leak-prone material or fittings.

Inactive Service Program – The project will provide for mandated abandonments of connected service lines that are not actively being used. Inactive services are at higher risk of third-party damage due to the customer no longer utilizing gas and therefore could potentially not know of the existence of a service on the property.

K Meter Replacement Program – K Meters are 60 PSIG meter sets that were installed indoors. Due to safety concerns associated with having meter sets, which include regulators, indoors, it is preferred to install 60 PSIG meter sets outdoors.

C1 SAP, AMI – Advanced Metering Infrastructure (“AMI”) is a communication network installed along with a two-way meter, allowing customer meter information to automatically collect and transmit consumption data to the utility constantly. The metering and communication network work together to construct the foundation of the grid modernization plan.

7. Keene Division

The costs to convert the Keene Division away from the existing propane-air system are not known at this time. This category covers the known capital projects in the Keene Division. Many of the projects in this category are similar to the projects for EnergyNorth, with unique projects included as well, such as converting customers to natural gas and facility improvements. Table 34 below describes the known capital projects in the Keene Division with expected spending over the next five years.

Table 34: Keene Division Projects (\$000)⁵⁹

Project Name	2023	2024	2025	2026	2027
Cathodic Protection/Corrosion Mitigation Program	\$5	\$5	\$5	\$5	\$0
Reserve for Unidentified Projects	\$20	\$0	\$0	\$0	\$0
KN Main Replacement LPP	\$350	\$200	\$200	\$200	\$200
KN Main Replacement City/State Construction	\$350	\$100	\$100	\$100	\$100
Service Replacement City/State Construction	\$25	\$10	\$10	\$10	\$10
KN Growth New Main	\$150	\$50	\$50	\$50	\$50
KN New Service Commercial/Industrial	\$25	\$10	\$10	\$10	\$10
KN New Service Residential	\$50	\$5	\$5	\$5	\$5
Main Replacement/Growth Fitting	\$5	\$5	\$5	\$5	\$0
KN Facility Improvements & Additions	\$5	\$0	\$0	\$0	\$0
Keene HP Conversion	\$600	\$0	\$0	\$0	\$0
KN Gas System Planning & Reliability	\$200	\$0	\$0	\$0	\$0
KN IT - Software, Equipment & Infrastructure	\$25	\$25	\$25	\$25	\$25
Replacement Services Random	\$10	\$0	\$0	\$0	\$0
TOTAL	\$1,820	\$410	\$410	\$410	\$400

Cathodic Protection/Corrosion Mitigation Program - The Cathodic Protection Corrosion Mitigation Program blanket provides funding necessary to complete known capital projects required to maintain and operate the cathodic protection system in accordance with 42 C.F.R. Part 192, Subpart I, Requirements for Corrosion Control. Known capital projects include:

- New and replacement test stations
- New and replacement rectifiers
- Installation of bond wires
- Recoating of pipes
- Installation of insulators

Reserve for Unidentified Projects - This blanket is a budget contingency planned for an unknown project that arises during the year based on the system requirements needed.

KN Main Replacement LPP - The scope of work of this project is for prioritized replacement of cast iron and bare steel gas mains and services in the Keene gas system. The LPP program replaces aging gas

⁵⁹ The costs to convert the Keene Division away from the existing propane-air system are not known at this time. The Company will update the Commission on those projected costs as the engineering matures and the construction timeline comes into view. Note also that, in compliance with Order No. 26,122 (April 27, 2018) and Order No. 26,294 (September 25, 2019), the Company will seek advance Commission approval of each phase of the Keene conversion pursuant to the process set forth in those orders.

infrastructure proactively to reduce the risk of a pipeline safety-related problem. To accomplish these safety improvements on an ongoing multi-year basis, the Company continually assesses asset condition and defects within its system.

KN Main Replacement City/State Construction – City/State construction is the response to third-party construction activity which threatens the integrity of Keene’s gas facilities. Typical third-party construction that impacts those facilities include new water, sewer, and drainage infrastructure, street reconstruction, road realignment, and bridge replacement. Efforts are made to work with the City or State to avoid forcing a relocation of gas facilities, but in the event that a relocation is unavoidable, Liberty coordinates to ensure the relocation alleviates conflicts and meets Company policies.

Service Replacement City/State Construction - The project covers the upgrade or replacement of meter sets that are directly related to City/State Construction jobs. At each service within the scope of a City/State Construction project, the meter set is assessed and either upgraded to a high pressure meter set if necessary or replaced due to integrity concerns.

KN Growth New Main – The project provides for the installation of new mains to allow for customer base growth. New main installed will allow the connection of new residential, commercial, and industrial customers. Each job is examined to ensure the cost incurred meets the company's required rate of return.

KN New Service Commercial/Industrial - Growth programs are designed to support forecasted customer growth to add new load and net margin by increasing system utilization in a cost-effective way. This project funds the installation of new services to commercial and industrial customers.

KN New Service Residential - Growth programs are designed to support forecasted customer growth to add new load and net margin by increasing system utilization in a cost-effective way. This project funds the installation of new services to residential customers.

Main Replacement/Growth Fitting - The project covers the upgrade or replacement of meter sets that are directly related to LPP replacement jobs. At each service within the scope of an LPP project, the meter set is assessed and either upgraded to a high pressure meter set if necessary or replaced due to integrity concerns.

KN Facility Improvements & Additions – This project supports improvements to and general upkeep of the buildings and grounds in Keene.

Keene HP Conversion - The Keene propane-air distribution plant will need to be retired in the coming years due to the age of the facility and expiring land lease. The system will be converted to CNG, LNG, RNG, or straight propane. The Company’s final decision will be based on analyzing and comparing the safety, financial and operational aspects of each option.

KN Gas System Planning & Reliability - The system reliability blanket includes projects that provide operational benefits to our customers by improving and providing better systems pressure to areas identified based on SCADA system data and hydraulic analysis as having poor pressure during cold weather conditions.

KN IT - Software, Equipment & Infrastructure – This blanket allows for the purchase of computers, software, equipment, and infrastructure as needed when existing technology malfunctions or ages.

Replacement Services Random - The project supports the replacement of services that are not within the scope of another capital project but should be replaced due to leak history or due to the presence of leak prone material or fittings.

8. Growth

Growth programs are designed to support forecasted customer growth to add new load and net margin by cost-effectively increasing customers and system utilization. Types of work in this category include:

- Extension of new main into new areas of town’s served to add service connections.
- Installation of new services to commercial and industrial customers.
- Installation of new services to residential customers.

Project work to allow new customers to be added to the distribution system ensures that minimum design pressures are maintained throughout the gas network during periods of peak demand, thus maintaining continuous service to all customers.

Table 35 summarizes the projects included in the known capital projects with expected spending over the next five years.

Table 35: Growth Projects (\$000)

Growth	2023	2024	2025	2026	2027
Growth Fitting	\$1,300	\$1,500	\$1,500	\$1,500	\$1,500
Growth Main	\$4,700	\$4,800	\$5,000	\$5,000	\$5,000
Marketing	\$150	\$150	\$150	\$150	\$150
New Reinforcement Main for Growth	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
New Service Commercial/Industrial	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100
New Service Residential	\$3,100	\$3,100	\$3,100	\$3,100	\$3,100
Reserve for Unidentified Growth	\$1,600	\$1,600	\$1,600	\$1,600	\$2,600
Total	\$12,950	\$13,250	\$13,450	\$13,450	\$14,450

9. Facility

Projects to provide funding associated with various known capital facility improvements required to support the buildings and grounds for the Liberty locations. Types of work in this category include:

- FLIR Cameras - Install FLIR Thermal imaging cameras to replace the shaker fence system used for the gas production yards to protect against break in.
- Security Equipment - This project is to provide the coverage of security improvements. This covers all aspects of security at all the Liberty locations, the security conversion, and maintains the security system to meet all Company standards.
- Dispatch & Control - Control room capital upgrades that arise throughout the year.
- Concord Control Building - New secure facility for gas control and electric control.
- Facility Capital Improvement - This project is an annual funding for any capital needs which may be required to support the facility infrastructure located at Liberty. This can include the purchase of office furnishings and required repairs to the HVAC or roofing systems to ensure the integrity

of the building. Funding additional will be used to address any safety audit issues identified to improve employee/customer safety, risk mitigation, and upkeep of assets.

- Nashua Paving - Remove current asphalt, re-bed the entire parking lot, install CAP on environmental areas, and repave the entire lot at Nashua operations yard. This is a multi-year project from 2021 through 2023.
- Install Solar Panels - Install solar panels at Liberty site to reduce grid reliance at site.

Table 36 summarizes the projects included in the known capital projects with expected spending over the next five years.

Table 36: Facility Projects (\$000)

Facility	2023	2024	2025	2026	2027
FLIR Cameras	\$600	\$600	\$600	\$0	\$0
Security Equipment	\$30	\$30	\$20	\$20	\$20
Dispatch & Control	\$10	\$10	\$10	\$10	\$10
Concord Control Building	\$1,000	\$4,000	\$0	\$0	\$0
Facility Capital Improvement	\$2,000	\$2,000	\$2,000	\$1,400	\$1,400
Nashua Paving	\$2,000	\$0	\$0	\$0	\$0
Install Solar Panels	\$300	\$0	\$0	\$0	\$0
Total	\$5,940	\$6,640	\$2,630	\$1,430	\$1,430

10. Information Technology (“IT”)

Projects to provide funding associated with local IT equipment and software, along with companywide various system enhancements include:

- IT Purchases—Software, Equipment & Infrastructure. During the year the need to purchase computers, software, equipment & infrastructure to meet new service demands and implement will occur.
- Liberty approved system enhancements. May include multiple company system upgrades or singular New Hampshire system upgrades.

Table 37 summarizes the projects included in the known capital projects with expected spending over the next five years.

Table 37: Information Technology Projects (\$000)

Information Technology	2023	2024	2025	2026	2027
Upgrade Synergi Software	\$65	\$65	\$65	\$65	\$65
IT-Software, Equipment & Infrastructure	\$50	\$50	\$50	\$50	\$50
IT System Allocations	\$500	\$500	\$500	\$500	\$500
Total	\$615	\$615	\$615	\$615	\$615

11. Corporate/Other

Company-wide customer experience enhancement and employee technology initiatives are included in the corporate/other category. Table 38 summarizes the known capital projects with expected spending over the next five years.

Table 38: Corporate/Other Projects (\$000)

Corporate/Other	2023	2024	2025	2026	2027
Corporate/Other	\$2,385	\$3,085	\$3,550	\$3,500	\$3,500
Total	\$2,385	\$3,085	\$3,550	\$3,500	\$3,500

12. Equipment, Tools & Fleet

The gas operations department identifies individual equipment, tools, and vehicle needs. From these needs, designated purchases are approved and capitalized following the Company's policies. Types of work in this category include:

- Standard replenishment and improvement of equipment and tools. These purchases ultimately support a safe and productive working environment.
- Fleet is performed in conjunction with operations to determine any fleet new and replacement vehicles required based on the current condition (mileage and age) of the fleet as determined in the corporate fleet policy.

Table 39 summarizes the projects included in the known capital projects with expected spending over the next five years.

Table 39: Equipment, Tools & Fleet Projects (\$000)

Equipment, Tools & Fleet	2023	2024	2025	2026	2027
Purchase capital equipment & tools	\$300	\$300	\$300	\$300	\$300
Transportation Fleet	\$1,600	\$1,600	\$1,500	\$1,500	\$1,500
Total	\$1,900	\$1,900	\$1,800	\$1,800	\$1,800