

Final Report on Central Hudson's Final Gas System Long-Term Plan

Prepared for New York Department of Public Service

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Glossary

AGREE-NY - Alliance for a Green Economy-New York

ASHP - Air source heat pump

BCA - Benefit-Cost Analysis

BE - Building Electrification

CapEx - Capital Expenditure

CB ECS - Commercial Buildings Energy Consumption Survey

CCA - Current Clean Agenda

ccASHP - cold climate air source heat pump

CJWG - Climate Justice Working Group

CLCPA - Climate Leadership and Community Protection Act

CLP - Communities for Local Power

CO₂ - Carbon dioxide

Commission - New York State Public Service Commission

DIMP - Distribution Integrity Management Program

DSM - Demand side management

EAP - Energy Affordability Program

EE - Energy efficiency

EIA - Energy Information Administration

EPA - Environmental Protection Agency

Final Report - PA's Final Report

FLT Plan - Final Long-Term Plan

FO - Fuel oil consisting of ultra-low sulfur diesel, which emits more CO₂ when combusted than natural gas

GHG - Greenhouse gas

GMP - Gross Metro Product

GSHP - Ground source heat pump

GS LTP - Gas System Long-Term Plan

HDD - Heating degree day

HEAP - Home Energy Assistance Program

HM - Highland Mills

HP - Heat pump

HPWH - Heat pump water heater

HVAC - Heating, Ventilation, and Air Conditioning

IEA - International Energy Agency

ILI - In-Line Inspection

ILT Plan - Initial Long-Term Plan

Initial Report - PA's report filed on April 5, 2024

IRA - Inflation Reduction Act

LCF - Low-carbon fuel

LDC - Local distribution company

LMI - Low-moderate income

LPP - Leak-prone Pipe

MAOP - Maximum allowable operating pressure

MI - Multiple Intervenors

MMcf - Million cubic feet

NFE - North Kingston Foxhall

NNI - No New Infrastructure

NPA - Non-Pipe Alternative

NPV - Net present value

NREL - National Renewable Energy Laboratory

NYS - New York State

NYSERDA - New York State Energy Research & Development

OTDA - Office of Temporary and Disability Assistance

PA - PA Consulting Group, Inc.

PHMSA - Pipeline and Hazardous Materials Safety Administration

Planning Proceeding - Gas Planning Proceeding Gas Number 20-G-0131

PLP - Poughkeepsie LP

Preliminary Report - PA's Report filed on October 9, 2024

PUT - Pipe Use Transformation

RFP - Request for Proposal

RIM - Ratepayer Impact Measure

RLT Plan V2 - Revised Long-Term Plan

RNG - Renewable natural gas

Sales - Volumetric Gas

SCT - Societal Cost Test

SEDS - State Energy Data Systems

SME - Subject Matter Expert

T&D - Transmission & Distribution

the Company - Central Hudson

the Department - New York State Department of Public Service

the Order - Gas System Planning Order

TMA - Transportation Mode Alternatives

TVPV - Titusville/Pleasant Valley

UCT - Utility Cost Test

UPC - Usage Per Customer

UTEN - Utility Thermal Energy Network

VRF - Variable refrigerant flow

YOU - Youth Opportunity Union

1 Executive Summary

This review is being conducted for the New York State Department of Public Service (the Department) pursuant to the New York State Public Service Commission (Commission) in its Gas Planning Proceeding Case 20-G-0131 (Planning Proceeding). The Planning Proceeding aims to assure that the State, customers, and Stakeholders have the opportunity to understand and engage in the future of New York's natural gas infrastructure.

On May 12, 2022, the Commission issued an order Adopting Gas System Planning Process (the Order) requiring natural gas utilities to submit comprehensive long-term plans (Long-Term Plans), which comply with the requirements of the Climate Leadership and Community Protection Act (CLCPA) on a repeating three-year cycle.¹ PA Consulting Group, Inc. (PA) was retained by the Commission to assess Central Hudson's Long-Term Plan. On February 6, 2024, Central Hudson (The Company) filed its Initial Gas Long-Term Plan (ILT Plan) in Proceeding Case 23-G-0676. On April 5, 2024, PA filed an Initial Report (Initial Report) summarizing our initial approach, observations, and recommendations. On June 25, 2024, the Company filed its Revised Gas Long-Term Plan; on July 26, 2024, Central Hudson filed a Revised Gas Long-Term Plan, Version 2 (RLT Plan V2), reflecting modifications to many figures, data, and accompanying narrative. In the accompanying filing letter, the Company indicates this second version has updates to the historical trend load forecasts, reflecting input and feedback from Stakeholders, and was provided to ensure Stakeholders have the most up to date information for their comments. On November 20, 2024, Central Hudson filed a Final Gas Long-Term Plan (FLT Plan).

In this report (Final Report) PA builds upon our Preliminary Findings Report, filed October 9, 2024, and includes additional observations regarding our final analyses, conversations with the Company and Stakeholders, assessment of all filed comments to date and our review of the Company's FLT Plan. Building upon our Initial Report and Preliminary Findings observations, in this Final Report we revise prior recommendations to reaffirm or clarify and add new or remove prior recommendations addressed by the Company.

In the following Section 1.1, several key themes representing improvements observed within the FLT Plan are summarized. However, PA also observes several remaining areas of improvement, as discussed within Section 1.2. Next, within Section 1.3 the Company's FLT Plan and its key metrics such as reduced peak demand and annual sales, reduced greenhouse gas (GHG) emissions, capital expenditures, benefit-cost analysis (BCA) and bill impacts are identified and discussed, including the extent to which the Company has considered all Stakeholder feedback and integrated improvements to the FLT Plan as appropriate and consistent with the Company's regulatory and statutory obligations.

PA believes successful, cost-effective, and equitable achievement of the State's ambitious climate goals require a comprehensive assessment of the intersection of natural gas market supply and demand, technical analysis including safety and operational risks, and changing end-use patterns. PA recognizes this planning approach needs a delicate balance of meeting statutory requirements, while ensuring delivery of gas services in a safe, reliable, and affordable manner.

1.1 Central Hudson FLT Plan Highlights

The Company has made several improvements to its LT Plan throughout this engagement when compared to the ILT Plan and RLT Plan V2. The improvements observed within the FLT Plan are steps in the right direction and will help the Company further enhance its long-term planning process and meet the requirements of the Order. PA observes the FLT Plan includes several revisions, based on feedback and recommendations from Stakeholders and PA, including the following identified within the Cover Letter filed along with the Company's FLT Plan. See Table 1-1, summarizing the revisions (in no particular order):

¹ Source: The Order, p. 20-22.

Table 1-1: FLT Plan Key Revisions

Identification and description of No New Infrastructure as the GSLTP pathway.	Changed account forecasts to incorporate historical and forecasted household growth in 20 years, leading to lower levels of forecasted account growth than historical trends.	Update the use per customer forecast to incorporate declining heating degree days (HDD) which impacts the sales volume. Additional figure and description of impact of climate change on heating degree day information and planning implications.
Update the CO ₂ e emissions factor.	The change in account growth and use per customer, also resulted in updated volumetric forecasts and the avoided costs study.	Revised list of barriers to electrification in DACs, including categorizing whether the barrier is viewed primarily from the customer or utility perspective.
Narrative description of new Non-Pipe Alternatives program efforts and analyses. Update on Central Hudson Utility Thermal Energy Network processes and proceeding.	Electric and gas retail rates were updated to match current rates and be inclusive of supply costs, including locational marginal price, generation capacity, transmission tariffs, and ancillary services.	Additional description and detail regarding upcoming hydrogen study.
Additional information on heat pump and energy efficiency incentives, including state and federal programs.	Additional analysis, figures, and narrative on total bill impacts (i.e., gas and electric) and wallet share (i.e., the share of income per household, for the typical customer, dedicated to combined gas and electricity costs).	Updated BCA results based on revisions to assumptions.

Below, PA discusses several notable improvements, based on our review of the demand forecast, supply assessment, bill impact review, environmental assessment, etc.

No New Infrastructure is the selected scenario.

In both the ILT Plan and RLT Plan V2, and as further discussed within Section 1.3.1, the Company describes a Historical Trend and four potential decarbonization scenarios, without specifying which scenario(s) represent the best path forward. PA understands the challenges associated with long-term planning in the face of technology and policy uncertainties but asserted in our Initial and Preliminary Findings Reports that the selection of a preferred scenario is needed to inform near-term decisions, as it is inefficient (if not impossible) to pursue multiple scenarios at the same time.

Now, in the FLT Plan, the Company selected No New Infrastructure (NNI) as their preferred scenario. The selection represents an important improvement that should be acknowledged. The suitability of this scenario will be further discussed in this report.

Company has sufficient supply resources to meet the demand for gas in the foreseeable future.

PA’s review of the Company’s load forecast indicates a slowdown in population growth and a continued decline in household growth within the Company’s service territory. PA’s analysis suggests that the Company is expected to experience 1) reduced organic growth in customer counts due to changing demographics, and 2) downward pressure on gas customer numbers and delivered gas volumes because of electrification, energy efficiency, and a warming trend. The only force exerting potential upward pressure on gas volumes and customer counts is the fuel switching from alternative heating fuels (e.g., fuel oil, wood, etc.) to natural gas. The Company has indicated that over 13,400 customers are within 100 feet of the existing gas network that could request a connection to the gas network.

If demand grows in the near term, even at the level of growth forecast by the Company, PA would not expect there to be a need for additional investments in its gas supply portfolio to accommodate that growth, given our observation that the current portfolio is currently capable of providing more gas on a design day than is presently required by the Company's customers – though the Company has noted some delivery limitations at the Tuxedo and Cedar Hill citygates. For managing more transient demand needs, the Company's portfolio currently incorporates delivered services which can be used to meet any marginal demand.

Low Carbon Fuels have a limited and targeted role in Company's selected decarbonization plan.

In the FLT Plan, some scenarios relied more (Pipe Use Transformation (PUT)) or less (NNI) heavily on the use of low-carbon fuels (LCFs) such as renewable natural gas (RNG) and hydrogen to decarbonize the Company's operations. However, there are significant uncertainties surrounding the use of LCFs from regulatory, technical, economic, safety, and environmental perspectives that still need to be addressed. As a result, the role of LCFs in decarbonizing gas LDCs' operations continues to be studied and its effectiveness tested at this time. However, a significant amount of activity is underway in terms of studies, pilots, and regulatory proceedings across the U.S.

In its choice of the NNI, the Company has acknowledged the role of LCFs in the near-term role will be much more limited and targeted given a number of reasons including, but not limited to, supply constraints, significant cost premiums for these fuels, and additional safety and operational considerations.

The Company's bill impact analysis suggests that electrification of gas heating is not cost prohibitive.

In the FLT Plan, PA finds the FLT Plan includes several improvements in the reporting and methodology of its bill impact analysis. Most notably, the Company has accepted the suggestion from PA and Stakeholders to include the bill impacts for residential customers who chose to electrify throughout the forecast period and those who do not. Electrification of various building use cases, including space heating, water heating, and cooking, is a promising decarbonization solution for the sector. The cost of heat electrification is driven by several assumptions, including cost of appliances, such as heat pumps, heat pump water heaters, and induction stoves. However, depending on the condition of the electric grid, additional costs may also be required across the grid to support the electrification of homes. As a summer peaking electric utility, the Company is likely to have underutilized capacities in the electric grid in the winter that could be used toward electrification of homes and businesses in the near term. Furthermore, the Company has noted that significant investments in the electric grid would likely not be required in the near term to support electrification.²

Another key issue to consider is the operational cost of electrification technologies on site, including the upfront equipment cost (e.g., gas furnaces vs heat pumps) and fuel costs (e.g., natural gas vs electricity) for customers. The cost considerations should also include the impact of volumes on unit costs for customers. For example, as volumes increase or decrease, all else being equal, unit costs of each energy carrier could decrease or increase respectively. This is a very important aspect of modeling heat pump adoption that should be properly accounted for in future version of the GSLTP.

PA observes the results presented suggest that, under certain circumstances, the operational cost impact of alternative fuels are similar. However, PA believes the bill impact calculations may remain low and optimistic, especially for customers who remain on the gas network throughout the forecast period.

Uncertainties and disagreements exist among Stakeholders regarding the true cost of electrifying homes and businesses, as well as the optimal sequence of actions to be taken to achieve the desired outcomes. As a result, we encourage the Company and Stakeholders to collaborate in identifying opportunities for scaling electrification to meet increased winter demand across the service territory to avoid costly investments in long-lived gas assets that may become stranded in the coming decades. Such targeted electrification planning should span both geographically and temporally for a successful decarbonization journey with least total societal cost and highest emissions reduction, reliability, and safety.

1.2 Opportunities to Further Improve the Plan

² Source: FLT Plan, Appendix A: 2024 Central Hudson 20-Year Historical Trend Gas Forecasts and Location-Specific Gas Distribution Costs, p. 31. Most Central Hudson electric grid system components have enough winter peaking capacity to accommodate the projected growth over the next ten years. However, electric grid upgrades will be required in the last ten years of the 20-year study period to accommodate the higher peak demands.

PA observes several opportunities for further improvement. Given the FLT Plan has been filed, PA suggests these opportunities should be implemented in future iterations of the GSLTP planning process such as the next annual report and full GSLTP filings. Below is a summary of the key areas of improvement, further discussed throughout this Final Report.

“No New Infrastructure” scenario does not align with the “No Infrastructure Option” defined in the Order.

As discussed, the Company selected NNI as the preferred scenario and, while PA applauds selection of a planning scenario (as previously recommended), we observe that despite the use of the term “No New Infrastructure”, this scenario may not be aligned with the “No Infrastructure Option” described within the Order,³ which states the Company should “include an entirely ‘no infrastructure option’ and other scenarios relying on alternatives to traditional capital projects.” The Order also acknowledges that some investments will still occur, in order to “address conditions that pose an immediate threat to system reliability and/or public safety, and of which would be exempted from consideration for these Non-Pipe Alternatives (NPAs).”⁴ More specifically,

“Each utility filing contains a “no infrastructure option” in addition to any others identified by the LDCs, in which the utility would include a mix of demand response measures and other non-pipes alternatives needed to close the gap between demand and supply. It also called for at least one contingency solution to be called upon if necessary.”⁵

We note that under the Company’s NNI scenario, capital expenditure (CapEx) investments are expected to be approximately \$817 million between now and 2043, approximately 14% less than under the Current Clean Agenda (CCA) scenario.⁶ While PA would expect that some of that difference is driven by lesser investments to serve new customers, we are not able to comment on those drivers as no detailed CapEx forecast information was provided by the Company for the NNI scenario.⁷ In the absence of that detail, PA is unable to provide an opinion on the extent to which CapEx investments under the NNI scenario could be avoided to support the spirit and meet the intention of the “No Infrastructure Option.” Furthermore, PA observes improvements to the NNI (and all other scenarios) customer growth forecast, as discussed below and in greater detail within Section 6.

While opportunities to avoid CapEx investments other than those to serve new customer demand may be possible, there will be an ongoing need to reinvest in the gas delivery system over time under any planning scenario. Investments related to safety, reliability and regulatory compliance are typically not discretionary. As noted in Section 5, many forecasted investments are not associated with customer growth in the near term. This may lead to a conclusion that avoiding material CapEx under the NNI scenario may be challenging. As noted in Section 1.3, replacement of assets to maintain service to an individual customer may be relatively easy to avoid via a non-pipeline alternative (NPA). In general, additional transparency about the nature and need for future investments may be appropriate so that all parties can better understand the drivers of CapEx over time. See Figure 1-1.

³ Source: The Order, p. 35.

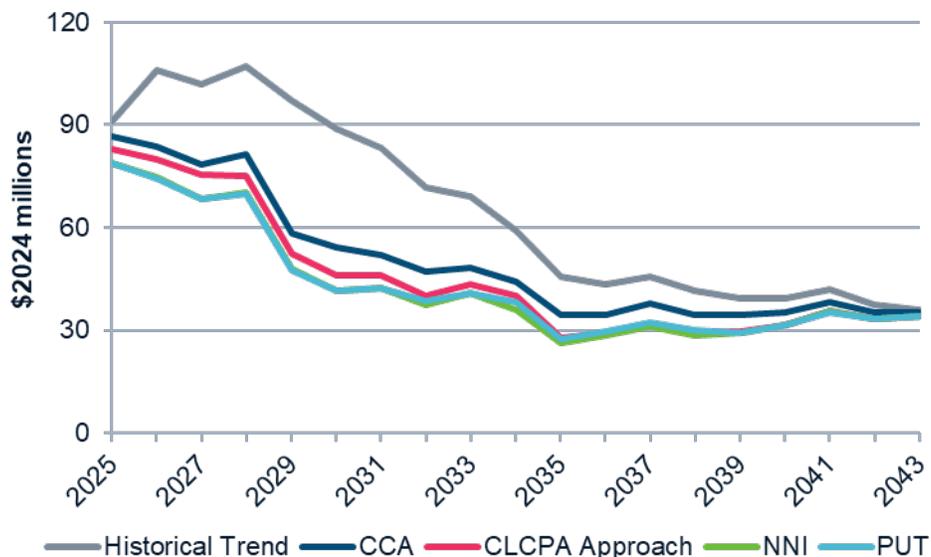
⁴ Source: The Order, p. 11-12.

⁵ *Ibid.*

⁶ Source: FLT Plan, Figure 59.

⁷ Source: Company response to PA 16-165.

Figure 1-1: Projected Gas Capital Investments by Scenario 2025-43 (\$ million)⁸



PA recognizes that additional policy and regulatory changes might help the Company avoid deploying additional investments in the gas network, however, while helpful, such policy and regulatory changes may not be strictly necessary. In absence of such policy and regulatory changes, the Company can proactively design programs and initiatives to identify and target potential stranded assets and reduce investments in assets that may be underutilized in the near future. For example, the Company indicated that over 13,400 customers are within 100 feet of the current gas network footprint. Under current regulatory guidelines in New York, the Company is obligated to serve these customers if they request gas service.

Additional policy tools, such as eliminating the 100-foot rule or providing extra incentives for electrifying customers in targeted areas, are just two examples of potential solutions to help overcome this barrier. We recommend that the Company and Stakeholders work closely and collaboratively to identify such strategic opportunities, develop the most effective solutions, and bring them to the Commission’s attention. As stated previously, additional transparency about the nature and need for future investments may be appropriate so that all parties can better understand the drivers of CapEx over time.

The Company’s volumetric and demand forecasts have improved but only partially reflect PA’s expectations.

Based upon Central Hudson’s Reply Comments, and our ongoing discussions throughout this engagement, PA anticipated revisions to all load and peak forecasts, reflective of macroeconomic forecasts from Moody’s Analytics, but also to reflect the impacts on both customer counts and (UPC) due to electrification of space-heating and fuel-conversions. Secondly, given the Company’s methodology of developing scenario forecasts, we expected that adjustments to the Historical Trend would propagate through to the scenario customer count and UPC forecasts.

In review of the FLT Plan, PA observes that although volumetric forecasts did change across all scenarios, customer counts only changed in the Historical Trend. We would have expected to see lower customer counts across all scenarios. Whereas PA observes the declining trajectories of the Historical Trend UPC forecasts do seem to capture the impact of eroding HDD over time, to some extent, (the Residential UPC declines ~6% through 2050), we expect that if the impact of electrification and energy efficiency were also incorporated, the average use per customer would be lower. Although the changes to the volumetric forecast may seem insignificant on their own, they will have an impact on bill impact, GHG emission, and BCA calculations.

While both the Residential and Non-residential UPCs in all scenarios now have negative trends, the scenario forecasts in the former are all higher than what we assessed within the RLT Plan V2, an unexpected finding. We suggest the Company review this and make further adjustments as we expect that Residential patterns

⁸ Source: FLT Plan, Figure 59.

ought to resemble those for the Non-Residential. Alternatively, we found the non-Residential UPC forecasts are indeed lower than the RLT Plan V2.⁹

Company should continue its collaborative and transparent efforts in developing long-term plans.

PA acknowledges that implementing the CLCPA's decarbonization objectives is a complex task that requires an unprecedented level of effort and cooperation among all Stakeholders. Utilities, and in this case the Company, play a pivotal role in leveraging its position, subject matter expertise, customer relationships and customer data, and market standing to achieve this monumental goal. We recommend the Company continue taking a more active role in shaping this future and informing Stakeholders on what is possible, and barriers that are holding the Company back from making significant strides on this objective. This would involve further transparency and collaboration to proactively identify solutions to overcome barriers, given the Company's visibility into customer data and ability to identify opportunities that may not be apparent to other Stakeholders. Lastly, the Company possesses the technical expertise and insight into the potential value of various assets, as well as the risk of stranded assets for certain investments, and should raise awareness of these risks.

For example, electrification is a promising decarbonization solution for the building sector but there are uncertainties, and at times disagreements among Stakeholders on the true cost of electrifying homes and businesses along with the ideal sequence of actions that need to be taken. Some argue that significant investments will be necessary to firm up the electric grid in support of the new electric load that will be added upon electrifying gas use cases in buildings and, if accounted for, electrification may become cost prohibitive. From this perspective, delaying electrification would result in significant investments in the gas network, which are likely to be underutilized in the coming decades.

Investments made in the gas network that are deemed prudent will have to be paid back to utilities regardless of whether they are being used in the coming decades; these investments will put significant upward pressure on gas rates and on gas bills as customer volumes decline over time. Therefore, avoidance of investments in the gas network without risking safety, reliability, and resiliency would lessen these consequences. As discussed earlier, identifying the most optimal decarbonization scenario with least cost while maximizing social welfare is a complex task that varies by company and region.

There is a need to implement a multi-variable optimization model to identify the most optimal scenario.

Given the trade-offs between the objectives of reducing GHG emissions and maintaining affordability, there are theoretically an infinite number of scenarios that could be developed by adjusting various assumptions, such as policy drivers, technological trends, cost projections, and more. To identify the scenario with the highest societal value, the Company should conduct an optimization process to identify and develop a long-term plan scenario with the highest emissions reduction potential and lowest impact on affordability while maintaining system reliability and safety and other requirements set by the Commission. PA first introduced this concept in our assessment of Consolidated Edison and Orange and Rockland GSLTP and then on September 20, 2024, the Commission agreed with PA's recommendation for the utility to select a preferred scenario that aligns its gas system planning with state climate goals.¹⁰ The Commission emphasized that selecting a scenario is an integral part of utility long-term gas planning and will ensure that gas utilities continue to progress decarbonization, while maintaining safe and reliable service for customers across the state. In the Order, the Commission states:

"To ensure the Companies explicitly select a preferred pathway in their next long-term plan filing in 2027, we direct the Companies to make that designation in their next filing. We also agree with PA that the Companies should use a multivariable optimization process to identify the preferred pathway because that process examines the highest emissions reductions potential and lowest impact on affordability. We thus also direct the Companies to follow the multivariable optimization process detailed in PA's Final Report in selecting a preferred pathway in their next long-term plan filing."¹¹

From our understanding, it is unclear and unlikely the Company has conducted such optimization processes in the selection of NNI. Therefore, we recommend the Company employ an optimization process in the future.

⁹ We compared the latest forecast provided through PA-167 with the previous RLT version in PA-146.

¹⁰ State of New York Public Service Commission, Case No. 23-G-0147

¹¹ State of New York Public Service Commission, Case No. 23-G-0147, p. 30.

Additional guidelines will need to be introduced to accelerate deployment of NPAs.

As discussed in more detail in this report, NPAs can be an effective solution for avoiding certain investments in the gas distribution system, mitigating gas delivery rate increases for customers and leading to reduced GHG emissions over time. However, the Company has not, thus far, been able to scale NPAs sufficiently to avoid or minimize significant investments in traditional gas assets. The lack of meaningful NPA implementation in the Company's service territory to date may indicate that (even with the relative newness of NPA methodologies) existing processes can be improved upon to begin successful deployment of NPAs at scale. Identifying specific changes to the NPA processes is beyond the scope of this review, but PA has documented some high-level observations for the Commission and Stakeholders to consider.

In the FLT Plan, Central Hudson presents two locations, the Kingston Saugerties and the Titusville-Pleasant Valley local gas systems, as potential NPA opportunities. The Company describes its detailed analyses conducted at these two locations and defines the strategy of demand side management and electrification to avoid growth-related infrastructure investments.¹² However, more work is needed by the Company, Stakeholders, regulators, and policy makers to introduce additional guidelines that support the timely deployment of NPAs. Examples include providing sufficient lead time to identify, issue requests for proposals (RFPs), and implement NPAs. While not all potential investments need to undergo a rigorous process, a minimum cost threshold should be considered for traditional CapEx which would trigger a robust NPA study, which aligns with Central Hudson's proposal.¹³

Developing a holistic view on the role of natural gas network in a decarbonized future.

Now that the Company has identified NNI as the most promising decarbonization scenario, PA encourages the Company to take an additional step: develop a holistic geographical view to determine which customers and use cases are most or least likely to remain on the gas network over time, and which areas could electrify between now and 2050. Such an approach will result in developing a directional view on geographical footprint of the gas system over time. It would identify segments of the gas network that could be reduced in size or eliminated altogether, and which sections of the service territory are likely going to remain and therefore investments made to them will be "no regret" and do not run the risk of becoming stranded. In addition, the Company is well positioned to develop this long-term coordinated view of gas and electric decarbonization as its gas and electric service territories have significant overlap. This effort should be iterative, as this endpoint view is likely going to evolve over time with advancements in technology, declining costs, and emerging customer preferences. However, there is still significant value in developing such a view to inform no-regret investment decisions, including identification of:

1. Customers or use cases that are most difficult to electrify in their service territory and are likely going to rely on pipeline gas and likely a targeted use of LCFs to decarbonize their operation,
2. Customers and use cases for who electrification is the most promising decarbonization solution and their geographical distribution,

Overlaying such an additional geographical view of customer needs on top of the condition of the gas network and electric network (which the company has already begun) would assist the Company in its multi-decade prioritization of gas system investment decisions.

1.3 Summary of Observations and Recommendations

A robust long-term plan recognizes the importance of balancing many topics. First and foremost, the Company must ensure that appropriate investments in the gas system are made to maintain safe, reliable, and adequate service to customers who continue to rely on gas to meet their energy needs. Second, customer behaviors have an impact on the pace of electrification, and resultingly further insights on customer willingness to switch fuels is critical. Finally, strategically reducing the need for both supply and distribution assets over time as gas demand shrinks, and further reducing costs for all customers, is a desired outcome of a long-term plan. Given that a gas LDC business is capital-intensive, and that gas distribution assets have long useful lives, it is important to proactively and strategically plan for what is to be a significant energy transition decades in advance.

¹² Source: FLT Plan, p. 47.

¹³ Source: Central Hudson Gas and Electric Proposals for Non-Pipe Alternative Screening and Suitability Criteria. Case 20-G-0131.

In this section, we highlight the following key observations and recommendations necessary to understand the FLT Plan, further discussed in greater detail throughout this Final Report.

Highly Loaded Distribution Systems

A key area of focus of the Initial Plan, RLT Plan V2, and FLT Plan is certain segments of the Central Hudson distribution system that have been identified by the Company as “highly loaded”, meaning it is either approaching or even exceeding its capacity to reliably serve customers on a design day. The highly loaded segments were identified using a Monte Carlo analysis to determine which parts of the system may experience drops in pressure that exceed the Company’s design day criteria. All segments of the distribution system are ranked from highest loaded to least loaded. Central Hudson then conducted hydraulic modeling as a more detailed assessment to identify constraints on those segments. In PA’s opinion, a Monte Carlo analysis based on distribution system pressure data is unable to convey enough information to effectively determine where reliability risks may exist. PA believes the hydraulic modeling process is the key step in determining whether these potential risks exist and lays the foundation for anticipating and addressing future design day reliability issues. Importantly, PA would expect there to be a strong correlation between the results of the Monte Carlo analyses and the results of hydraulic modeling scenarios. As is more fully explained in this report, however, it does not appear that the two modeling approaches are producing similar outcomes in all cases. We continue to recommend that Central Hudson work to ensure that the two modeling processes complement one another, to the extent the Company believes both are useful.

Supply Stack

As peak day demand begins to decrease, a methodology to consider how to reduce the volume of contracts that are no longer needed to match changing customer usage is necessary. The Company indicated that it does not anticipate opportunities for de-contracting over the next five years, given its supply portfolio was sufficient to meet expected demand under the CCA. However, the Company did not indicate how its supply portfolio is sufficient to meet demand under the other three scenarios, or how much excess capacity the Company may have under additional alternative scenarios. PA believes a plan for de-contracting would help provide Stakeholders a longer-term view of the Company’s plans to source gas supply and evaluate the affordability of service. To this end, we recommend the Company indicate how its de-contracting strategy may shift and the degree to which its supply portfolio may exceed design day demand under different scenarios.

Capital Expenditures (CapEx)

The Company provided 20-year CapEx forecasts for each planning scenario in the RLT Plan V2. PA requested detailed information supporting the forecast for each planning scenario; Central Hudson has provided those details for only the CCA scenario to date. Central Hudson also provided some information regarding the expected change in capital costs for each of the scenarios as reflected in Figure 47 of the RLT Plan V2, however that information was in a different format. In the FLT Plan, PA observed some changes to the CapEx forecasts presented for each scenario, however we are not able to comment on those drivers as no detailed CapEx forecast information was provided by the Company.¹⁴

We have investigated the relationship between planned distribution system reinforcement investments and current and potential future operating conditions (based on hydraulic models of the highly loaded systems), as discussed in Section 4. Notably, approximately 7.2% of the CapEx forecast for 2025-29 makes up projected reinforcements of the overall gas distribution system; these are projects required to maintain design day operating standards and ensure reliability. However, it appears that only one of those reinforcements in the forecast are associated with the identified highly loaded systems.¹⁵ PA recommends that the Company better synchronize the results of its various models and ensure that its CapEx forecast is consistent with those results to the extent they are viewed as reliable modeling tools and explain why projected reinforcements of the distribution system are expected to focus on areas that have not been identified as highly loaded.

¹⁴ Source: Company response to PA 16-165.

¹⁵ The Company provided an updated response to PA 8-121 on January 9, 2025. In that updated response, the Company presented a modified list of Distribution Improvements projects, purportedly in highly loaded systems. That list now includes 22 projects, however only 3 are identified as reinforcements of the highly loaded systems identified in the FLT Plan at page 35. The addition of two newly identified reinforcement projects in highly loaded systems, with total projected investments of approximately \$6.4 million, would change the percentage of reinforcement Capex in the overall CapEx forecast for 2025-29 from 7.2% to 8.6 %. We note that this calculation does not reflect any other recent updates that may have been made to the Company’s CapEx forecast.

PA has also identified specific types of CapEx investment that the Company may have the opportunity to avoid. When taken together, more than 28% of the overall capital forecast for 2025-29 consists of investments in service line replacements many of which are associated with the replacement of leak-prone pipe (LPP), smaller new business projects, customer conversions, and elimination of service lines that are directly connected to transmission mains (also known as farm taps). Avoidance of these investments depends (in most, if not all cases) on a single customer decision regarding their continued use of natural gas, rather than in other circumstances such as when considering whether a NPA is feasible to allow abandonment (rather than replacement) of LPP mains. We recommend that the Company prioritize these opportunities that can incrementally reduce CapEx requirements as well as GHG emissions, especially as it moves forward with the NNI scenario.

Demand Dynamics

PA's analysis of Central Hudson's historical billing data reveals two critical residential customer dynamics: one is evolving customer counts, and the other is structural changes to gas usage patterns. PA's review of Moody's Analytics macroeconomic forecasts a slowdown in population growth and continued downturn in household growth. Resultingly, PA observes three main dynamics shaping the Company's forecasted annual sales and peak demand are: 1) declining organic growth in customer counts driven by evolving service territory demographics, 2) sustained additions to customer count due to customers switching to natural gas as the primary heating fuel away from fuel oil, wood, etc., and 3) downward pressure from electrification and energy efficiency (EE) due to a combination of gas customers leaving the system and falling UPC. This trend is propelled by a combination of technological change, state and federal policy and local laws. Furthermore, the influence of warmer winters – attributable to climate change – is projected to lower sales growth but not necessarily the peak demand.

Based upon Central Hudson's Reply Comments, PA anticipated revisions to the forecasts contained in the ILTP, reflective of its process change to include macroeconomic forecasts from Moody's Analytics, but also to reflect the impacts on both customer counts and UPC due to electrification of space-heating and fuel-conversions in the FLT Plan. Secondly, given the Company's methodology of developing scenario forecasts, we expected that adjustments to the Historical Trend would propagate and appear as revisions to the scenario customer count and UPC forecasts. Although volumetric forecasts did change across all scenarios, PA observes customer counts only changed in the Historical Trend and we would have expected to see the customer counts to be lower across all scenarios. Whereas the declining trajectories of the Historical Trend UPC forecasts do seem to capture the impact of eroding HDD over time (the Residential UPC declines ~6% through 2050), we think that if the impact of electrification were also further incorporated, the average usage would be considerably lower.

Bill Impacts

As opposed to the ILT Plan and RLT Plan V2, in the FLT Plan, the Company includes clarity in its bill impact methodology regarding the bill impacts for customers who do and do not electrify.¹⁶ In the FLT Plan, the Company includes projected usage and bill impacts, for both gas and electric, for residential customers who do and do not electrify under each scenario throughout the forecast period. PA commends the Company for including this additional analysis as it paints a clear picture of the impact of electrification on residential customer bills throughout the forecast period. In the FLT Plan, the Company opines that despite the decrease in energy use, associated with building electrification, energy efficiency, and the adoption of heat pumps, customer bills will remain largely the same. Central Hudson expects natural gas rates will increase with electrification, resulting in gas bills nearly doubling over the 20-year forecast period.¹⁷ However, the Company projects the increase in gas rates will be more than offset by reductions in gas consumption for a typical household, resulting in lower bills for customers. In addition, the Company has included a Share of Wallet analysis for the residential class under each of the four scenarios.

GHG Emissions

To reduce GHG emissions associated with the gas system, the Company presents four decarbonization scenarios that offer increasing opportunity for GHG emission reduction through the incorporation of demand-

¹⁶ PA's analysis is limited to customers' gas costs and does not include any increase or decrease in electric costs.

¹⁷ Source: FLT Plan, p. 100.

side management measures (e.g., EE, weatherization, NPAs) and the blending of low-carbon fuels (i.e., RNG and hydrogen) into the gas supply. The Company has evaluated the inclusion of RNG, clean hydrogen, and differentiated gas (which the Company refers to as Responsibly Source Gas or RSG) for blending into its supply mix. The use of LCFs such as hydrogen, RNG, and differentiated gas is an assumption applied in some combination throughout all the scenarios. PA is encouraged that the Company has refocused its FLT Plan to the NNI scenario with lower blends by volume of LCFs. The Company has limited its reliance on RNG and hydrogen for emissions reduction in the NNI scenario. Although PA believes RNG has potential use in future gas planning, PA agrees with the Company's decision to focus LCFs deployment as a targeted decarbonization measure for hard-to-electrify customers after other decarbonization measures are deployed for use cases that are easier and do not require costly LCFs fuel blending.

In the FLT Plan, Central Hudson accepted Stakeholder feedback to update the CO₂e emissions factor.

1.3.1 Summary of Scenarios

Our observations are further discussed within this section but first we summarize each of the four scenarios, CCA, CLCPA Approach, NNI and Pipe Use Transformation, as presented by the Company in its FLT Plan. In the FLT Plan, the Company identifies NNI as its "Gas System Long-Term Plan (GSLTP) Pathway" it plans to pursue.

1. **Current Clean Agenda (CCA)** reflects present day (2024) legal and policy framework at current funding levels and does not achieve state net zero GHG goals.
2. **CLCPA Approach (CLCPA)** builds on the CCA to include policies and programs needed to support achievement of the economy-wide GHG reductions envisioned in the CLCPA.¹⁸ To accomplish this, this scenario assumes a system-wide transition approach, as opposed to targeted regions, via a two-fold increase to heat pump conversion incentives and a cap of new connections starting in 2030. This scenario also assumes blends of hydrogen and renewable gas in the supply mix.
3. **No New Infrastructure (NNI)** reflects assumptions Central Hudson makes regarding future policies that will prevent growth-related investments while investments to ensure safe and reliable gas distribution service continue for the benefit of customers that remain on the gas system. The NNI scenario is supported by a focus on highly loaded areas and deployment of NPAs to limit capital investments. The NNI Scenario involves targeted (and five-fold higher) incentives, EE and building electrification (BE) program incentives focused on highly loaded targeted areas to promote these outcomes. The Company selected NNI as its preferred GSLTP Pathway.
4. **Pipe Use Transformation (PUT)** builds on the NNI Scenario, in terms of continued efforts in highly loaded areas and features the increased use of LCFs, such as differentiated gas, RNG, and green hydrogen.

Table 1-2 provides a high-level summary of the key assumptions of each scenario, including EE and heat pump (HP) incentives, LCF blending, and assumed restrictions on new connections.

¹⁸ The CLCPA does not seek to achieve a specific level of emissions reductions for the gas utility sector.

Table 1-2: Central Hudson FLT Plan Assumptions¹⁹

Scenario	Key Assumptions
CCA	<ul style="list-style-type: none"> • Reflects present day (2024) legal and policy framework at current funding levels. • Expects higher level of investment in clean heat, weatherization, not yet enacted policies such as code requirements for HPs in new buildings. • Continuation of Clean Heat & EE programs with increased emphasis on weatherization. • Only scenario with budget cap at current Commission approved levels. • RNG & hydrogen integrated into the supply to the extent they are cost-effective.
CLCPA	<ul style="list-style-type: none"> • Assumes doubling HP incentives. • Expects technological advancements in HPs. • System-wide transition approach, rather than one targeting specific regions. • Caps new connections starting in 2030. • Finds sufficient capacity to accommodate winter peaking over 5-10 years; requires large electric transmission and distribution (T&D) investment to support incremental load.
NNI (GSLTP Pathway)	<ul style="list-style-type: none"> • Assertive effort to identify highly loaded areas and use NPAs where possible. • Up to a five-times increase in HP incentives and weatherization (in highly loaded areas). • Caps new connections starting 2026.²⁰ • Assumes incremental electrification-oriented incentives. • Small amounts of RNG and hydrogen blending.
PUT	<ul style="list-style-type: none"> • Same high load growth infrastructure avoidance as NNI. • Use of existing pipeline infrastructure to decarbonize industrial facilities. • Increased use of RNG (20% by 2043) from variety of RNG feedstocks. • Green hydrogen blending.

Table 1-3 compares the key outcomes of the assumptions applied under each scenario.

¹⁹ Source: FLT Plan, p. 6-8.

²⁰ In our review of PA-167, PA was unable to confirm this assumption is reflected within the customer count, volumetric and demand forecasts reflect a cap in 2026; Furthermore, we note customer counts did not change in the NNI between the RLT Plan V2 and the FLT Plan, unexpectedly.

Table 1-3 Scenario Key Outcomes as of 2043²¹

	CCA	CLCPA	NNI	PUT
Gas Supply Mix (2043)	5% RNG	5% RNG, 5% hydrogen	5% RNG, 5% hydrogen	20% RNG, 20% hydrogen
2043 Net Sales % change from 2024 ²²	-1.5 MMcf, 11.1% decrease	-4.8 MMcf, 36.0% decrease	-5.2 MMcf, 39.2% decrease	-6.1 MMcf, 45.7% decrease
2043 CO ₂ Metric Tons per Customer (% of 1990)	67.4%	37.7%	34%	19.7%
Benefit Cost Ratio (Under SCT)	1.24	0.74	0.72	0.69
Bill Impact (% change in Gas Bill by 2043)	-7.3%	-15.5%	-19.4%	-19.3%

The FLT Plan describes key outcomes of the scenarios, including gas supply mix, changes in net sales, avoided CO₂ emissions, and results of the Company's BCA analysis. PA summarizes our observations in more detail within the following subsections and at great length, within Sections 4 through 8. In Section V Part C of the FLT Plan, the Company explains its selection of the NNI scenario reflects the Company's commitment to ensure safe and reliable service and adequately support achievement of CLCPA targets via enhanced incentives in targeted areas to achieve cost benefits beyond what can be achieved under current programs. Given the present economics at this time, Central Hudson now considers targeted deployment of LCFs in future planning cycles based on Stakeholder feedback and what is learned in the coming months and experience gained in other states and regions. Central Hudson further cites the key benefits of NNI:

1. Limiting Capital Investment in Gas Infrastructure supported by efforts to identify highly loaded areas and develop NPAs where possible.
2. Increased incentives for heat pumps and weatherization in highly loaded local gas systems, with a cap on new connections starting in 2026 for new construction.²³
3. Energy Efficiency and Building Electrification program design and implementation will emphasize decarbonization through electrification, focusing on areas where load levels present challenges.
4. Practical Integration of LCFs: Small amounts of RNG and hydrogen blending will be added as appropriate based on prevailing economic and market conditions.

Selecting a preferred scenario, rather than presenting potential options, will better inform the Company's near-term and mid-term investment decisions. PA commends the Company for selecting the NNI Scenario, as was envisioned in the Order. The rationale behind selection of NNI appears reasonable and, selection of a preferred plan is in line with PA's understanding of the Order and will provide the Company and Stakeholders a course to decarbonization that leads to CLCPA compliance and maintains reliable and affordable service for customers.

However, the Order required that utilities include a "No Infrastructure Option," even if a scenario may not be feasible for a particular project or portion of its long-term plan. This "No Infrastructure" option does not mean the Company is prevented from making certain investments that support safe, reliable, and adequate service,

²¹ Source: FLT Plan, p. 90-91.

²² Source: Company response to PA 2-37, Attachment 1. PA presents Net Sales as compared to 2024 in order to provide Stakeholders with an understanding forecasted volumes the end of the forecast period, as compared to today.

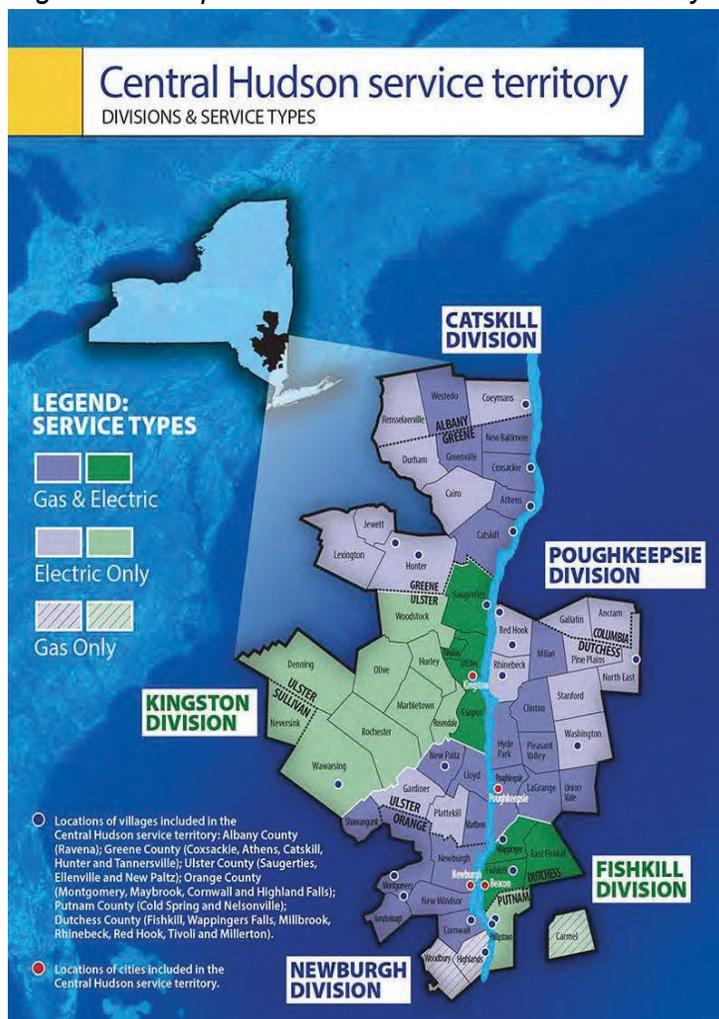
²³ In our review of PA-167, PA was unable to confirm this assumption is reflected within the customer count, volumetric and demand forecasts reflect a cap in 2026; Furthermore, we note customer counts did not change in the NNI between the RLT Plan V2 and the FLT Plan, unexpectedly.

including those driven by State and Federal requirements and obligation to serve, and the option would provide a lower end boundary on the Company’s level of total infrastructure investment with NPAs. Therefore, PA recommends Central Hudson provides a more specific “no infrastructure” scenario to reasonably comply with the Order, within its next full GSLTP filing.

1.3.2 Customer Base

As was previously discussed within our Preliminary Findings Report, a vast majority of the Company’s customers are residential customers who use gas for heating. Furthermore, the Company provides both gas and electric service; 25% of the Company’s electric customers receive gas service and over 90% of customers with gas service also receive electric service, as illustrated in Figure 1-2.

Figure 1-2: Map of Central Hudson’s Service Territory²⁴



However, a small number of non-residential customers contribute a larger proportion of gas sales than residential customers. Over 40% of the Company’s gas consumption is by non-heating customers. Fewer than 40 of the Company’s approximately 87,000 customers account for over 40% of total annual gas consumption. Most of these customers are large non-firm interruptible customers and six are large transportation-only customers, some of which use natural gas to power electric generation facilities expected to cease use of natural gas by 2040.²⁵ In the RLT Plan V2 (and the subsequent FLT Plan) the Company

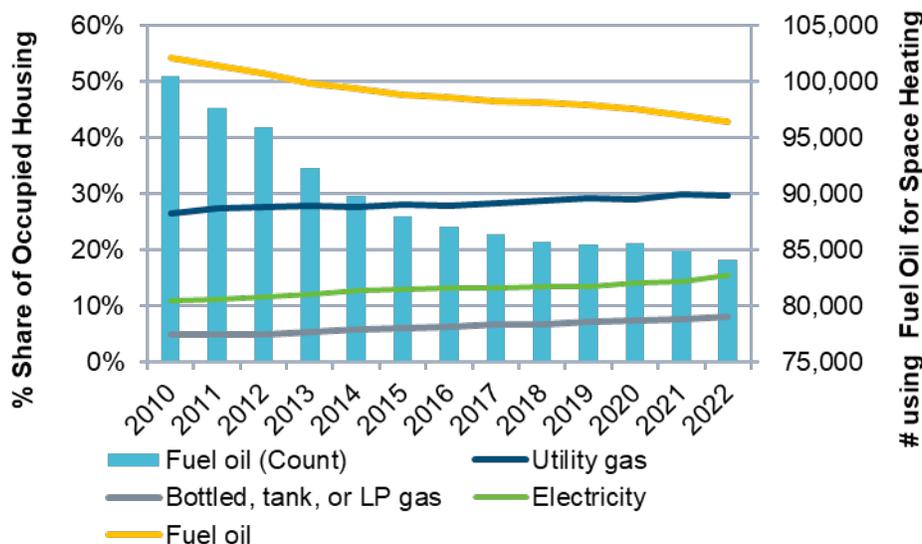
²⁴ Source: FLT Plan, Figure 9.

²⁵ The Company’s electric generation transportation customers are required to decarbonize, given CLCPA requirements for statewide net zero electricity. In general, the Company does not discuss or address interruptible and transportation customers that tend to be quite distinct from the vast majority of non-residential customers in terms of both size and the nature of their demand, within its GSLTP. We suggest that the Company provide pertinent details about these large customers in its first annual update.

combines commercial and industrial customers into a non-residential category resulting in the Company’s analysis and impacts now being provided on a residential and non-residential basis. We find this new segmentation to be challenging for a number of reasons further discussed within the Report, and recommend the Company provide more granularity and analysis of commercial, industrial and other interruptible and transportation customers, in its first annual update and full GSLTPs. In the RLT Plan V2, within the CLCPA, NNI, and PUT scenarios, the Company assumes a fixed residential customer growth rate of 1% over the forecast period, representing a significant change in methodology between the RLT Plan V2 and the ILT Plan. In the ILT Plan, the Company held the residential customer count constant, assuming the overall gas revenue requirement was allocated across a fixed number of customers throughout the forecast period. In PA’s Preliminary Findings Report, we observed a 1% annual growth rate appears excessive when electrification initiatives, state and local policy objectives, demographic trends and the Company’s recent experience is considered. In the FLT Plan, PA anticipated revisions to all load and peak forecasts, reflective of the Company’s expected use of macroeconomic forecasts from Moody’s Analytics and, given the Company’s methodology of developing scenario forecasts, we expected that adjustments to the Historical Trend would propagate through to the scenario forecasts; however, this is not what was observed.

A review of the types of heating fuel sources within the Company’s service territory finds fuel oil (FO) as the predominant heating fuel currently, as illustrated by Figure 1-3, below. Although FO’s share in the territory has declined since 2010, almost 43% of all occupied housing units still used FO consisting of ultra-low sulfur diesel, which emits more CO₂ when combusted than natural gas for space heating, at the end of 2022. With over 97,000 homes still using FO, there are strong implications of the potential for fuel switching to gas (or electric) – a crucial consideration for the Company as it navigates towards decarbonization. For example, during the period of 2017-23, the Company has converted 3,304 customers from FO to natural gas.²⁶ However, given State decarbonization objectives, the past may not predict the future as some FO customers are likely going to consider either air-source or ground-source heat pumps in lieu of natural gas for space heating. PA observes customers converting from FO is a growing trend already apparent as shown by the increasing green line in Figure 1-3.

Figure 1-3: Central Hudson Residential Space Heating Fuels²⁷



²⁶ Source: Company response to PA 3-72.

²⁷ Source: <https://data.census.gov/table?q=DP04>. PA studied data for Dutchess, Ulster, and Orange counties in New York. The Company’s gas service territory covers practically the entire Dutchess County, roughly 75% of Ulster County that includes the major population and commercial centers and the northeast region of Orange County that accounts for approximately 20% of its population. It is salient to note that while Orange County has experienced substantial growth in recent years, those population gains are almost entirely outside the Company’s footprint. In fact, the population trends in the relevant Company Orange County towns/cities – Newburgh, Woodbury, New Windsor etc. – resemble those in the other two counties. For this analysis, we omitted Columbia and Greene counties as the Census does not provide data, and, therefore made assessments based on Dutchess and Ulster counties – which represent about 85% of its customer-base.

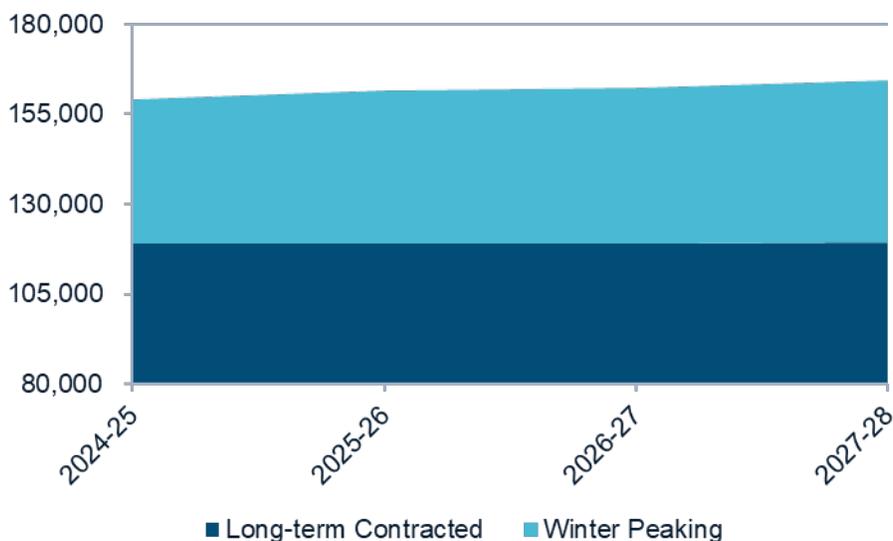
Other factors are expected to impact growth in natural gas customers and sales. Based upon a review of the region’s macroeconomic forecasts,²⁸ new construction is likely to slow down. Furthermore, legislation prohibiting fossil fueled equipment and building systems in many new buildings beginning December 31, 2025 will dampen the growth of gas heating customers. These trends present a unique challenge with respect to decarbonization goals and strategies, and the Company has reflected policy changes within the CCA Scenario. While macroeconomic and regulatory forces work to limit the growth of gas customers, limited growth in residential and commercial natural gas customers is expected as a portion of fuel oil customers switch to natural gas.²⁹

1.3.3 Supply

The Company’s transmission system receives gas at four interstate pipeline interconnections (or citygates) and delivers that supply throughout the distribution system footprint. In aggregate, the four citygates are currently capable of flowing more gas on a design day than is presently required by the Company’s customers – though the Company has noted some limitations at the Tuxedo and Cedar Hill citygates. As demand grows in the near term, even at the level of growth forecast by the Company, PA would not expect there to be a need for additional investments in those citygates to accommodate that growth.

In the FLT Plan, the Company explains that natural gas is procured to satisfy demand behind the citygates and that its supply stack has remained relatively static, (see Figure 1-4) with the caveat that this situation could change as the Company considers a de-contracting methodology when the current level of supply is no longer needed to meet reduced demand over time. PA agrees the Company should be considering de-contracting. Given the likelihood that peak demand will be decreasing as discussed in Section 6.2.3, PA recommends the Company outline its approach to de-contracting to better inform Stakeholders and the Commission how sources of gas supply will be prioritized for reduction as demand decreases. The need to consider de-contracting is especially relevant in the Company’s selection of the NNI scenario, which envisions more drastic load-shedding than in the CCA. We further discuss our observations on the Company’s Supply within Section 4.

Figure 1-4: Central Hudson Peak Day Supply Stack



1.3.4 CapEx

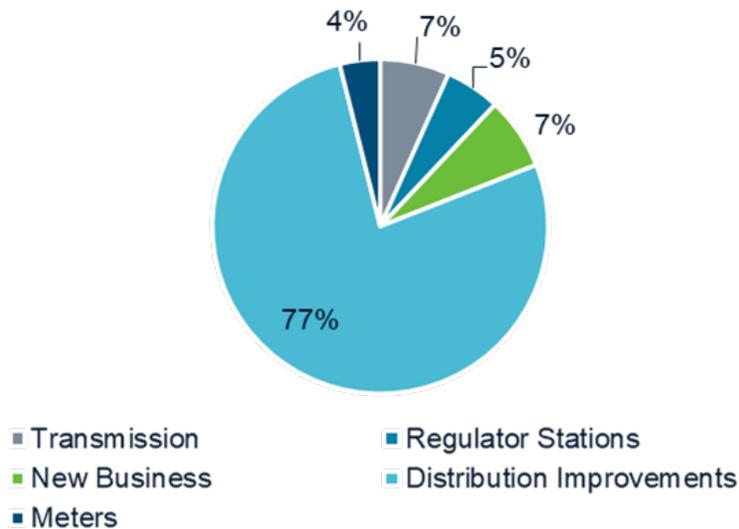
The ILT Plan discussed the Company’s CapEx plan for the five-year period 2024-29. During the pendency of our review, the Company provided an updated “five-year forecast” for 2025-29. In response to PA’s recommendation, in the RLT Plan V2 the Company has developed 20-year views of projected CapEx for each

This is based on Moody’s forecast that 2025 onwards both household and population growth rates are expected to turn negative.
²⁹ It is notable that the share of container gas (largely Propane) has been rising steadily over the past decade. Given that this data pertains to the primary heating fuel, we can surmise that customers formerly using fuel oil or wood that switch to, say, propane, do so because it is either more affordable or that the Company’s distribution system does not cover their locations.

of the four planning scenarios. Those 20-year forecasts are quantified in total in the FLT Plan. We have received detailed information about the 20-year forecast under the CCA scenario. No other CapEx detail has been provided to PA. We discuss several aspects of the CapEx forecast in Section 5.

PA observes that any program that addresses the ongoing safety, integrity and reliability of its delivery system is appropriate. Certain transmission pipeline replacements are contemplated in the Company’s five-year capital plan, driven by Federal pipeline safety requirements. Otherwise, the transmission system generally appears to be well positioned for continued reliability going forward. The Company’s overall near-term capital plan is heavily weighted towards replacement of the existing distribution system. Figure 1-5 illustrates the relative size of investment types included in the Company’s forecasted CapEx for the period 2025-29.³⁰

Figure 1-5: Central Hudson Five-Year CCA Scenario CapEx Forecast (2025-29)



Highly Loaded Distribution Systems

A key area of focus, on which Central Hudson’s ability to continue reliable service throughout the energy transition depends, is the extent to which the Company’s distribution system is capable of delivering gas to customers on a design day. The Company identified (via a Monte Carlo analysis) in the FLT Plan certain segments of its distribution system that are considered “highly loaded”, which implies the systems are approaching or exceeding its capacity to reliably serve customers on a design day.³¹ PA requested and has evaluated a variety of hydraulic modeling scenarios of these segments and investigated the relationship between planned distribution system reinforcement investments and the current and potential future operating conditions (again, based on these hydraulic models). PA would expect there to be a strong correlation between the results of the Monte Carlo analyses and the results of hydraulic modeling scenarios. As is more fully explained in this report, however, it does not appear that the two modeling approaches are producing similar outcomes. We recommend that Central Hudson work to ensure that the two modeling processes complement one another, to the extent the Company believes both are useful in evaluating which segments are approaching or exceeding its capacity to reliably serve customers on a design day.³² PA requested and has evaluated a variety of hydraulic modeling scenarios of these 13 segments and investigated the relationship between planned distribution system reinforcement investments and the current and potential future operating conditions (again, based on these hydraulic models). We recommend that Central Hudson work to ensure that the two modeling processes complement one another, to the extent the Company believes both are useful.

We assessed the relationship between planned distribution system reinforcement investments and the current and potential future operating conditions (based on these hydraulic models), and it appears that only three of

³⁰ Source: Company’s response to PA 8-118.

³¹ The Company refers to these segments as “highly loaded systems” in the FLT Plan. While PA understands that these are distinct systems within the overall distribution system, we refer to these as highly loaded “segments.”

³² *Ibid.*

the reinforcement projects in the forecast are associated with the identified highly loaded systems. Table 1-4 summarizes Distribution Improvement investments in highly loaded systems as planned for 2025-29.³³

Table 1-4: Distribution Improvements CapEx in Highly Loaded Segments (\$000)³⁴

	2025	2026	2027	2028	2029
LPP	\$10,512	\$10,970	\$0	\$6,663	\$0
Reinforcement ³⁵	\$0	\$3,563	\$3,097	\$3,157	\$3,228
Other	\$3,707	\$3,401	\$3,6800	\$2,5210	\$2,255
Total	\$14,219	\$17,933	\$6,777	\$12,341	\$5,483

PA has identified specific types of CapEx investment that the Company may have the opportunity to avoid. These include:

- Service line replacements (many of which are associated with the replacement of LPP mains),
- Smaller new business projects,
- Customer conversions, and
- Elimination of service lines that are directly connected to transmission mains.

Avoidance of these types of investments depends, in most cases, on a single customer decision to electrify, rather than in other circumstances such as when considering whether an NPA is feasible to allow abandonment (rather than replacement) of LPP mains. PA does not believe the Company can reduce this level of future investment in its entirety through successful NPA implementation under current policies. However, to illustrate the potential power of NPAs, even with only a 10% reduction in each of these investment types annually in 2025-28, the total CapEx forecast in those four years would be reduced by more than 3%, equating to several million dollars of avoided investment. PA further discusses potential opportunities for reducing capital investments going forward in Section 5.

1.3.5 Demand

PA’s analysis of Central Hudson’s historical billing data reveals two critical residential customer dynamics: one is evolving customer counts, and the other is structural changes to gas usage patterns. Our review of Moody’s Analytics macroeconomic forecasts reveals a forecasted slowdown in population growth and continued downturn in household growth. Three main dynamics will shape the Company’s forecasted annual sales and peak demand: 1) additions to customer counts due to customers switching from fuel oil, wood, etc. to natural gas as the primary heating fuel, 2) declining organic growth in customer counts driven by evolving service territory demographics and, 3) downward pressure from a combination of gas customers installing heat pumps and leaving (or reducing reliance on) the gas system and the impact of demand side management measures. Furthermore, the influence of warmer winters – attributable to climate change – is projected to, all else equal, lower gas volumes over the forecast period but not necessarily reduce the peak demand.

In its ILT Plan, the Company had concluded the impact of converting natural gas heating and water heating customers to electric. Status-quo incentive funding and other electrification impacts were not enough to drive

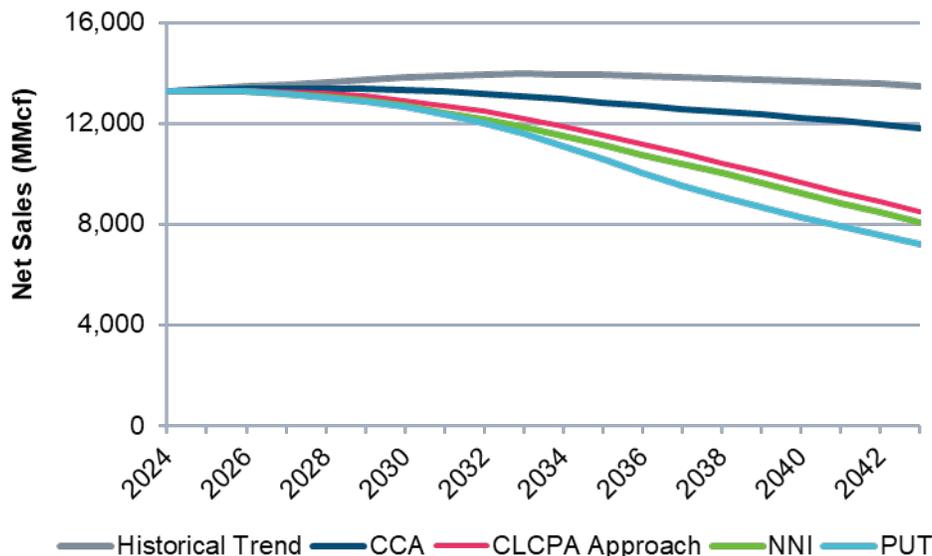
³³ Source: Company’s response to PA 8-121. Interestingly, hydraulic models of the Highland Mills (HM) system suggest that system reinforcements are contemplated; referring to Table 4-1, the modeled hourly gas flow in 2026 exceeds the flow in 2024, however the lowest pressure in that model is much higher (62% of MAOP in 2026-27 vs 37% in 2023-24). These results imply that a reinforcement has been assumed and built into the hydraulic model at some point in the intervening years.

³⁴ Source: Company’s updated response to PA 8-121 received on January 9, 2025. Historical CapEx values are nominal and forecasted values reflect inflation, unless otherwise specified.

³⁵ The three reinforcement projects appear to also be associated with relocations work for highway relocation projects.

a decline in demand in the CCA, CLCPA and NNI scenarios. PA finds substantial changes within the FLT Plan which now shows declines in net sales from 2024 through 2043 in all scenarios, illustrated by Figure 1-6 below.

Figure 1-6: Central Hudson Forecasted Net Sales (2024-43)³⁶



In our review of the Company’s Reply Comments, PA expected that the Company would not only reassess Historical Trend in the context of projected impact due to inclusion of macroeconomic forecasts from Moody’s Analytics, but also to reflect the impacts on both customer counts and UPC due to electrification of space-heating and fuel-conversions. Given PA’s understanding of the Company’s methodology of developing scenario forecasts, we expected adjustments to the Historical Trend would propagate through to the scenario customer count and UPC forecasts. Additionally, in the FLT Plan, the Company notes the NNI includes a cap on new construction beginning 2026 (vs prior assumption of 2030), PA was unable to confirm whether this 2026 cap is reflected within the customer count, volumetric and demand forecasts.

As discussed in greater detail within Section 6, taken together, PA’s observations pertaining to the customer forecast (including the implications of heat pump adoption, new buildings, and other electrification policies) and observations regarding UPC indicate that net sales could still be overstated despite recent adjustments. Similar trends may exist for the peak forecast.

1.3.6 Bill Impacts

The Company accepted PA and Stakeholders' suggestion to include the bill impacts for residential customers who chose to electrify throughout the forecast period and those who do not. In the FLT Plan, the Company projects a natural gas bill decrease of 7-20% for the residential customer class, while gas rates are forecasted to increase by 5-60% for the residential class throughout the forecast period, dependent on scenario.³⁷ PA observes this is likely due to the assumption that declines in gas consumption will surpass the rise in gas rates, ultimately leading to lower gas bills. However, if the overall increase in delivery costs being shared by a smaller number of customers remaining with full gas heating service is considered (which we believe is missing from the Company’s calculations), remaining natural gas customer bills would increase further.

In the FLT Plan, and as further elaborated by Company subject matter experts (SMEs), the methodology for calculating the bill impacts begins with the forecasted total revenue requirement divided by total forecasted gas volumes for each customer class. This methodology has been updated in the FLT Plan to include the dissimilar results for customers who electrify and those who do not electrify all or portions of their gas end-uses. Based on a review of Figure 63 of the FLT Plan, PA accepts that the Company accounted for reductions in typical customer annual gas usage for the bill impact assessment.³⁸ PA agrees that volumes per customer

³⁶ Source: Company response to PA 16-167, Attachment 1.

³⁷ Source: FLT Plan, Figure 68, and Figure 69.

³⁸ Source: FLT Plan, p. 82.

will decline over the forecast period and believes the revised analysis will better inform Stakeholders of the Company's bill impact methodology. PA observes the results suggest that, under certain circumstances, the cost impact of all alternatives is close. PA believes the bill impact calculations may remain conservative, especially for customers who remain on the gas network throughout the forecast period. The primary driver of this is that the total volume of gas delivered will likely be lower than projected in the FLT Plan, especially for residential and small commercial customers. This outcome is driven by electrification of gas appliances over the forecast period, EE, the observed warming trend, and the resulting reduction in delivered gas volumes.

Given the trade-offs between the objectives of reducing GHG emissions and maintaining affordability, there are theoretically an infinite number of scenarios that could be developed by adjusting various assumptions, such as policy drivers, technological trends, cost projections, and more. PA believes an optimization process will assist in identifying and developing a long-term plan with the highest emissions reduction potential and lowest impact on affordability, while maintaining system reliability and safety. From our understanding, it is unclear and unlikely the Company conducted such optimizations in the selection of NNI and, therefore PA recommends the Company employ an optimization in the future.

1.3.7 Environmental

To reduce GHG emissions associated with the gas system, the Company presents four decarbonization scenarios that offer increasing opportunity for GHG emission reduction through the incorporation of demand-side management measures (i.e., EE, weatherization, NPAs), electrification, and the blending of low-carbon fuels (i.e. RNG and hydrogen) into the gas supply. In the FLT Plan, the Company has identified the NNI scenario as its preferred scenario. The NNI scenario represents the gas system under policies aimed to prevent growth-related infrastructure investment and focuses on decarbonization using NPAs, an increase in incentives for heat pumps and weatherization, energy efficiency, building electrification, and capping new connections in 2026. Reductions in GHG emissions associated with building electrification and heat pumps result from the reduced energy demand of these technologies and the increasingly clean electric grid.

Although relied upon less in the NNI scenario, the Company still expects to blend small amounts of RNG and hydrogen into the gas supply. As the Company describes in the NNI scenario, LCFs, including RNG and hydrogen, will be most impactful through targeted application for hard-to-electrify customers. The proposed statewide framework to report on GHG emissions pending before the Commission will have important implications for the GHG accounting associated with the use of LCFs in the decarbonization scenarios presented in the FLT Plan.³⁹ If the Commission decides LCFs cannot count towards utility decarbonization goals, the Company will have to reconsider its options for decarbonization through the use of LCFs, although minor in the NNI scenario. We further discuss our initial observations on the Company's plans for LCFs in Section 8.3.

1.4 Summary of Recommendations to Improve Future GSLTPs

In this section we summarize our Final Report Recommendations that are designed to improve the Company's future full GSLTP filing. We note the Company has addressed some of the recommendations made by PA and Stakeholders throughout this process. However, PA finds the Companies have yet to adequately address several recommendations made by PA and Stakeholders. To the extent these recommendations have been addressed in the FLT Plan, they have not been repeated in this report. Below PA provides the following recommendations for the Company to consider in developing future GSLTPs. PA urges the Commission to require the Company to make the necessary modifications to address these recommendations in its next annual update and/or next full GSLTP filing,

1. Explain and provide an annual quantification to show how the Company's supply stack meets demand under all four scenarios and the degree to which there is oversupply in the other scenarios.

³⁹ Case 22-M-0149, In the Matter of Assessing Implementation of and Compliance with the Requirements and Targets of the Climate Leadership and Community Protection Act, Order on Implementation of the Climate Leadership and Community Protection Act (issued May 12, 2022), pp. 12-16.

2. Discuss how the Company's approach to de-contracting may change under differing scenarios or if realization of an alternative scenario may require the Company to accelerate its de-contracting planning.
3. Discuss the Company's decision making in its reliance on gas from different delivery points through the lens of satisfying demand and providing least-cost service to customers. Comment explicitly on which delivery points tend to be most expensive and how the Company chooses to procure gas to reduce ultimate costs to customers.
4. While the Company may technically be able to flow enough gas to satisfy demand on a design day, the Company should comment on potential market limitations in purchasing additional spot gas, should that become necessary, and the Company's confidence that it can purchase additional gas during design day conditions, especially at certain city gates.
5. Review the apparent modeling inconsistencies noted in this section related to highly loaded system segments and either correct any errors or explain in detail any misunderstandings in PA's observations.
6. Central Hudson to further explain, in its first annual update, how the Monte Carlo and hydraulic modeling processes work in tandem, how they promote overall gas planning efficiency, and clarify in detail how its CapEx forecast is consistent with the results of the two modeling exercises.
7. Ensure that the need for reinforcements of the distribution system is clearly communicated. Synchronize the results of various models and ensure that the CapEx forecast is consistent with those results to the extent they are viewed as reliable modeling tools. Address potential inconsistencies and explain, as necessary, why the majority of projected reinforcements of the distribution system are expected to focus on areas not identified as "highly loaded".⁴⁰
8. Develop and provide detailed CapEx forecasts for the Company's preferred scenario, No New Infrastructure.
9. Provide further analysis on the costs and benefits of customer fuel switching for each fuel option for each scenario supported by the most current data available.
10. Consider the impact of annual oil-to-gas conversion-led customer acquisitions more consistent with (a) the Company's own reporting of around 350/year in recent years.
11. The Company should review FLT Plan Residential UPCs and Customer Counts as compared to RLT Plan V2, with consideration of PA's expectations, and make further adjustments as appropriate in its first annual update and future GSLTPs.
12. Develop a view on the economics of electric appliances such as heat pumps and how it will change over time as gas rates increase when the Company pursues blending LCFs and other costly measures. The Company should share the assumption and results of this analysis with Stakeholders and consider this analysis in its long-term gas planning and bill impact calculations.
13. Further refine and explore the fuel switching assumptions for each use case (e.g., space heating, water heating, cooking, etc.). Develop a view on what share of customers who electrify their gas appliances do or do not disconnect from the gas system, and if so why.
14. Provide the assumptions used in this modeling effort on cost of home heating for a typical household using various fuels including propane, fuel oil, electric resistance as well as heat pumps as requested by PA and Stakeholders.
15. Provide Stakeholders visibility into projected costs of each scenario from a residential, non-residential, and average customer view.
16. Further investigate the technical, environmental, and economic implications of hydrogen production, transport, and distribution across Company's service territory.

⁴⁰ In its Reply Comments, on p. 11, the Company states that the capital plan described in the RLT Plan V2 includes focused reinforcements on highly loaded systems. Information provided to PA does not appear to be consistent with that statement.

17. Research and update the costs associated with RNG procurement and blending sourced from within and nearby geographies to their service territory and reflect this updated cost of RNG on customer bills throughout the forecast period.

Our analysis and development of this Final Report resulted in observations and conclusions summarized above in this Executive Summary that are discussed in greater detail within the following sections.

2 Introduction

New York State has established several of the most ambitious decarbonization goals in the United States, through a combination of both legislative and regulatory reforms that will impact the evolution of natural gas supply, planning, infrastructure, and operations. In January 2024, New York Governor Kathy Hochul unveiled the proposed Affordable Gas Transition Act, which, among many other things, would give regulators increased authority to execute certain aspects of the transition from natural gas if approved. For instance, the proposal includes adjustments and limitations to the foundational law governing natural gas utility obligation to serve, authority to limit distribution system expansions beginning in 2026, changes to line extension policies, and the authority to decommission portions of the system. This Act did not pass in the 2024 Legislative session but the continued evolution of these goals and policies will have significant implications for the Company and all other New York natural gas utilities and natural gas local distribution company (LDC) growth, in general. Additionally, some actions could have direct and profound impacts on the investment in and evolution of natural gas infrastructure and supply requirements across the State.

PA was retained to conduct an independent assessment of the Company's Long-Term Plan. This review is being conducted for the Department pursuant to requirements of the Commission in its Planning Proceeding Order. The Planning Proceeding Order specified that the independent review address specific criteria related to long-term gas plans, including but not limited to:

- Test the assumptions and check calculations and analyses used by the Company,
- Evaluate the economic and environmental tradeoffs associated with different scenarios,
- Assess a reasonable number of scenarios representing hydraulic models of the Company's distribution system or segments thereof,
- Participate in Stakeholder meetings and make requests of the Company and Stakeholders, and
- Suggest other solutions.

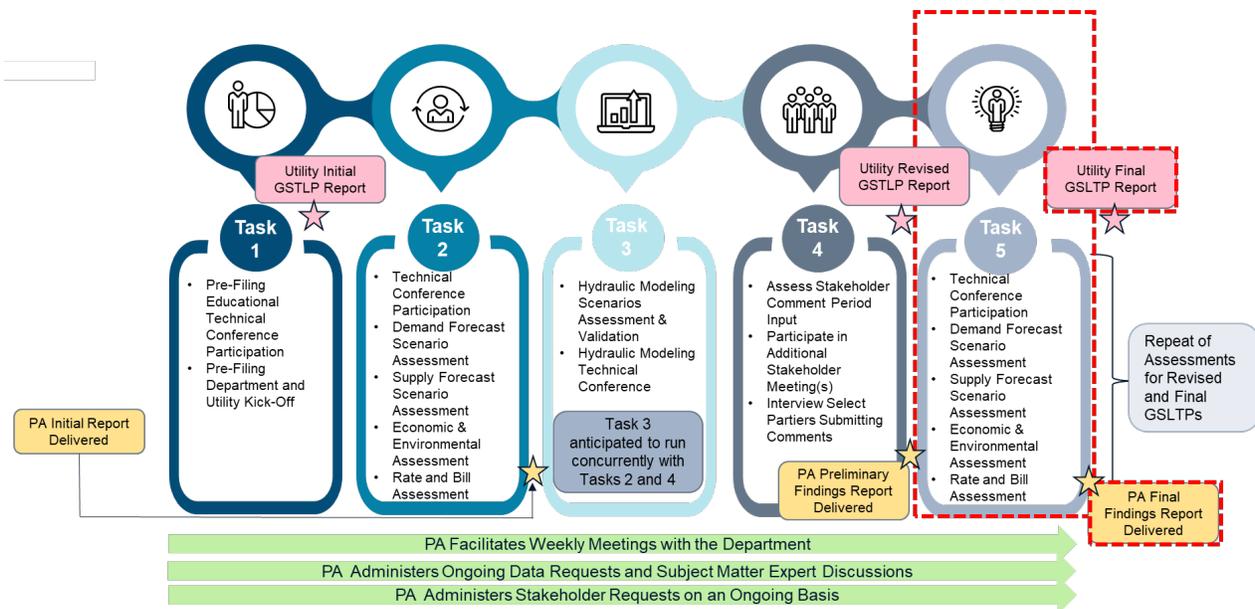
This Final Report summarizes our observations pertaining to the Company's FLT Plan, outlines suggested improvements for the Company to consider in development of future GSLTPs, and provides additional details on our continuing assessment.

2.1 Scope of Work

PA's review of the ILT Plan, RLT Plan V2, and FLT Plan was conducted over approximately 11 months. During this time frame, PA submitted and received responses from the Company to over 170 data requests, held several virtual meetings with various subject matter experts (SME) from the Company, attended the virtual pre-filing and post filing technical presentations and an on-site meeting with Central Hudson and Staff. Company personnel have provided significant amounts of requested data and have made their experts available for meetings and cooperation with PA.

PA has reviewed all comments filed to date by Stakeholders and the Company. Further, several Technical Conferences were held leading up to the development of this Final Report, which are summarized within Section 3 and discussed in greater detail throughout this Final Report. PA has included additional observations that were applicable after the Bill Impacts and Affordability Technical Conference and additional recommendations within this Final Report. Figure 2-1 below illustrates the scope of work completed to date.

Figure 2-1: PA Scope of Work and Schedule



We have organized our Final Report to first address and provide observations for the supply and demand considerations which form the basis of evaluating future investments, followed by the other aspects of the FLT Plan which cumulatively provide the basis for PA’s overall recommendations and reflect our comprehensive review of the FLT Plan. Below is a list of the key topics we cover:

- Stakeholder Engagement, including:
 - Summary of Stakeholder Comments
 - Company Comments
 - Technical Conferences
- Supply Assessment, including:
 - Supply Stack
 - Hydraulic Modeling
- Capex Assessment, including:
 - General Observations
 - Transmission CapEx
 - New Business CapEx
 - Distribution Improvements CapEx
- Demand Assessment, including:
 - Customer Base Growth
 - Load Forecast
- Economic Assessment, including:
 - Bill Impact
 - Disadvantaged Communities
 - Cost-Benefit Analysis
- Environmental Assessment, including:
 - GHG Emissions
 - DSM Programs
 - Low-Carbon Fuels

3 Stakeholder Engagement

The Order encourages natural gas utilities to engage in a process that is understandable to Stakeholders and enables meaningful Stakeholder participation. PA understands our role is not only to evaluate the plans but also to assess and help facilitate a robust Stakeholder engagement process. Within this section of our Final Report, we discuss comments from the Stakeholders engaging in the proceeding, technical conferences held to date and comments received to date. PA includes summaries of the pre-filing technical conference, facilitated by the Company, and subsequent technical conferences, facilitated by Staff, , as well as comments filed by Stakeholders and the Company.

The Stakeholders engaging in this proceeding include New York State Energy Research & Development (NYSERDA), Communities for Local Power (CLP), Multiple Intervenors (MI), Alliance for a Green Economy-New York (AGREE-NY) and Sierra Club. In filed reply comments, Central Hudson asserts it has actively engaged with Stakeholders to evaluate a range of issues addressed throughout the ILT Plan, including participation in Stakeholder meetings on technical and model approaches, SME conversations with PA and Staff, and responses to data requests. Additionally, the Company comments it has closely reviewed feedback and recommendations shared during technical conferences and written comments, most of which have been addressed in the RLT Plan V2.

Several Stakeholders filed comments on the Company's ILT Plan on April 29, 2024, and the Company filed revised comments in response to PA's Initial Report and Stakeholder Comments on June 11, 2024. On August 23, 2024, CLP filed comments on the Company's RLT Plan V2 and PA's Preliminary Findings Report. On October 23, Central Hudson filed additional reply comments. In the following sections, we summarize Stakeholder filed comments, Central Hudson's filed comments and technical conferences.

3.1 Summary of Stakeholder Comments

On April 29, 2024, a number of Stakeholders filed Initial Comments on the Company's ILT Plan. Within this section of the report, Stakeholder comments are summarized at a high-level. Stakeholder comments are then discussed in greater detail within the respective assessment sections of this report. In these sections of the report PA outlines our observations, analyses, and recommendations in each of these areas, including how Stakeholder comments have been considered in our analysis.

Stakeholders filing comments on the ILT Plan include MI, AGREE-NY, and CLP. Many of the Stakeholder comments focused on similar themes as summarized in Table 3-1. The most common themes included comments related to a preferred scenario and low carbon fuels (LCFs). All the above-mentioned Stakeholders (except for AGREE-NY) emphasized the need for Central Hudson to pick one of the four scenarios in its ILT Plan. Communities for Local Power stated, "The purpose of the long-term gas planning proceeding is to chart a course for CLCPA compliance while maintaining reliable energy services at reasonable prices. These goals cannot be achieved while attempting to follow several divergent paths at once." Most of the Stakeholders were also skeptical of the LCFs recommended by Central Hudson and indicated the need for additional analyses into each of the LCFs.

Table 3-1: Summary of Initial Stakeholder Comments⁴¹

Stakeholder	GSLTP Costs, Benefits, and Bill Impacts	Forecasting Demand	Gas Supply	Electrification and Non-Pipeline Alternatives	GSLTP Scenarios
Multiple Intervenor	X	X		X	X
AGREE-NY			X	X	
Communities for Local Power	X		X	X	X

On October 25, 2024, AGREE-NY filed its Revised Comments on the Company’s RLT Plan V2, which focused on topics similar to its Initial Comments. In the Revised Comments AGREE-NY reaffirms selection of a preferred plan. AGREE-NY also stated the Company’s scenarios rely too heavily on LCFs, questions the practicality of RNG and suggests planned reliance on hydrogen is overestimated. It should be noted that in its FLT Plan, Central Hudson selected the NNI Scenario as its preferred pathway,⁴² however, the FLT Plan was published after AGREE-NY filed its Revised Comments.

3.2 Company Comments

3.2.1 Response to Initial Report and Stakeholder Comments

Central Hudson filed its response to PA’s Initial Report and Stakeholder Comments on June 11, 2024, in which the Company also identifies and responds to comments made by CLP, AGREE-NY, and MI. PA finds the responses generally receptive to the feedback the Company had received on the ILT Plan. The Company’s comments are organized in five parts and summarized below within Table 3-2 and described in greater detail following the table.

Table 3-2: Central Hudson's Initial Reply Comments

Categories	Subtopic
GSLTP Costs, Benefits, and Bill Impacts	Capital Investment Forecast
	GSLTP Costs and Benefit Analysis
	Bill Impacts
	Assessment of Costs
Forecasting Demand	N/A
Gas Supply	Low-Carbon Fuels
	Bill Impacts of Blending LCF
	Health and Safety Impacts of LCF
	Responsibly Sourced Gas
	Gas System
	Current Gas Supply

⁴¹ Categorized to align with Central Hudson’s Reply Comments.

⁴² Source: FLT Plan, p. 6.

Categories	Subtopic
Electrification and Non-Pipeline Alternatives	N/A
GSLTP Scenarios	N/A

In general, PA finds Central Hudson appreciative of the feedback Stakeholders, Staff, and PA have shared in this proceeding, including in written feedback and in technical sessions. Central Hudson acknowledged the detailed and concrete recommendations and feedback, provided by PA and Stakeholders. The reply comments also addressed and described plans to incorporate certain recommendations within the Central Hudson GSLTP or future GSLTP cycles. Additionally, to the extent that Central Hudson disagreed with a recommendation or is unable to address a recommendation in the near-term, the Company's reasoning is explained. PA further describes the reply comments within the following sub-sections and within the subsequent sections of this Report.

GSLTP Costs, Benefits and Bill Impacts

Capital Investment Forecast

The Company agreed with PA's recommendation that 20-year capital forecasts for each planning scenario presented in the ILT Plan will aid in the assessment of those scenarios, and indicated it expected to include such forecasts in its revised plan. The Company further commented that as planning scenarios continue to be optimized over time, capital spending projections may need to be adjusted and, therefore, it will likely provide additional updates to its capital expenditure forecasts in its FLT Plan.

GSLTP Costs and BCA

The Company agreed that decarbonization efforts will entail significant costs. Central Hudson directed MI and other readers to the BCA calculation discussions in Section V and in Appendix B of the ILT Plan for more information on cost and benefit assumptions of the ILT Plan. MI asserted that the Company should submit a BCA for the utility cost test (UCT), and Ratepayer Impact Measure (RIM) test, in addition to the already provided BCAs under the societal cost test (SCT). MI further commented BCAs presented in the ILT Plan are not cost effective and should not be considered for implementation. The Company disagreed with MI's assertion and commented that its BCA results are reflective of a middle position. Central Hudson indicated a willingness to run additional calculations but noted that different assumptions supportive of higher BCA results would diminish the level of GHG emission reductions.

Bill Impacts

The Company endorsed PA's recommendation to conduct a comprehensive (gas and electric) share of wallet analysis to understand the bill impact of each scenario on customer affordability. This analysis shows how the potential shifting of costs for a gas to electric bill would look for each customer class under each scenario. Central Hudson indicated that its revised plan would include both gas and electricity bill impacts.

The Company disagreed with PA's conclusion that, in the ILT Plan, it had used a constant average volume of gas consumed by a representative customer over the forecast period. Rather, the Company had assumed a drop in net sales in the PUT scenario. During a SME conversation with the Company, PA alerted the Company to our observation about holding the annual average usage flat. The Company then clarified that this was a reporting mistake and the table shared in the ILT did not accurately reflect the Company's bill impact results nor methodology. The Company revised the table and shared an updated version with PA.

The Company also emphasized that the analysis presented in the ILT Plan did not reflect abandonment of the gas system by customers adopting heat pumps, due to lack of sufficient data to make clear projections and that the focus was on gas "rates" without any assumptions about whether or not customers who install heat pumps abandon the gas system. Central Hudson indicated that going forward its analysis would include assumptions about whether such customers exit the gas system.

Assessment of Costs

The Company stated that Figure 49 of the ILT Plan contains net present value (NPV) calculations and details as to the cost and benefit components, and that this figure describes the derivation of BCA results, in response to the MI assertion that “Central Hudson should be directed to set forth, in detail, the projected costs of its [GS]LTP to customers, preferably on both a total and an NPV [i.e., net present value] basis (with an explanation as to how the NPV amount was calculated).”⁴³

Forecasting Demand

Central Hudson agreed with PA’s recommendation to quantify the impact of factors like electrification, EE, climate change, etc. over time and across all scenarios, beginning with the Historical Trend forecast, indicating it would provide further detail across the planning scenarios in its revised plan.

Gas Supply

Low-Carbon Fuels

In response to recommendations from PA related to the potential use (and/or blending) of RNG and hydrogen, the Company indicated it is open to further analysis of hydrogen and RNG through additional studies and agrees that it would be valuable to conduct a study to investigate the technical and economic implications of hydrogen and RNG production, transport, and distribution across the Company’s service territory. It referenced the hydrogen study proposed in its current rate case and indicated that study could be expanded to include additional topics and suggestions from the Stakeholder process. While some Stakeholders expressed concerns about relying on low-carbon fuels and perhaps limiting its use, the Company stated that at this point in the long-term planning process, it is necessary and appropriate to look at every possibility, such as the ability to leverage the emission reductions that these alternative fuels could provide, so all options must remain on the table, and the Company does not support precluding hydrogen or RNG from the GSLTP at this time.

Bill Impacts of Blending LCFs

PA recommended that the Company conduct a study to show how fuel blending with RNG and hydrogen would impact a representative customer bill within Disadvantaged Communities or a low-income customer over time and the potential impact on energy assistance programs. AGREE asserted that the Company has not yet been able to purchase RNG at its target cost, and that RNG price increases are likely give the intensely competitive market for RNG. The Company commented that it expects that RNG facilities will be located in close proximity to pipeline systems with RNG supply contracted to specific gas utilities, potentially mitigating the likelihood and impact of price hikes.

While the Company agreed with PA and AGREE-NY that issues related to blending of RNG and hydrogen reflect important considerations that should be analyzed in future GSLTP cycles, it indicated that at this time there is not enough information available to calculate the proposed metrics.

Health and Safety Impacts of LCFs

AGREE stated that system-wide hydrogen blending of 20% is speculative, referring to uncertainty around the maximum level of hydrogen blending that would allow utilities to deliver hydrogen safely and reliably. CLP asserted that studies have found that, when burned, pure hydrogen produces as much as six times the nitrogen oxides as burning methane, leading to health risks for anyone who remains on the gas system. The Company reiterated the importance of its proposed hydrogen study and that it is not appropriate to remove hydrogen and other LCFs from consideration at this point in the gas planning process.

Differentiated Gas

The Company responded to CLP’s recommendation that the Commission look to unbiased resources and research that accurately portrays what differentiated gas is (as opposed to accepting the claims of utilities generally as to what it is) by pointing to Staff’s support of differentiated gas purchases up to \$200,000.⁴⁴ The Company also noted that while differentiated gas was not included in the emissions calculations presented in

⁴³ Source: MI Comments, p. 4.

⁴⁴ PA understands that \$200,000 is the annual limit.

the ILT Plan, it would incorporate out-of-state emissions from imported fossil fuels as the CLCPA's GHG accounting methodology integrates those emissions into its process.

Gas System

The Company agreed to provide greater clarity in its revised plan as to the operational flexibility of its pipeline delivery system, as recommended by PA. Central Hudson highlighted the interconnected nature of its system behind the four citygates serving its service territory. The Company also agreed with PA's conclusion that the four citygates are currently capable of flowing more gas on a design day than is required by the Company's customers at this time, but clarified that while true in the aggregate, individually there is an existing constraint in the aggregate of between 30,000-35,000 Dth/day at the Tuxedo and Cedar Hill gates. The Company further indicated it would include in its revised plan a discussion of the risk associated with the reduction or loss of a citygate.

Current Gas Supply

PA recommended that Central Hudson discuss its level of confidence in being able to continue contracting the necessary Winter Peaking and Delivered Services volumes to meet winter demand, as well as the cost of those supply resources. The Company agreed to include its assessment in its revised plan, noting that any delivered services contract could, potentially, be difficult to renew.

PA also requested more information on how the Company may approach de-contracting of supply and how that may change under differing planning scenarios, including whether any one scenario might require the Company to accelerate the de-contracting process. While Central Hudson agreed that this is an important consideration in long-term planning, it opined that it is too early for this type of analysis given near-term demand projections.

Electrification, Demand Response and Non-Pipes Alternatives

PA recommended that the Company further explore customer fuel switching assumptions and explain what share of customers who retrofit their gas appliances are projected to disconnect from the gas system, and why. The Company agreed to the value of that exercise and, while noting that there is limited empirical data to rely upon, indicated it would provide as much information for these assumptions as possible in its revised plan and track the data going forward for inclusion in the next GSLTP cycle.

The Company indicated that there is limited experience implementing NPAs that would lead to decommissioning of portions of the gas network. It agreed to provide additional information as suggested by PA (e.g., the number of rebates or subsidies required to close the financial gap to incentivize electrification) as it becomes available. Central Hudson also reiterated its preference to focus on reducing demand growth in specific areas to prevent the need to invest capital in system reinforcements, rather than focus on full abandonment.

PA recommended that the Company consolidate the list of barriers that exist for deploying solutions, such as heat pumps across disadvantaged communities. The Company provided a list of those barriers, identified thus far (and invited additional Stakeholder input), which included:

- Relatively high up-front costs.
- The relatively high proportion of customers residing in disadvantaged communities who live in rental housing (the customer is not the key decision maker on the investment).
- In some circumstances, switching to a heat pump may result in a net increase to the customer's bill for all utilities.
- Uncertainties around the cost of electricity for heating.
- Circumstances in which customers in multi-family housing may pay for a central heating system as part of their rent while paying for their own, separately metered electricity; an overall housing and energy cost increase would result if the rent were not adjusted downward.
- The cost of electrical panel and wiring upgrades in older buildings.
- The potential cost to modify existing, or install new, ductwork in a home or other structure.
- The cost of weatherization required to maximize the efficiency of a heat pump.

- Customer preferences to retain fossil fuel heating even when there are substantial incentives to switch technologies.
- The need for additional workforce development in Disadvantaged Communities to facilitate heat pump installations.

MI recommended that the Company be directed to evaluate one or more gas demand response programs if deemed effective. The Company indicated its willingness to explore the issue and suggested that MI identify customers who would be willing to participate in program design.

CLP suggested a more aggressive approach to NPAs, and/or a program for LPP repair, could further reduce LPP replacement costs. The Company noted its current, proactive approach to NPAs that includes potential avoidance of load growth projects. Central Hudson also noted its targeted LPP replacement program completion date of 2029.

As suggested by Stakeholders, in the RLT Plan V2 Central Hudson included additional discussion on barriers to address electrification in disadvantaged communities such as high up-front costs including electrical panel and wiring updates and ductwork, large population of customers in rental housing, prices of other heating fuels, need for proper building weatherization to maintain temperatures efficiently, heat pump installation workforce development needs and overall customer preferences.

GSLTP Scenarios

The Company disagreed with the CLP assertion that the ILT Plan is unacceptable because it does not include a preferred scenario. CLP suggested the purpose of the long-term planning proceeding is to chart a course for CLCPA compliance while maintaining reliable energy services at reasonable prices and this objective cannot be achieved while attempting to follow divergent paths at once. The Company commented that the Gas Planning Order directs consideration of a range of scenarios, and it would've been counterproductive to establish a chosen scenario without informed consideration and appropriate input from Stakeholders. The Company indicates an eagerness to engage with Stakeholders interested in participation in the scenario development process, including an invitation to CLP to suggest modeling recommendations to PA Consulting.

PA encourages identification of the scenario that is preferred to guide the Company's plans. PA appreciates the challenges of a single point forecast when many variables are at play and finds a discussion on the range of possibilities is reasonable and useful. However, it is unclear which scenario is going to inform the Company's long-term planning and investment decisions that need to be made in the near-term since there are clear tradeoffs between each scenario, and it is inefficient and impossible to pursue all scenarios at the same time.

PA believes achieving desired outcomes for all Stakeholders – including the Company, customers, and the communities in which they live – requires all parties to acknowledge several key considerations, including:

- Implementing any decarbonization scenario will take time and requires cooperative efforts of customers and their representatives, the Company, and State and local legislators and regulators.
- The realities of customer needs, gas system needs, and regulatory requirements (including maintaining system safety, reliability, and affordable rates) in the short or intermediate term cannot be set aside even if they appear to be at odds with longer term objectives.
- Significant value is realized through planning for a “coordinated decarbonization” across New York to ensure safe, reliable, and affordable provision of energy services to customers. In contrast, an unplanned and uncoordinated decarbonization approach can result in stranded assets, suboptimal reliability of the gas and electric system and possibly lead to high gas and electric bills that are unaffordable to portions of the population, including disadvantaged communities.
- Identifying “no regrets” actions to be taken under any given scenario, coupled with ranges of potential outcomes, can offset the impact of many uncertainties as key assumptions including technology, policy, and customer preferences change over time.

3.2.2 Additional Reply Comments

Central Hudson filed its response to PA’s Preliminary Findings Report and Stakeholder Comments on October 23, 2024, in which the Company also identifies and responds to comments made by AGREE-NY. PA finds the responses generally receptive to the feedback the Company had received on the RLT Plan V2. The Company’s comments are organized in six parts and summarized below within Table 3-3 and described in greater detail following the table.

Table 3-3: Central Hudson's Additional Reply Comments

Categories	Subtopic
Supply Planning	Portfolio Design Low-Carbon Fuels (Generally) RNG Hydrogen
Capital Planning Assessment	Modeling: Consistency of Inputs, Results System Reinforcement Investment Miscellaneous
Gas Supply	Driver: Population Growth Rate Driver: Change in Customer Count Driver: Change in Usage Per Customer Driver: Design Day
Economic Analysis	GSLTP Benefit and Cost Analysis Bill Impacts
Environmental Considerations	N/A
Electrification and NPAs	N/A

Similar to the Initial Comments, PA finds Central Hudson appreciative of the feedback Stakeholders, Staff, and PA have shared in this proceeding, including in written feedback and in technical sessions. The reply comments addressed and described plans to incorporate certain recommendations within the Central Hudson FLT Plan or future GSLTP cycles. Additionally, to the extent that Central Hudson disagreed with a recommendation or is unable to address a recommendation in the near-term, the Company’s reasoning is explained. PA further describes the reply comments within the following sub-sections and within the subsequent sections of this Report.

Supply Planning

Portfolio Design

The Company agreed with PA’s recommendation to quantify how the supply stack meets demand under each scenario and notes that the supply portfolio is dynamic, and the Company is open to additional ways to meet reliability requirements in a cost-effective way. To address this recommendation the Company agreed to develop a Load Duration Curve associated with the supply stack. Central Hudson also agrees with quantifying winter peaking expenses. However, Central Hudson finds PA’s recommendation of how Central Hudson’s approach to de-contracting may change under different scenarios would be examined in future GSLTP cycles as it is too early for this type of analysis. The Company also anticipates reducing its reliance on delivered peaking services as a step in de-contracting. Central Hudson agrees with PA’s recommendation regarding decision-making around its reliance on gas from different delivery points and notes that this will be addressed

in the FLT Plan. The Company pushes back on PA's recommendation about market limitations in purchasing additional spot gas noting that analyses performed about purchasing additional gas during design day conditions are speculative. However, the Company notes that it hopes to procure enough supply ahead of the winter season in anticipation of forecasted peak demand.

Low-Carbon Fuels

Central Hudson notes that it is conducting a hydrogen study to evaluate economics and RNG planning will reflect current market conditions, in response to PA's recommendation about developing a view on hydrogen and RNG feasibility. The Company notes that it would need approval from the Commission to develop an RNG facility specifically for hard-to-electrify customers but is open to further studies on these LCFs. PA recommended Central Hudson prioritize investments in electrification such as NPAs, DSM, and EE and Central Hudson indicated, as it did in its Initial Comments, that it is prioritizing these measures. Central Hudson would like to consider all alternative fuels and electrification options without prioritizing a certain option.

RNG

Regarding RNG specifically, the Company expressed similar sentiments in its Initial Comments. The Company agrees with PA's recommendation to update costs associated with procuring RNG, however it notes that the purchase cost of RNG already includes developer capital costs and including these separately, as PA suggests, would be double counting. The Company indicates it will further evaluate RNG cost in future GSLTP cycles. Sierra Club mentioned obtaining and retiring RNG attributes to claim environmental benefits and Central Hudson indicates that its approach uses pricing information from NYSERDA.

Hydrogen

Central Hudson agrees with PA and Stakeholder recommendations around hydrogen and will use these recommendations when developing a pilot study.

Capital Planning

Modeling: Consistency of Inputs, Results

The Company agrees with PA's recommendation that models should be consistent, but it notes the different purposes of models. Central Hudson indicates that hydraulic modeling is labor intensive and is not usually utilized to produce long-term forecasts due to uncertainty, so the Company combines it with statistical modeling. The reply comments detail this process.

System Reinforcement Investment

The Company comments that its RLT Plan V2 focuses on reinforcements on highly loaded systems, in contrast to PA's recommendation that Central Hudson address whether projected reinforcements focus only on areas not identified as highly loaded.

Miscellaneous

CLP commented on the prioritization of capital investments and the Company appreciates this comment but emphasizes maintaining a reliable and safe gas system.

Demand Forecasting

Driver: Population, Household, and Account Growth

Central Hudson agrees with PA's recommendation to modify its population growth rate and will use Moody's forecast to update the number of households. The Company notes that reducing this growth rate will impact many modeling outputs. Central Hudson also notes it will re-align its oil-to-gas conversion rate, consistent with PA's recommendation. NYSERDA also had comments on oil-to-gas and propane-to-gas conversions, but the Company indicates that it doesn't have enough historical data to quantify the impact of these conversions on household growth.

Driver: Changes in Usage per Customer

PA included various recommendations on fuel switching, and the Company notes that it provided additional details on this in the RLT Plan V2 in response to feedback on the ILT Plan. This additional detail also includes the percentage of customers who keep their gas service when installing heat pumps. Central Hudson agrees with PA's recommendation to update the UPC forecast, and this is reflected in the FLT Plan. The Company

also notes that the drop in UPC is due to efficiency and climate change and will avoid double counting these. Sierra Club wondered if the Company calculated the change in gas consumption for customers that have decided to retain their gas service after installing heat pumps and Central Hudson included this in its RLT Plan V2. NYSERDA mentioned a conflict in the Company's gas distribution study in Appendix A and Central Hudson amended this in the FLT Plan.

Driver: Design Day

NYSERDA would like the Company to develop a framework to update its definition of design day conditions to reflect extreme weather patterns and long-term events like global warming. The Company is open to participating in a study about this but emphasizes its commitment to providing reliable and safe service.

Economic Analysis

Central Hudson agrees with developing a view of the economics of electric appliances like heat pumps and agrees this should be implemented into its BCA analysis, but notes that this will take time and the Company hopes to include this in future GSLTP planning cycles. The Company will work with PA to determine if further updates are needed regarding rebates and subsidies.

GSLTP Costs & Benefit Analysis

NYSERDA mentions that the BCA should include more recent data and current policies, and Central Hudson comments that current trends are not much different than those decades ago and the "current policy" is reflected in the CCA scenario. The Company notes it included an optimal BCA baseline in the FLT Plan. NYSERDA also thinks the Company should include health benefits and GHG accounting results in its BCA calculations. The Company welcomes engagement with NYSERDA on the health benefits aspect and will update its GHG accounting when the state or Commission identifies a unified method for the industry.

Bill Impacts

The Company agreed with PA's recommendation to include an updated bill impact calculation to capture the impacts of customers who retain gas service vs those that electrify and this is reflected in the FLT Plan. NYSERDA recommended Central Hudson develop all-in energy costs for representative customers with a variety of technology configurations and the Company has updated this in the FLT Plan. NYSERDA also suggested the Company include price elasticity into its modeling and the Company will consider this in future GSLTP cycles.

Environmental Considerations

The Sierra Club includes several recommendations related to environmental concerns. It recommends including the cap and invest trading program and Central Hudson notes it will include this in future GSLTP cycles once the program is finalized. The Sierra Club also questions the emissions presented and emissions reductions achieved within each scenario. The Company notes it is using DEC and NYSERDA methodology and pushes back on Sierra Club's second point. The Sierra Club and NYSERDA mention the All-Electric Buildings Act and its incorporation into the GSLTP, and the Company notes that it does not include any new construction of fossil fuels in its modeling starting in 2026.

Electrification and NPAs

NYSERDA and Sierra Club include several NPA recommendations about implementation strategies, pipe decommissions, NPA opportunities, and a full NPA plan. Central Hudson agrees with placing an emphasis on NPAs, but indicate it is already including some of these efforts in its daily procedures. Central Hudson points to its two categories of NPA projects: Transportation Mode Alternative and Load Growth-Based Projects. The Company is also developing a beneficial electrification program for highly loaded locations.

Regarding electrification, NYSERDA recommends evaluating targeted incentives to reduce gas distribution capacity cost. The Company indicates that it does model higher incentives for higher loading and agrees that mapping these locations would be helpful.

3.3 Technical Conferences

The Department, customers and Stakeholders had the opportunity to participate in a number of Technical Conferences throughout this proceeding. As we previously discussed within our Initial Report, PA was also in

attendance and summarizes here the Technical Conferences held to date and further discussed in detail throughout this Report.

December 19, 2023

The Company hosted a Pre-filing Technical Conference on December 19, 2023. The session began with an overview of the natural gas industry, which provided the audience with foundational information about how the gas utility system operates. SMEs from the Company then provided more detailed information about a variety of topics that collectively inform the ILT Plan. These topics included: customer demographics, usage trends and demand forecasting, decarbonization efforts, gas supply procurement, transportation and storage, distribution system engineering and operation, utility thermal energy networks, and utility emissions. Several Stakeholders also attended, and instructions for submitting questions to PA throughout the review process were provided.

March 6, 2024

ILT Plan Technical Conference

PA participated in a Technical Conference in early March, facilitated by Staff, to discuss the ILT Plan with Stakeholders. In this Technical Conference, the Company reviewed assumptions and modeling methodology pertaining to the four presented scenarios. Topics covered included: gas demand modeling, demand side programs, supply planning, and results. This session provided Stakeholders an opportunity to receive an overview of the ILT Plan and ask clarifying questions.

April 4, 2024

Non-Pipes Alternatives Technical Conference

In April of 2024, PA attended a Technical Conference, facilitated by Staff, in which the Company discussed NPAs. In this Technical Conference, the Company presented NPA options including transportation mode alternatives (TMA) and load growth based NPAs, NPA screening and suitability criteria, the incorporation of NPAs into LPP projects, and historical NPA implementation across its service territory. This session provided Stakeholders an opportunity to ask questions regarding the Company's approach to NPA and gain understanding as to the role NPA will play in the Company's long-term approach to decarbonization.

May 8, 2024

Low-Carbon Fuels and Oil-to-Gas Conversions

PA participated in a Technical Conference, facilitated by Staff, to discuss the role of low carbon fuels and oil-to-gas conversions in the ILT plan with Stakeholders. In this Technical Conference, the Company reviewed assumptions and modeling methodology pertaining to LCF feasibility and the role of oil-to-gas conversions in its customer growth forecast. The Company discussed historical oil-to-gas conversion data, notable conversions, and the assumptions associated with fuel conversions across the forecast period under the four decarbonization scenarios. Regarding LCFs, the Company provided an overview of research on RNG and hydrogen, presented the results of the third-party studies on RNG and hydrogen included in the ILT Plan, and described an overview of implementation of these LCF across the four scenarios.

May 15, 2024

Hydraulic Modeling and Vulnerable Areas

Central Hudson presented its methodology used to identify and analyze the segments of the distribution that are considered "highly loaded," which are identified using a Monte Carlo simulation and analysis technique. The Monte Carlo analysis uses Gas System historical trends for operating pressure along with billed volumes, considers the segment's physical characteristics, and forecasts for weather and population growth to identify areas that are approaching, or perhaps are already exceeding, its design day capacity. From the Monte Carlo analysis, 13 segments of the distribution system were identified by the Company as "highly loaded".

Once a segment of the system has been identified as highly loaded, information is provided to the Company's Gas Transformation and Planning group where a hydraulic analysis of the segment is performed using Synergi Gas hydraulic modeling software. Estimates of required capital investments required to mitigate operating

conditions that could negatively affect reliability are also developed by the Company for potential inclusion in future budget cycles.

November 6, 2024

Bill Impacts and Affordability

PA participated in a Technical Conference, facilitated by Staff, to discuss bill impacts and affordability in the RLT plan V2 with Stakeholders. In this Technical Conference, the Company reviewed delivery rates, revenue requirements, assumptions surrounding gas and electric rates (and how electrification would affect these rates), and assumptions associated with gas bill impacts for the average customer. This session provided Stakeholders an opportunity to ask questions regarding the Company's approach to gas rates and bill impacts and gain understanding of how the Company develops its rates and the impact to ratepayers.

4 Supply Assessment

PA has undertaken a review of several supply and supply-related aspects of the Company's system, based on information presented in the Final LT Plan and responses from the Company to several related data requests. Our preliminary observations are summarized within the sub-sections below. We first highlight components of the supply stack, then discuss hydraulic models of the distribution system. We conclude with comments on the Company's forecast of capital expenditures.

The Central Hudson distribution system is comprised of approximately 1,300 miles of mains and 67,000 service lines. The Company's transmission system receives gas at four interstate pipeline interconnections (or citygates) and delivers that supply throughout the distribution system footprint. In aggregate, the four interstate pipeline interconnections are currently capable of flowing more gas on a design day than is required by the Company's customers. It is important to note that this is not true at individual citygates: there are limitations at the Tuxedo gate and the Cedar Hill. Generally, however, if demand grows as forecast by the Company in the near term, PA would not expect there to be a need for additional investments in the citygates to accommodate growth. While certain transmission pipeline segment replacements are contemplated in the Company's capital plan, the transmission system generally appears to be well positioned for continued reliability. The Company has also indicated that there are no segments of its system that are served by a single citygate, meaning that any reduction to deliverability at a given citygate can be compensated for by procuring additional supply through other citygates.

The supply portfolio consists primarily of interstate pipeline transportation contracts and storage contracts with interstate pipeline transportation agreements. Long-term contracted capacity on interstate pipelines is held by the Company. The majority of the natural gas consumed within the Company's footprint is sourced from the Marcellus shale, including a modest volume of differentiated gas.⁴⁵ The Company has indicated in its pending rate⁴⁶ case that it will continue to pursue the utilization of differentiated gas (natural gas obtained from suppliers that proactively manage their methane emissions) and will seek to procure differentiated gas up to the incremental cost threshold of \$200,000, established in the previous rate case.⁴⁷ For winter peaking needs, the Company relies on Delivered Services contracts and spot purchases (which may be referred to as Winter Peaking Supplies), if necessary, to meet peak demand. The Company typically issues an RFP to procure these supplies. Over time, to reduce the volume of contracts no longer needed as peak day demand decreases, a methodology for considering how to de-contract capacity to match changing customer usage is needed. While Central Hudson indicates it does not anticipate opportunities for de-contracting over the next five years, it would be valuable for the Company to identify the factors and contract features it will consider when it comes time to consider de-contracting. It would also be beneficial for the Company to indicate the degree to which demand declines associated with each planning scenario might impact how the Company considers de-contracting – especially if de-contracting considerations are accelerated in those scenarios.

A key area of focus of the Final LT Plan are 13 segments of the Central Hudson distribution system that have been identified by the Company as “highly loaded”, meaning that it is either approaching or even exceeding their capacity to reliably serve customers on a design day. PA and Staff had the opportunity to meet with Central Hudson's SMEs at the Company's Poughkeepsie offices on June 10, 2024, to review these systems in more detail. This review included a discussion of hydraulic modeling scenarios previously requested by PA; we have investigated the relationship between planned distribution system reinforcement investments and both current and potential future operating conditions (again, based on these hydraulic modeling results).

4.1 Supply Stack

As mentioned above, the system is supplied at four citygates that feed one contiguous service territory. The interstate natural gas pipelines are interconnected with the Company's network as follows:

1. the Tuxedo gate connecting to the Millenium Pipeline,
2. the Cedar Hill gate connecting to Tennessee Gas Pipeline's 200 Leg lateral,
3. the Pleasant Valley gate connecting to Iroquois Gas Transmission, and

⁴⁵ Source: Company response to PA 1-3 and PA 3-57 Attachment 1.xlsx.

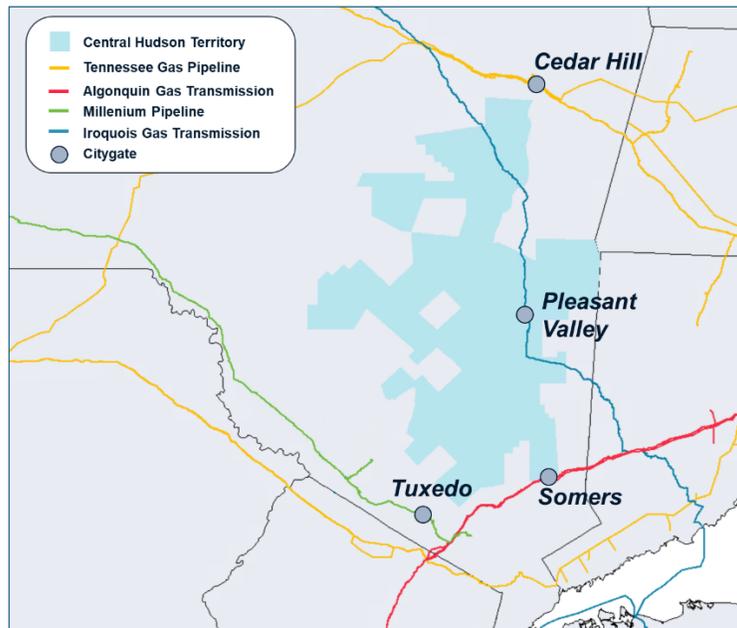
⁴⁶ Source: Electric and Gas Procurement Panel Testimony, Case 24-G-0462, dated 8/1/2024.

⁴⁷ Source: Notice of Schedule for Filing Exceptions and Recommended Decisions, Case 23-G-0419, dated 5/1/2024.

4. the Somers gate connecting to Algonquin Gas Transmission.

Figure 4-1 illustrates these interstate natural gas pipeline interconnections.

Figure 4-1: Central Hudson Pipeline and Delivery Point Map

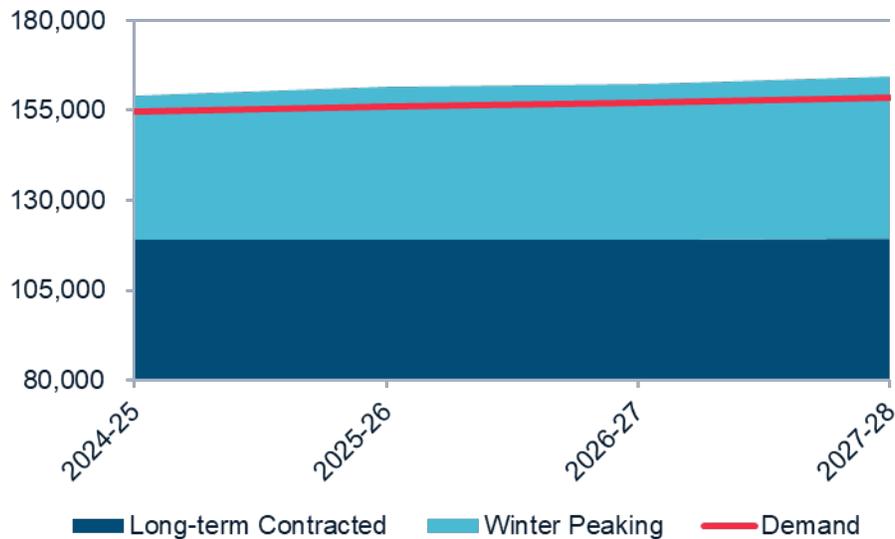


4.1.14.1 Long-Term Contracts Assessment

The majority of the Company's natural gas supply exists in the form of interstate pipeline transportation contracts. These contracts are agreements with federally regulated interstate pipeline companies to transport a specified quantity of natural gas from one region – typically a supply region such as the Marcellus shale – to a destination in proximity to load centers. These pipeline contracts do not necessarily deliver gas directly to citygates connected to the Company's local distribution system; rather, it may deliver to a point upstream of the Company's distribution system with gas then nominated through a separate contract for ultimate delivery. Similar contracts can also provide for the delivery of stored natural gas.

In its supply stack forecast, the Company has over 118 MDth/d of long-term contracted capacity on interstate pipelines held by the Company. See Figure 4-2. This volume includes storage withdrawal contracts.

Figure 4-2: Central Hudson Peak Day Supply Stack⁴⁸



In the FLT Plan, the Company explains that its natural gas is procured to satisfy demand behind citygates and that its supply stack has remained static in recent years, with the caveat that this could change as the Company considers a de-contracting methodology when some supply is no longer needed to meet demand.

The Company’s approach to securing natural gas to satisfy its demand appears to be sound, especially given the relatively static nature of its supply stack and the lack of major projects that will alter the supply landscape. To clearly show that supply is adequate we recommend the Company outline and quantify how its supply stack satisfies demand under its CCA scenario, the NNI scenario, and the other alternative scenarios it identified. The Company partially fulfilled this recommendation by providing load duration curves that verify that the existing supply portfolio is sufficient to meet design day demand under the NNI scenario but did not go so far as to provide an annual quantification of the degree of oversupply. It is important that the Company convey the potential quantity of oversupply it may have in future years under various scenarios to indicate to Stakeholders the degree to which oversupply can vary.

The Company further indicated in the FLT Plan that none of the segments of its system are isolated or served by a single citygate. This system arrangement grants the Company a contingency in the event a citygate experiences a flow derate or outage. The Company could purchase additional natural gas on the spot market for delivery to other citygates and further has sufficient capacity within its own delivery systems to move gas to satisfy demand. In PA’s view, this approach to ensuring adequate supply is reasonable however it must be noted that during design day conditions, it is entirely possible that there will not be available natural gas on the spot market due to tight market conditions across the northeast. While it may be technically possible for the Company to purchase additional gas on the spot market and move it through its system, the additional pipeline capacity may not actually be available to purchase, especially during design day conditions, due to market limitations.

While the Company discussed the array of delivery points it relies on for sourcing natural gas, it would be valuable for the Company to highlight its relative reliance on different delivery points and specifically the “order” in which it would choose to purchase additional gas to satisfy demand and provide least-cost service to customers, especially given the variability in rates charged by interstate pipelines – some pipelines’ transportation rates are more expensive than others and this expense is passed through to ratepayers.⁴⁹ In the FLT Plan, the Company provided a graphic of historical spot pricing at various delivery points which is useful for understanding how commodity costs vary by delivery point and discussed some of its seasonal nomination decisions from a high level but did not go further to explain the “order of operations” it undertakes in nominating least-cost gas and which delivery points tend to be best suited for providing least-cost service. For example, during its SME session, the Company indicated that supply procured at the Tuxedo Gate tends

⁴⁸ Source: Company response to PA 3-53 and PA 3-53 Attachment 1.

⁴⁹ PA acknowledges that the Company’s flexibility in selecting which interstate pipelines serve its customers’ gas requirements may be limited by the availability of capacity on a given pipeline and the proximity of a pipeline to its load centers.

to be the least-cost and that it would opt to rely on Cedar Hill, followed by Mahopac, and finally Pleasant Valley which, connected to Iroquois, tends to be some of the more expensive gas in the region. The Company should comment on its decision making in procuring gas, the relative costs of gas from the different delivery points, how it is pursuing least-cost supply for its customers, and its reliance (or non-reliance) on gas indexed to Iroquois Z2.

4.1.2 Delivered Services and Winter Peaking Supplies

Delivered Services are natural gas volumes purchased from third parties that hold the rights to the underlying contracted capacity on a particular pipeline. The Company uses short-term contracted delivered supplies to meet any expected imbalances between the long-term supply portfolio and coming winter demand. Because Delivered Services can be contracted as Winter Peaking Supplies (procured immediately prior to a winter season to meet expected demand), the volumes fluctuate slightly in each year and the Company may not have procured all of the delivered services required for a given year until just before the winter season begins. The Company typically issues an RFP to procure these supplies. In Central Hudson's existing forecast, the volumes of Winter Peaking Supplies fluctuate between 40 and 45 MDth/d.⁵⁰

In the Final LT Plan, the Company explains its general methodology for seeking Winter Peaking Supplies before a winter season and indicates in broad terms that reducing reliance on delivered services would be economically beneficial for customers. In filing its Final LT Plan, the Company also quantified the relative cost of peaking supplies contrasted against the cost of firm capacity for the rest of its supply stack. While Winter Peaking Supplies and Delivered Services are currently necessary components of the supply stack to meet winter demand, it makes sense that these supplies tend to be more expensive due to the relatively tight natural gas market within the Northeast and seasonal deliverability constraints. The Company also acknowledged increased risk in its ability to renew Winter Peaking Supplies and indicated it will consider reducing its reliance on this type of supply when possible.⁵¹ Winter Peaking Supplies remain the component of the Company's supply portfolio that has the most embedded risk, so PA believes that it was valuable for the Company to elaborate on those risks. Winter Peaking Supplies are also the most likely to be displaced by NPA programs such as demand response on peak or design day.

4.1.3 Company's De-Contracting / Re-Contracting Approach

As peak day demand begins to decrease, to reduce the volume of contracts that are no longer needed a methodology for considering how to de-contract capacity to match changing customer usage is necessary. In Section 4.1.2 of the Final LT Plan, the Company indicated that it would reduce reliance on peaking delivered service contracts as peak day demand declines, however a de-contracting methodology must also consider how to retire long-term transportation and storage contracts as both peak demand and annual sales decline. The Company indicated that it does not anticipate opportunities for de-contracting over the next five years. However, a plan for de-contracting would help provide Stakeholders a longer-term view of the Company's plans to source gas supply and evaluate the affordability of service.

In the FLT Plan, the Company discusses its expected methodology for de-contracting and retiring components of its supply portfolio when the supply is no longer necessary to meet demand. The Company's general approach appears to be reasonable and consistent with the general outline of de-contracting methodologies described by other New York utilities. One limitation in the Company's discussion of its de-contracting methodology is that it does not consider how de-contracting might apply in its alternative planning scenarios. While it may be relatively early to implement specific de-contracting details, it would be beneficial to consider – in broad terms – how soon de-contracting may need to be considered (and identify the applicable cost savings) under all four planning scenarios, especially those that consider more rapid declines in demand. This would be a particularly valuable addition now that the Company has selected the NNI scenario as its GSLTP Pathway. Because the NNI scenario envisions lower demand than the CCA scenario, pursuing that scenario could allow the Company to accelerate de-contracting of the existing gas supply portfolio. In Sections 6.1 and 6.2.3, PA observes that the main drivers of customer growth, gas net sales and peak day demand are not likely to follow historical trends with a likely decrease in demand from levels projected by the Company.

⁵⁰ Source: Company response to PA 1-3 and PA 3-57 Attachment 1.

⁵¹ Source: Company response to PA-3-53 and PA 3-53 Attachment 1.

The Company indicated that its supply portfolio was sufficient to meet expected demand under the CCA but did not indicate how its supply portfolio is sufficient to meet demand under the other three scenarios, or how much excess capacity the Company may have under additional alternative scenarios. To this end, we recommend the Company indicate how its de-contracting strategy may shift and the degree to which its supply portfolio may exceed design day demand under different scenarios including the NNI scenario. This information will help Stakeholders and the Commission evaluate how CapEx requirements for the Company's distribution system may evolve over time as well as ongoing affordability.

4.2 Hydraulic Modeling

PA focused much of its hydraulic modeling analysis on 13 segments of the Central Hudson distribution system that were identified by the Company as "highly loaded", meaning that it is either approaching or even exceeding their capacity to reliably serve customers on a design day. PA and Staff had the opportunity to meet with Central Hudson's SMEs at the Company's Poughkeepsie offices on June 10, 2024, to review these segments in more detail. This review included a discussion of hydraulic modeling scenarios previously requested by PA.⁵² Those scenarios were based on the Company's projections of design day demand (at 73 HDDs) for specific winter seasons as well as under defined operating conditions, as follows:

- (a) Winter 2023-24
- (b) Winter 2026-27
- (c) Winter 2028-29
- (d) Winter 2030-31
- (e) 100% of the segment's capacity⁵³
- (f) 95% of the segment's capacity
- (g) 80% of the segment's capacity

Key outputs of each hydraulic modeling scenario included (1) hourly demand on the highly loaded segment, (2) identification of the lowest pressure point (and the corresponding pressure) on the segment, (3) the locations at which gas velocities exceed 70 feet per second⁵⁴ (along with the corresponding velocities), (4) the system "choke point" (defined below) with corresponding pressure, and (5) identification of representative system pressures throughout the segment.

The highly loaded segments were identified using a Monte Carlo analysis to determine which parts of the system are stressed and have the potential to drop below the minimum system delivery pressure on a design day. All segments of the distribution system are ranked from highest loaded to least loaded.⁵⁵ Results of the Company's analysis are presented in the FLT Plan, Appendix A, Table 3 as the Company's "Weather-Normalized Loading Factor Forecast (Absent Incremental Interventions)".⁵⁶ Once a segment is identified as highly loaded, the Company's hydraulic modeling group further evaluates the segment to determine if any "choke points" exist. Choke points are restrictions to required gas flows such as sections of pipe with relatively high velocities, damaged pipe, partially open valves, undersized pipe, etc. A system segment may be removed from the highly loaded list if design day demand is projected to decrease. In fact, during the course of our assessment and as part of the Company's ongoing review, at least five such segments have been removed from the highly loaded list.

It was noted during our discussions with Central Hudson's SMEs that the load forecasts for the 2028 and 2030 models did not include anticipated impacts from changes in building codes, policies, etc., that could influence

⁵² Source: Company response to PA 6-109; confidential responses were provided at the June 10, 2024, meeting.

⁵³ For purposes of these modeling scenarios, 100% of the segment's capacity is defined as the maximum demand that can be served while maintaining minimum distribution system pressures consistent with the Company's design day criteria, which is 50% of the applicable system segment's MAOP. As further context, in the FLT Plan at p. 28, the Company defines "vulnerable locations" as portions of the system where, in the next five years, pressures on a design day are anticipated to drop below 50% MAOP under planning conditions.

⁵⁴ Gas velocity of 70 feet per second is considered the limiting velocity for gas distribution system piping outside of pressure regulating stations. The Company makes the same observation in the FLT Plan, Appendix D, at page 12.

⁵⁵ Source: FLT Plan, Appendix A, Figure 17.

⁵⁶ PA interprets "absent incremental interventions" to mean that the loading factors presented do not consider any reinforcement of the distribution system.

design day demand. Refined load forecasts incorporating such anticipated changes could benefit these models.

In PA 6-109, PA asked Central Hudson to model the highly loaded segment scenarios listed above. As discussed previously, PA defined “100% of a segment’s capacity” as the capacity of the system that would yield a pressure drop of 50% on a design day. PA would expect there to be a strong correlation between these two separate approaches (Monte Carlo analysis and hydraulic modeling) to demonstrating the relative need for reinforcement of segments of the system; that is, when Appendix A, Table 3⁵⁷ reflects that a segment of the distribution system is either approaching or exceeding its capacity (in other words, approaching or exceeding 100% loaded), the corresponding hydraulic models provided in PA 6-109 would demonstrate a pressure drop approaching (or even exceeding) 50%. However, as shown in Table 4-1 below, that does not always appear to be the case.

Table 4-1: Hydraulic Modeling Results for Highly Loaded Segments

Segment	Percent Loaded 2024 ⁵⁸	Year at which Segment Exceeds 90% Loaded ⁵⁹	Approximate % Likelihood of Triggering Upgrades by 2033			Percent maximum allowable operating pressure (MAOP) in 2024
			In Next 10 Years ⁶⁰	By 2033 ⁶¹ CCA	By 2033 ⁶² NNI	
CW	91	2023	0	0	0	88
HM	95	2023	Not included	56	51	81
MLP	77	NEVER	Not included			64
NFE	139	2023	Not included			76
PLP	93	2023	28	21	18	73
PM	113	2023	54	63	54	50
PN	77	NEVER	Not included			79
SP	84	2030	20	10	7	36
TVPV	111	2023	22	26	24	37
KS 40	100	2023	60	44	25	37

It is PA’s understanding that Table 3 in Appendix A intends to communicate the degree to which a segment of the distribution system is “loaded”, or the percentage of that system segment’s maximum capacity at which it is operating under design day conditions. For example, Table 3 indicates that the Titusville/Pleasant Valley

⁵⁷ Source: FLT Plan, Appendix A, Table 3.

⁵⁸ Source: FLT Plan, Appendix A, Table 3.

⁵⁹ *Ibid.*

⁶⁰ Source: FLT Plan, Appendix A, Figure 27 in the next 10 years.

⁶¹ Source: FLT Plan Figure 58.

⁶² Source: FLT Plan Figure 58l.

⁶³ Source: Company response to PA 6-109.

(TVPV) system is at 84% of its maximum capacity in 2024. However, the 2023-24 hydraulic model of the TVPV system demonstrates that the lowest pressure on this segment drops to 36% of MAOP (i.e., a greater pressure drop than the 50% drop under the design hour conditions criterion) in 2024.

As also noted in Table 4-1, the TVPV system has been modeled as having no more than a 20% likelihood of requiring upgrades by 2033. Beyond the apparent inconsistency between Appendix A, Figure 27, and Figure 58 of the GSLTP (a likelihood of 20% vs. 10% under the CCA Scenario), we would expect that a system segment for which modeled design day pressures are already below the Company's design day threshold to be more than 84% loaded and also reflect a much higher likelihood of needing reinforcement than is demonstrated above. Said differently, these data points do not appear to support the same conclusion as to how much capacity is remaining on a design day; if indeed pressures on the TVPV system would fall below the Company's 50% pressure drop design day criteria, then it seems that reinforcement should be a higher priority. PA also notes that some of the models provided in PA 6-109 also indicate gas velocities that exceed (and in some cases, far exceed) the maximum 70 feet per second gas velocity for a gas distribution system.

The following summarizes our observations about apparent inconsistencies in the information included in Table 4-1:

- HM – if the design day operating pressures are already below 50% of MAOP in 2024, we would expect there to be reinforcement projects included in the CapEx forecast, rather than there being less than a 50% likelihood of an upgrade as shown in Figure 58.
- MLP – we would not expect there to be a greater than 50% likelihood that the system will require upgrades by 2033 if the minimum design day pressure on the system is more than 80% of the MAOP. As shown above, the approximate 50% likelihood is a greater likelihood than those shown for other systems whose design day models reflect much greater pressure drops.
- PLP – the notion that the system is 139% loaded currently is not consistent with a minimum operating pressure that is 76% of that system's MAOP on a design day.
- PM – the range of likelihood of required system upgrades does not appear to be consistent with the fact that the system is currently 93% loaded (i.e., nearing its design day capacity)
- PN – we would expect a system that is currently 113% loaded on a design day to be operating at less than 50% of its MAOP; we would also expect system upgrades to be highly likely, rather than in the 50-60% likelihood range.
- TVPV – if the system is operating at 36% of its MAOP on a design day as modeled, we would expect there to be a highly likely need to upgrade that system. We would also expect the system to be more than 84% loaded currently under those conditions.

KS 40 – there appears to be a correlation between the system being 111% loaded and that system operating at 37% of its MAOP. We would, however, expect that upgrades are very likely to be required under those conditions, as opposed to being roughly 25% likely as shown. A reinforcement project is included in the CapEx forecast for the KS-40 system in 2026.⁶⁴

Finally, we observe in Appendix A, Figure 27 that the Highland Mills (HM) system was considered to be 100% likely to require an upgrade as of 2023 if historical growth were to continue. That likelihood reduced to 80% in 2024 and 70% in 2025. For the period 2026-2043, the likelihood hovers around 60%. One possible assumption for why the likelihood of upgrades dropped between 2023 and 2025 is that the system was reinforced. However, we observe (from the information provided by the Company) that no reinforcement projects were completed on the HM system between 2018 and 2023, and none are included in the CapEx forecast for 2024-2028. We are not aware if load growth has subsided, or demand has otherwise dropped on that system.⁶⁵

In PA's opinion, a Monte Carlo analysis based on distribution system pressure expectations is unable to convey enough information to effectively determine where reliability risks may exist. While the analysis may assign statistical probabilities to whether or when a distribution system (or segment thereof) may be operating at full capacity (placing reliable delivery of gas to customers at risk), hydraulic models of the same system segments better identify the nature of reinforcements that should be considered, where applicable. The hydraulic modeling process is the key step in determining whether these potential risks exist and lays the

⁶⁴ Source: Company response to PA 8-121, Attachment 1.

⁶⁵ *Ibid.*

foundation for anticipating and addressing potential future design day reliability challenges. PA recommends Central Hudson re-evaluate the outputs of its various modeling exercises to ensure that the results thereof are complementary and support effective distribution system planning going forward. We note that in its Reply Comments filed on October 23, 2024, the Company describes the complementary nature of its Monte Carlo and hydraulic modeling analyses. As described above, we continue to observe inconsistencies in the outputs from the two processes. PA recommends that the Commission direct Central Hudson to further explain, in its first annual GSLTP update, how these processes work in tandem, how they promote overall gas planning efficiency, and clarify in detail how its CapEx forecast is consistent with the results of the two modeling exercises.

We discuss the implications of the analyses of the highly loaded segments on future capital investments in Section 5.4.3.

4.3 Recommendations to Improve Future GSLTPs

Recommendations for the Company to improve the supply components of future GSLTPs are summarized below.

1. Explain and provide an annual quantification to show how the Company's supply stack meets demand under all four scenarios and the degree to which there is oversupply in the other scenarios.
2. Discuss how the Company's approach to de-contracting may change under differing scenarios or if realization of an alternative scenario may require the Company to accelerate its de-contracting planning.
3. Discuss the Company's decision making in its reliance on gas from different delivery points through the lens of satisfying demand and providing least-cost service to customers. Comment explicitly on which delivery points tend to be most expensive and how the Company chooses to procure gas to reduce ultimate costs to customers.
4. While the Company may technically be able to flow enough gas to satisfy demand on a design day, the Company should comment on potential market limitations in purchasing additional spot gas, should that become necessary, and the Company's confidence that it can purchase additional gas during design day conditions, especially at certain city gates.
5. Review the apparent modeling inconsistencies noted in this section related to highly loaded system segments and either correct any errors or explain in detail any misunderstandings in PA's observations.
6. Central Hudson to further explain, in its first annual update, how the Monte Carlo and hydraulic modeling processes work in tandem, how they promote overall gas planning efficiency, and clarify in detail how its CapEx forecast is consistent with the results of the two modeling exercises.

5 CapEx Assessment

The Company provided historical nominal CapEx values, and 20-year CapEx forecasts, including inflation, for each planning scenario in the FLT Plan. PA requested detailed information supporting the forecast for each planning scenario; Central Hudson has provided those details for only the CCA scenario to date.

The ILT Plan discussed the Company's CapEx plan for the five-year period 2024-28. During our review, PA requested and received additional details about the makeup of the investments included in the Company's forecast, including updates to the ILT Plan forecast and the addition of 2029, both of which are reflected in the FLT Plan. PA's observations of the Company's investment plan are discussed below, particularly as the plan relates to safe and reliable delivery of supply.

5.1 General Observations

The Company provided high-level 20-year CapEx forecasts for each planning scenario in the FLT Plan. PA requested detailed information supporting those forecasts; Central Hudson has provided those details for only the CCA scenario to date; these details form the basis of our observations in this section.

PA observes an increase in overall annual CapEx in 2024-2029 vs. actual investments in 2018-2023.⁶⁶ The average annual CapEx in the prospective six-year period is approximately 28% greater than the average annual investments in the historical six-year period.⁶⁷ More than half of that growth (nearly \$9.5 million annually) can be attributed to new programs proposed in the recently completed rate case.⁶⁸ Another approximately 20% (or more than \$3 million annually) of the forecasted increase is related to reinforcement of the distribution system. While increased transmission system investments also make up more than 20% of the difference (approximately \$3.9 million per year), declines in new business CapEx of roughly \$4 million per year in 2024-29 offset that increase overall. Annual investments to serve new customers in 2024 and 2025 are forecast to be on par with actual investments in 2018-23; beginning in 2026, annual new business CapEx is projected to be less than half of the average annual investments in 2018-25. Additional focus on a targeted distribution improvement program makes up another 11% of the difference.⁶⁹ Table 5-1 summarizes these drivers of the differences in annual CapEx investments between the historical and prospective period. It is important to note historical values are nominal whereas forecasted values are inflation adjusted, throughout this report unless otherwise specified. Figure 5-1 and Figure 5-2 summarize average annual CapEx spending by major investment category in 2018-2024 and 2025-2029. These figures demonstrate a continued focus on Distribution Improvements, additional focus on Transmission investments, and relatively less investment in new business in the 2024-2029 period.

⁶⁶ Investments made in 2018-2022, and projected for 2024-2028, were provided in the Company's response to PA 2-39. The Company provided actual investments in 2023 in PA 4-80. An updated five-year forecast for 2025-2029 was provided in PA 8-118. As such, we have a six-year historical period (2018-2023) as well as a six-year "forecast" period (2024-2029). References to a "five-year forecast" are related to 2025-2029.

⁶⁷ For purposes of this discussion, PA considers 2024 as part of the projected period.

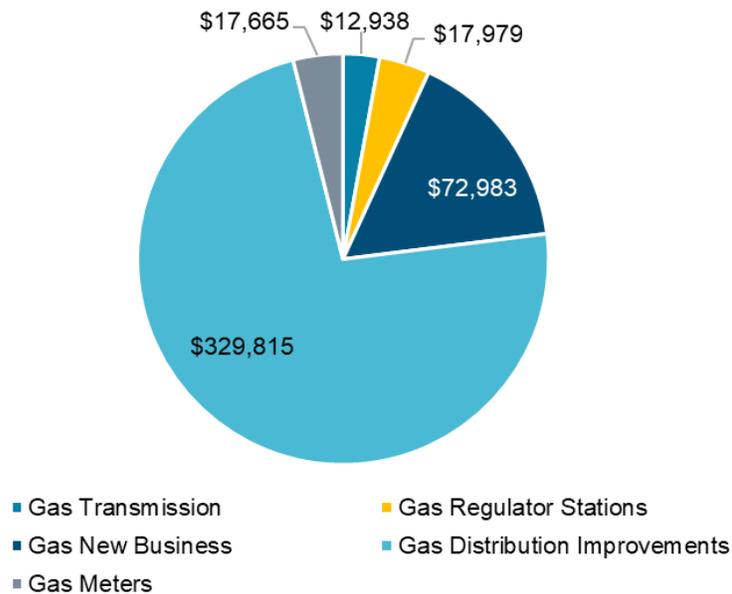
⁶⁸ The Commission issued an order in Case 23-G-0419 on July 18, 2024.

⁶⁹ The Company's Large Diameter Gas Welded Pipe Replacement Program is discussed in Section 5.4.4.

Table 5-1: Central Hudson CapEx by Major Investment Category (\$000)⁷⁰

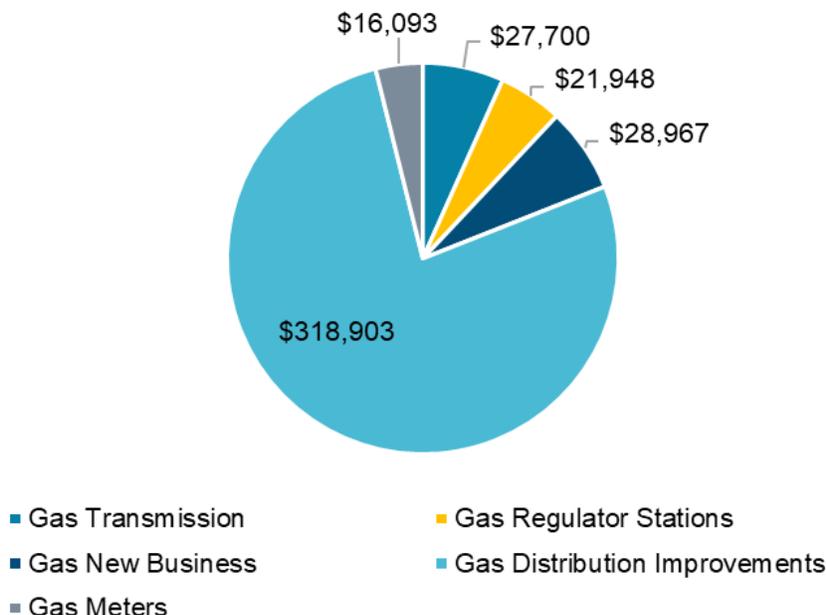
	2018-2023	2024-2029
Rate Case Programs	\$0	\$9,448
Distribution System Reinforcements	\$2,164	\$5,472
Transmission	\$1,449	\$5,324
New Business	\$10,504	\$6,487
Large Diameter Welded Pipe Program	\$1,112	\$3,101
Other CapEx Investments	\$47,998	\$51,105
Total	\$63,229	\$80,936

Figure 5-1: Central Hudson CapEx 2018-24 (\$000)



⁷⁰ Historical CapEx values are nominal unless otherwise specified.

Figure 5-2: Central Hudson CapEx 2025-29 (\$000)



Of note, it appears that only one system reinforcement project included in the CapEx forecast is associated with an identified highly loaded system,⁷¹ as discussed in Section 4.2. PA recommends that the Company better synchronize the results of its various models and ensure that its CapEx forecast is consistent with those results to the extent they are viewed as reliable modeling tools and explain why projected reinforcements of the distribution system are expected to focus on areas that have not been identified as highly loaded.

In the FLT Plan, the Company selects the NNI Scenario as GSLTP Pathway⁷². The NNI Scenario is described as a profile of the gas system under policies that prevent growth-related investment in the gas system. However, the NNI Scenario does not eliminate capital spending altogether as investments to ensure safe and reliable service will continue.⁷³ Figure 59 of the FLT Plan also includes overall CapEx forecasts for each planning scenario. We observe that the total CapEx forecast under the NNI scenario for 2025-2043 is approximately 86% of the CCA scenario; under the CCA scenario the Company forecasts a total of \$954 million of CapEx during this period, compared to \$817 million under the NNI scenario. As noted previously, PA requested more details supporting the CapEx forecasts for each planning scenario and has not received those details. While we expect that some of that difference is driven by lesser investments to serve new customers, we are not able to comment on those drivers as no detailed CapEx forecast information was provided by the Company.⁷⁴ In the absence of that detail, PA is unable to provide an opinion on the extent to which CapEx investments under the NNI scenario could be avoided to support the spirit and meet the intention of the "No Infrastructure Option" requirement.

Importantly, we do not speculate in this report which categories of investment will make up the difference between the CCA and NNI Scenario CapEx forecasts. We do, however, assume that the investments that would not be made under the NNI Scenario are related to more than the customer growth category.⁷⁵

While opportunities to avoid CapEx investments other than those to serve new customer demand may be possible, there will be an ongoing need to invest in the gas delivery system over time under any planning scenario. Investments related to safety, reliability and regulatory compliance are typically not discretionary. As noted in Section 5, the overwhelming majority of forecasted investments are not associated with customer growth in the near term. This may lead to a conclusion that avoiding material CapEx under the NNI scenario

⁷¹ The Company's updated response to PA 8-121 received on January 9, 2025 suggest there are three such projects, rather than the one project as previously communicated to PA. PA's analysis discussed in Section 4.2 covered only one reinforcement project as originally identified by the Company.

⁷² Source: FLT Plan, p. 7.

⁷³ Source: FLT Plan, p. 7-8.

⁷⁴ Source: Company response to PA 16-165.

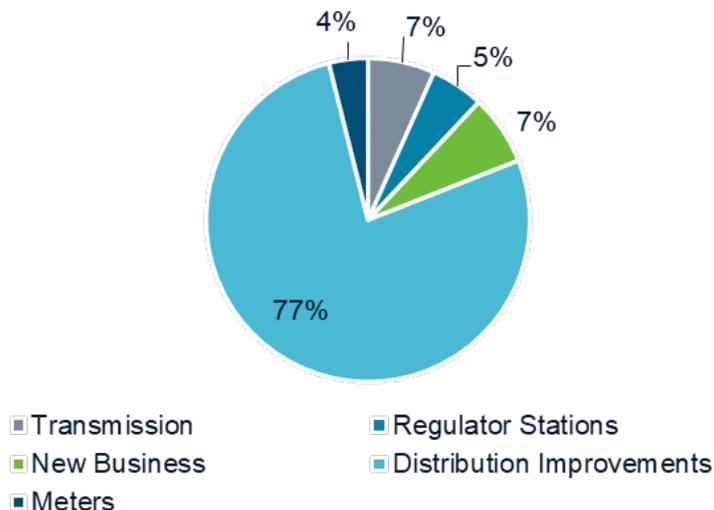
⁷⁵ We also observe that the detailed discussion of the 20-year Gas Capital Plan on p. 27-28 of the FLT Plan focuses on the CCA Scenario.

may be challenging. As noted earlier, replacement of assets to maintain service to an individual customer may be relatively easy to avoid via an NPA. In general, additional transparency about the nature and need for future investments may be appropriate so that all parties can better understand the drivers of CapEx over time.

Finally, PA observes that in the Commission’s July 18, 2024, order in the most recent rate case for the Company (Case 23-G-0419), the CapEx budgets approved for 2024 and 2025 differ from the forecast Central Hudson has provided to PA. We have based our analysis here on responses to many data requests received throughout the period of our review from the Company. Central Hudson provided PA with the majority of those prior to the Commission’s issuance of the rate order. Central Hudson has indicated that it will prioritize projects as necessary and defer work to future years as needed to remain within the approved budget. The Company has further indicated that any projects that are postponed are still planned for completion within the 20-year forecast period as noted in its response to PA 8-118.⁷⁶ Our analysis in this report is based on the Company’s forecast related to the RLT Plan V2 as provided to PA, and which appears to be unchanged in the Company’s FLT Plan. We note that the observed discrepancy with CapEx approved in the rate case was not addressed in the Company’s FLT Plan.

Figure 5-3 illustrates the relative size of the investment types making up the Company’s overall five-year forecast. Table 5-2 summarizes the investment amounts associated with that forecast and includes the 2018-24 period.⁷⁷

Figure 5-3: Makeup of Central Hudson Five-Year (2025-29) CapEx Forecast⁷⁸



⁷⁶ Source: Company response to PA 13-154.

⁷⁷ Source: Company responses to PA 2-39, PA 4-79, PA 4-80, and PA 8-118.

⁷⁸ Source: Company response to PA 8-118.

Table 5-2: Central Hudson Historical and Projected Capital Investments (\$000)⁷⁹

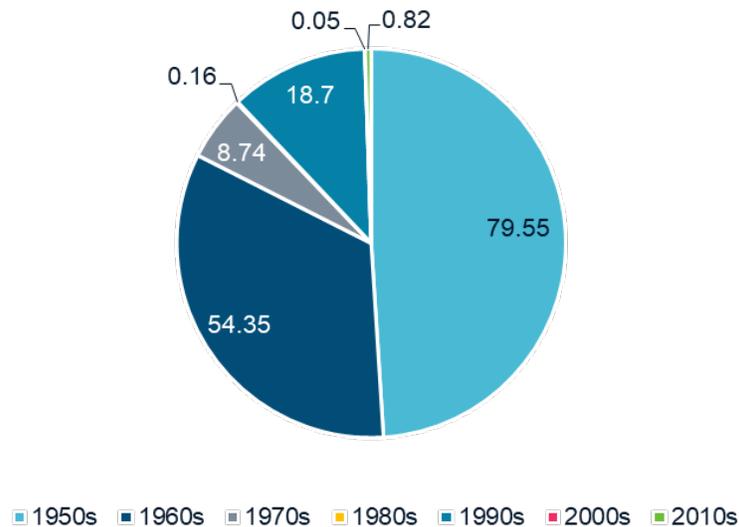
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Transmission	\$1,016	\$753	\$931	\$1,559	\$1,112	\$3,326	\$4,241	\$5,817	\$6,684	\$5,834	\$4,596	\$4,769
Regulator Stations	\$2,070	\$2,787	\$1,767	\$1,873	\$2,581	\$3,596	\$3,304	\$3,398	\$4,161	\$4,681	\$5,039	\$4,669
New Business	\$11,451	\$9,961	\$9,282	\$11,249	\$10,506	\$10,578	\$9,956	\$12,293	\$4,489	\$3,960	\$3,883	\$4,342
Distribution Improvements	\$45,883	\$49,556	\$54,264	\$43,246	\$39,076	\$46,209	\$51,581	\$63,775	\$68,898	\$66,178	\$72,081	\$47,972
Meters	\$2,672	\$2,621	\$2,478	\$2,180	\$2,012	\$2,776	\$2,926	\$3,126	\$3,072	\$3,159	\$3,362	\$3,374
Total	\$63,092	\$65,678	\$68,721	\$60,107	\$55,287	\$66,485	\$72,008	\$88,410	\$87,302	\$83,812	\$88,962	\$65,126

PA focused its analysis on Transmission, New Business and Distribution Improvements. Each of these three categories have implications on the reliable delivery of supply to customers, even if they are not “supply” investments in the traditional sense.⁸⁰ Where applicable, we quantify where opportunities to reduce capital investment going forward may be available to the Company.

5.2 Transmission CapEx

The Company operates over 162 miles of transmission pipelines and 100% of the transmission system is coated and cathodically-protected steel. Most of the system (133.9 miles) was installed in the 1950s and 1960s. More than 90% of the system consists of 10- and 12-inch diameter pipelines. Figure 5-4 illustrates the age of the Company’s transmission system.⁸¹

Figure 5-4: Transmission Miles in Service by Decade Installed



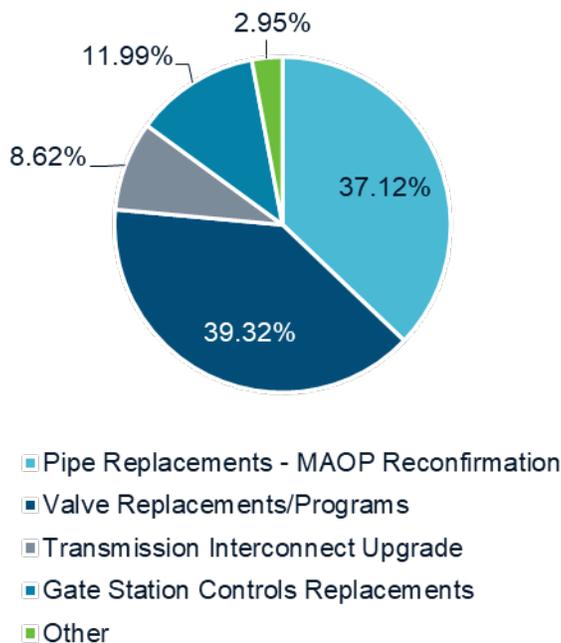
⁷⁹ Forecasted amounts reflected here do not appear to be consistent with the Company’s responses to PA 8-118 and PA 12-151. Moreover, the amounts in Table 5-2 do not tie to any of the forecasts reflected in Figure 59 of the FLT Plan.

⁸⁰ Arguably, Regulator Stations investments also play a role in reliable delivery of supply. PA did not review those investments due to their relatively small contribution (approximately 5%) to the overall forecast for 2025-29.

⁸¹ Transmission system data is from the Company’s Annual Gas Transmission Report submitted to PHMSA for calendar year 2023 (PA 8-125). 0.21 miles were installed in the 1980s and 2000s in total, along with 0.82 miles in the 2010s.

CapEx in the Company’s transmission system make up nearly 7% of the Company’s five-year forecast. The primary components of the transmission investments forecast are pipeline replacements and programs to install new, or upgrade existing, pipeline valves. These categories make up more than 75% of the transmission investments included in the five-year forecast, as shown in Figure 5-5.⁸² PA concurs that ongoing investment in the transmission system, the backbone of the gas delivery system on which all customers depend, is appropriate. Moreover, PA does not consider the level of proposed investment for any transmission project or program to be unreasonable.

Figure 5-5: Makeup of Transmission CapEx Forecast (2025-29)



5.2.1 Transmission Pipeline Replacements

The Company’s capital forecast includes replacement of segments of its transmission system through 2030 to comply with Federal regulations. The Pipeline and Hazardous Materials Safety Administration (PHMSA) issued a final rule in October 2019⁸³ that requires operators of transmission lines to reconfirm the MAOP of certain of those pipelines in their systems. In the absence of traceable, verifiable, and complete records supporting the MAOP, compliance can be achieved by a number of means, including re-testing the pipeline, reducing the MAOP of the pipeline, or replacing pipeline segments for which the applicable records are not available.⁸⁴ PHMSA established an interim program milestone requiring that at least 50% of the pipelines requiring reconfirmation be completed by July 3, 2028, with 100% completion required by July 2, 2035.⁸⁵ The transmission pipelines in the Company’s system ensure that required gas volumes are delivered to the various distribution regulator stations throughout the service territory at or above established minimum design pressures. PA explored each of the options for compliance as enumerated in 49 CFR Part 192.624.⁸⁶

The regulation provides that a pressure test along with verification of the pipeline system materials' properties may be conducted to reconfirm the MAOP. The materials verification process requires the same consideration of traceable, verifiable, and complete records which, in the Company’s case, are not available. Moreover, in general there is an inherent risk of failure associated with certain re-testing methods for these pipelines which may have been in service for decades.⁸⁷

⁸² Source: Company response to PA 8-118.

⁸³ Source: <https://www.govinfo.gov/content/pkg/FR-2019-10-01/pdf/2019-20306.pdf>.

⁸⁴ Source: eCFR :: 49 CFR 192.624 – Provides the complete list of alternatives -- Maximum allowable operating pressure reconfirmation: Onshore steel transmission pipelines.

⁸⁵ Source: eCFR :: 49 CFR 192.624 -- Maximum allowable operating pressure reconfirmation: Onshore steel transmission pipelines.

⁸⁶ Source: Company response to PA 8-123 and PA 11-150.

⁸⁷ Source: Company response to PA 2-44 indicates that the majority of pipeline segments to be replaced to achieve MAOP Reconfirmation compliance were installed in the mid-1970s.

The regulation would allow operators of natural gas transmission pipelines such as Central Hudson to achieve compliance by reducing the MAOP of the applicable pipeline segments; the parameters under which compliance can be achieved are prescribed accordingly. However, the Company indicated that reducing the pressure to the allowed level is not feasible, explaining that derating the pipelines requiring reconfirmation limits operational flexibility, negatively impacts system reliability and resilience, and limits the amount of gas available from a citygate with typically lower commodity costs than other supply points.

The regulation provides a separate pressure reduction methodology for pipeline segments with a small potential impact radius (defined in Title 16 of the New York Codes, Rules, and Regulations § 255.903(h) and 49 CFR Part 192.903 as the radius of a circle within which the potential failure of a pipeline could have significant impact on people or property). Central Hudson explained that this option is infeasible since most of the Company's transmission system has a potential impact radius greater than the 150 feet applicable to this alternative.

The regulation allows operators of natural gas transmission pipelines to either follow a prescribed engineering methodology or use an alternative technical evaluation process that provides documented engineering analysis for establishing MAOP. The Company explained the perceived risk of developing or utilizing an unproven alternative technology. PA does not disagree with that conclusion; at the very least, either of these options would be burdensome.

Replacement of the applicable pipe segments is the remaining compliance alternative. PA is aware the replacement path is not uncommon as gas system operators across the United States address this requirement. The Company's replacement plan to achieve MAOP Reconfirmation compliance appears to be reasonable. As indicated in the FLT Plan, the Company has determined that only approximately 1.8 miles of transmission pipeline require replacement.⁸⁸ It is PA's understanding that plans are in place to complete replacement of nearly 90% of those segments well in advance of the 2028 deadline.⁸⁹

We note that the Company's CapEx forecast after 2035 contemplates minimal transmission pipeline replacements; for the period 2036-2045 less than 5% (\$2 million of the total forecasted transmission investment of more than \$45 million) of the forecast is associated with replacements.⁹⁰ Given the relative age of much of the transmission system as described above, additional replacement investments may be required as these assets continue to age, even when well maintained. Importantly, the long-term need for the transmission system will not be impacted by any successful efforts to decommission segments of the distribution system or to otherwise reduce gas demand in the Company's service territory. These pipelines function much differently than distribution pipelines, as they provide the path to move gas to the many distribution regulator stations throughout the service territory. The Company's transmission pipelines will be needed to deliver gas to customers who remain on the system throughout the energy transition, and investments to ensure the safety and reliability of that gas delivery would not be considered discretionary.

5.2.2 Transmission Valve Programs

The five-year CapEx forecast includes investments to modify pipeline segments in order that they can accommodate In-Line Inspection (ILI) tools. It also includes investments to replace existing valves with those that can be operated remotely, and to install new valves to address deficiencies in valve spacing that have resulted from population growth and new building construction. These investments make up only approximately 2.6% of the five-year CapEx forecast and are in large part driven by PHMSA and New York State requirements.

5.3 New Business CapEx

New Business makes up 7% of the overall capital forecast for 2025-29. Average annual new business investments during the forecast period are approximately 44% lower than the average investments in 2018-2024.⁹¹ The forecast in 2025 is influenced by the second year (of two years) of a project to extend facilities to

⁸⁸ Source: FLT Plan, p. 28.

⁸⁹ Source: Company response to PA 2-44.

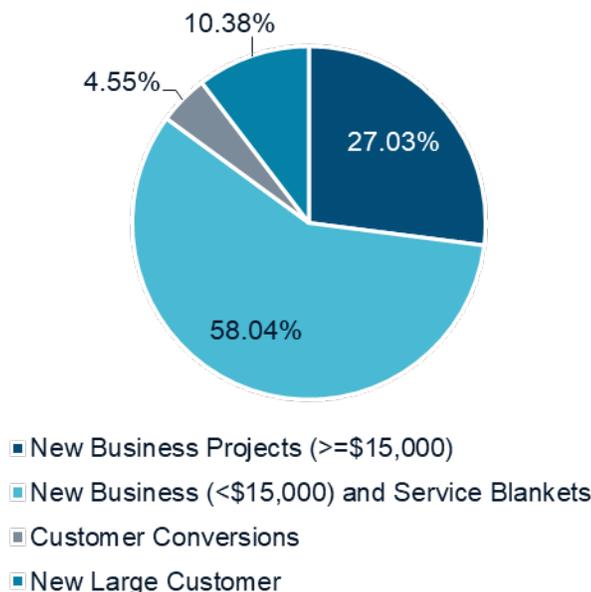
⁹⁰ Source: Company's response to PA 8-118.

⁹¹ Source: Company responses to PA 2-39, PA 4-79, PA 4-80, and PA 8-118.

serve one large new customer.⁹² Setting that investment aside, the annual New Business CapEx in 2024-29 forecast is nearly 50% lower than investments in the 2018-23 period, which is consistent with expectations for reductions in new connections pursuant to New York’s All-Electric Building Act which prohibits the installation of fossil fuel-burning equipment in most new buildings (i.e., those that are less than seven stories) as of the end of 2025, and in all new buildings, with some exceptions, by the end of 2028.⁹³ Declines in the annual level of new business investment can also be driven by shifts in consumer thinking; whereas in recent years natural gas may have been the more obvious preference, some consumers may now choose electricity (or in some cases, propane) as their source of heating. We discuss these issues in more detail in Section 6.

As shown in Figure 5-6, nearly 60% of the New Business five-year CapEx forecast is made up of individual projects of less than \$15,000 and service line blankets.⁹⁴ It may be reasonable to assume that smaller projects are contemplated to serve fewer customers per project than larger scale projects. Additionally, approximately 5% of the new business forecast is earmarked for the conversion of commercial and residential customers to natural gas service from an alternate fuel.⁹⁵ PA encourages the Company to pursue NPAs that will allow them to avoid the installation of new mains and service lines to serve new gas customers. While we do not expect that the full 65% of the new business forecast (smaller projects/service blankets plus conversions) could be avoided in favor of successful NPAs, any avoided capital investment can serve to reduce customer bills prospectively.

Figure 5-6: Central Hudson Forecast New Business CapEx (2025-29)



5.4 Distribution Improvements CapEx

As noted previously, investments to replace and reinforce the distribution system drive much of the five-year forecast, making up more than 77% of the overall forecast.⁹⁶ Moreover, annual investments in 2025-29 are projected to be materially higher than for the historical period 2018-24; the average annual distribution

⁹² Central Hudson does not identify the customer in the FLT Plan.

⁹³ See statements/targets pertaining to building and energy codes elaborated in the New York State Budget, Fiscal Year 2023-2024.

⁹⁴ “Service line blankets” refers to the manner in which Central Hudson aggregates capital investments related to service line installations. While larger, more complex projects requiring engineering design specific to those projects are typically installed under a single, unique work order, standard service line designs are developed, approved, and used for the completion of service line work. The service line “blanket” is the work order under which all service line costs are aggregated for accounting purposes.

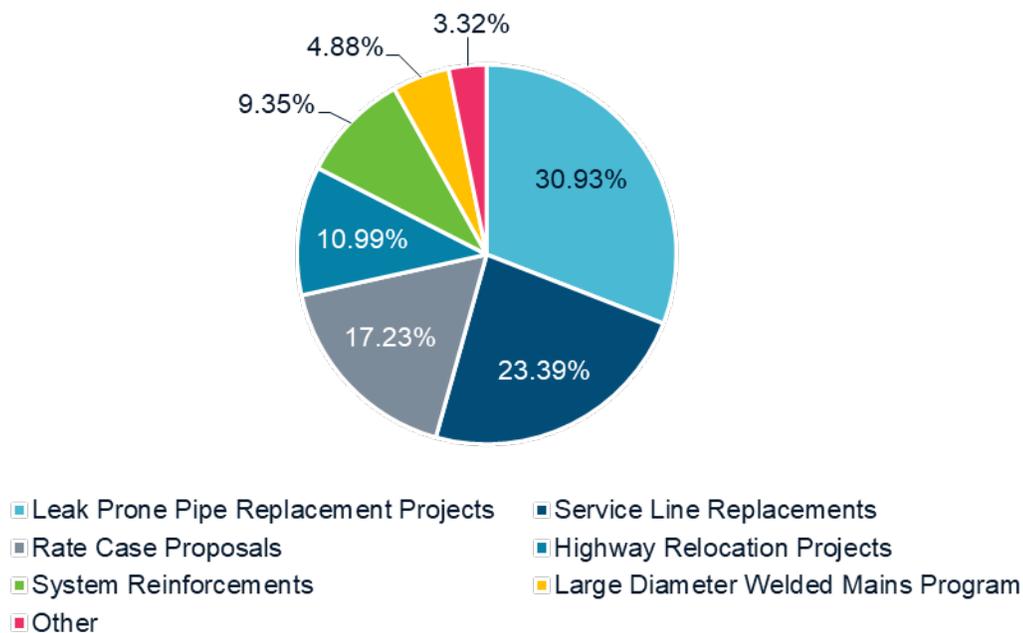
⁹⁵ Source: Company response to PA 8-118.

⁹⁶ Source: Company response to PA 8-118.

improvement investment in the forecast period is approximately 35% higher than in the historical period.⁹⁷ Most (roughly two-thirds) of the difference is attributed to new programs the Company has proposed in its pending rate case; we discuss those programs later in this report.

Figure 5-7 summarizes the Company’s forecasted Distribution Improvements by investment type. We have investigated the drivers of these investments and discuss below several of the programs and areas of investment focus identified in the FLT Plan and in the Company’s currently pending rate case.⁹⁸

Figure 5-7: Central Hudson Forecast Distribution Improvement CapEx (2025-29)



5.4.1 Leak Prone Pipe (Distribution Main and Service Lines)

The Company classifies leak prone pipe as cast iron, wrought iron, and steel pipe that is either bare or ineffectively coated and not cathodically protected. The Company indicates it has approximately 67 miles of leak-prone distribution main, along with 3,517 leak-prone service lines, in service as of the end of 2023.⁹⁹ As shown in Figure 5-8 and Figure 5-9 below the Company continues to make steady progress towards eliminating this higher-risk infrastructure from its system, consistent with the forecasted CapEx supporting the FLT Plan.

⁹⁷ Source: Company responses to PA 2-39, 4-79 and 4-80.

⁹⁸ Source: Direct Testimony of Gas Capital and Operations Panel, Case 24-G-0462.

⁹⁹ Source: Company response to PA 1-7. The Company’s response to PA 2-40 indicates that the number of LPP services reflected on p. 26 of the RLT Plan V2 is incorrect. PA also notes that the Direct Testimony of the Gas Capital and Operations Panel filed in the pending rate case reflects a different number of LPP service lines. PA has derived annual replacements from amounts included in the CapEx forecast provided in PA 8-118. PA does not expect that the differences in the data will impact the Company’s plans to remove all LPP service lines by the end of 2030, which is the final year such investments are reflected in the forecast.

Figure 5-8: Central Hudson Miles of LPP Main in Service as of December 31¹⁰⁰

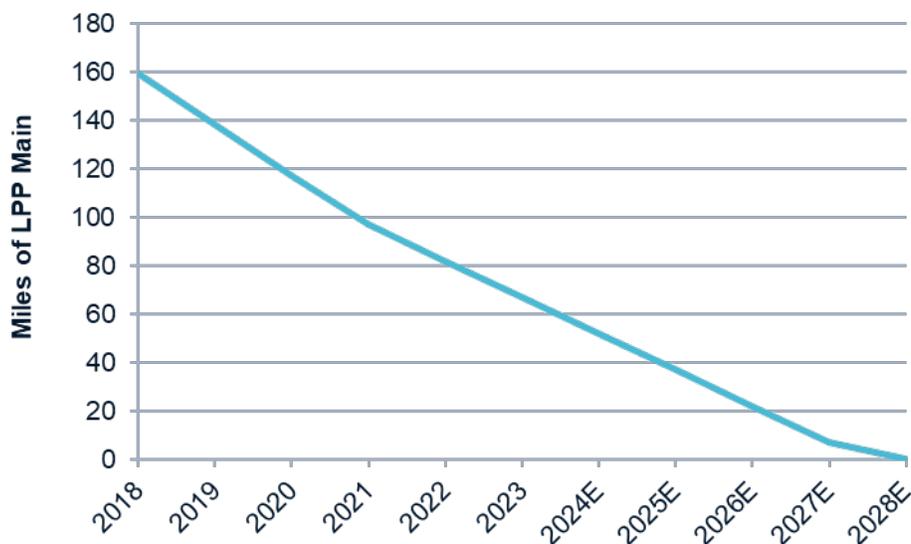
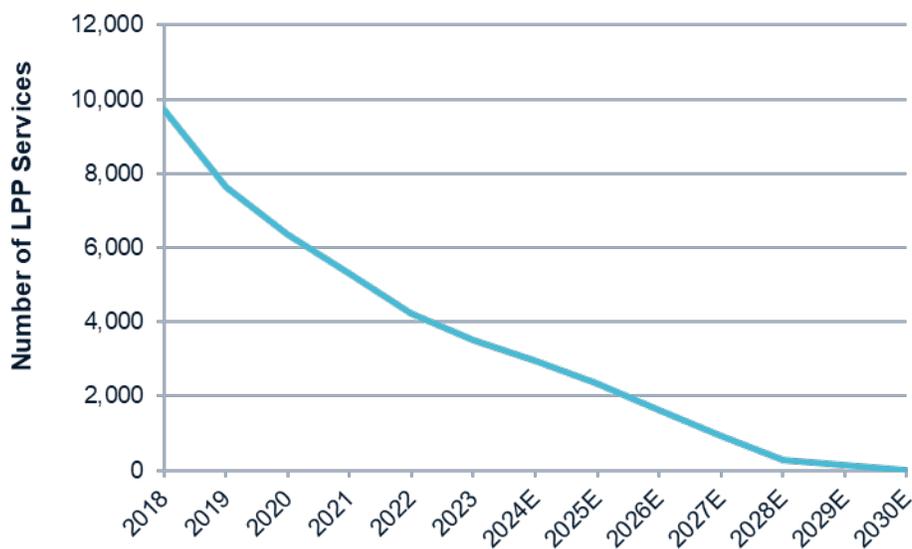


Figure 5-9: Central Hudson Number of LPP Service Lines as of December 31¹⁰¹



Under its 2021 rate plan, the Company was required to eliminate at least 15 miles of LPP main per year; that same minimum target continues in the most recent rate case.¹⁰² In its rate case currently pending before the Commission (Case 24-G-0462), the Company has proposed to continue the 15 miles per year target which would eliminate all LPP main by the end of 2028. Under this program, leak-prone service lines associated with LPP mains are also replaced.

During the period 2018-24, approximately 32% of the Company’s Total CapEx is related to its LPP replacement program, compared to approximately 28% as projected for the period 2025-28.¹⁰³ These levels of investment do not, however, reflect the total investment to eliminate LPP from the system. LPP mains are eliminated outside of the “program,” per se, when completing projects to remedy undermining of cast iron mains and work required to avoid conflict with public road construction, among other types of projects.¹⁰⁴

¹⁰⁰ Source: Annual Gas Distribution System Reports to PHMSA; 2024 and beyond reflect estimated amounts based on the CapEx forecast and the requirement to eliminate a minimum of 15 miles of LPP main annually.

¹⁰¹ Source: Annual Gas Distribution System Reports to PHMSA.

¹⁰² Source FLT Plan, p. 27, and the Commission’s Order in Case 23-G-0419, p. 64.

¹⁰³ Source: Company responses to PA 2-39, 4-79, 4-80 and 8-118. As all LPP mains are targeted for replacement by the end of 2028, there is no associated CapEx in the Company’s forecast for 2029.

¹⁰⁴ Source: Company response to PA 11-149.

5.4.2 Leak-Prone Service Lines Program

Central Hudson proposed a new program in its recently completed rate case to replace LPP service lines that are not associated with LPP mains being replaced. The Company proposed to continue the program in the currently pending rate case. If approved, the Company plans to complete these replacements (1,224 in total) within 7 years (or by the end of 2030).¹⁰⁵

PA considers it reasonable and appropriate to continue to pursue the retirement of leak-prone infrastructure, including under a new program for leak-prone service lines that serves the same purpose as the LPP main replacement program. The figures below demonstrate the avoided leak/leak repair benefits that have been derived from removing LPP infrastructure from the system in recent years. As shown in Figure 5-10, the number of leaks repaired on mains, per 100 miles of main in service, dropped by approximately 50% between the end of 2018 and the end of 2023. Further, Figure 5-11 indicates that the number of total leaks repaired (on both mains and service lines) in 2023 were roughly 50% of the number repaired in 2018. Finally, Figure 5-12 demonstrates that the number of annual corrosion-related leak repairs (on mains and service lines) has decreased by more than 50% in the same 2018-23 period. It is reasonable to conclude that retirement of leak-prone infrastructure is directly related to the decline in leaks and leak repairs.

Figure 5-10: Central Hudson Main Leaks Repaired per 100 Miles of Main¹⁰⁶



¹⁰⁵ Source: Company responses to PA 2-41 and 8-118. In the recent rate order, the Commission approved this and other programs for the term of that order. PA also observes that the Direct Testimony of the Gas Capital and Operations Panel in the pending rate case identifies a different number of remaining LPP services.

¹⁰⁶ Source: Annual Gas Distribution System Reports to PHMSA.

Figure 5-11: Central Hudson Total Leaks Repaired¹⁰⁷



Figure 5-12: Central Hudson Total Corrosion Leaks Repaired¹⁰⁸



We recommend the Company aggressively pursue NPAs where feasible to avoid the incremental CapEx associated with replacing leak-prone mains and service lines.

Replacement of Service Lines

The Distribution Improvements CapEx forecast includes the replacement of service lines (apart from those that are directly connected to transmission mains as discussed below) representing approximately 18% of the overall CapEx forecast for 2025-29. PA recommends the Company aggressively pursue electrification of these customers; some portion of the forecasted investments can be avoided with individual customer decisions to exit the gas system.

5.4.3 System Reinforcement

PA observes that a key area of focus of the FLT Plan are segments of the distribution system that the Company has determined to be “highly loaded,” as explained previously. Approximately 7.2% of the Total CapEx forecast for 2025-29 makes up projected reinforcements of the overall gas distribution system; these

¹⁰⁷ Ibid.

¹⁰⁸ Ibid.

are projects required to maintain design day operating standards and ensure reliability.¹⁰⁹ However, and unexpectedly, it appears that only three of those reinforcement projects in the CapEx forecast is associated with an identified highly loaded system segment. Table 5-3 summarizes Distribution Improvement investments planned for the period 2024-28 in highly loaded segments.¹¹⁰

Table 5-3: Distribution Improvements CapEx in Highly Loaded Segments (\$000)¹¹¹

	2025	2026	2027	2028	2029
LPP	\$10,512	\$10,970	\$0	\$6,663	\$0
Reinforcement ¹¹²	\$0	\$3,563	\$3,097	\$3,157	\$3,228
Other	\$3,707	\$3,401	\$3,6800	\$2,5210	\$2,255
Total	\$14,219	\$17,933	\$6,777	\$12,341	\$5,483

Interestingly however, hydraulic models of the Highland Mills (HM) system suggest that system reinforcements ARE contemplated; referring again to Table 4-1, the modeled hourly gas flow in 2026 exceeds the flow in 2024, however the lowest pressure in that model is much higher (62% of MAOP in 2026-27 vs 37% in 2023-24). These results imply a reinforcement has been assumed and built into the hydraulic model in the intervening years.

PA observes other potential inconsistencies between the FLT Plan and the CapEx details provided by Central Hudson:

- Alongside the lack of identified, projected reinforcement investments in the highly loaded systems, the Company appears to have invested minimal capital in recent years in those same systems; of all system reinforcement investments made from 2018-23, less than 7% of those investments were made in the highly loaded segments (equating to approximately 0.2% of total CapEx over that period).¹¹³
- The forecast appears to include material CapEx to reinforce the Highland Falls system (which is not categorized as a “highly loaded system”), yet according to the FLT Plan that system is not expected to be as much as 30% loaded throughout the forecast period, even without reinforcement.¹¹⁴
- The system reinforcement CapEx forecast is fairly constant from 2025-29 and grows with inflation thereafter. There being no identified reinforcements in the near term, PA concludes that there are also no identified reinforcements of the highly loaded systems after 2029. Further, the FLT Plan identifies several distribution system segments as having a 5% or greater likelihood of triggering a growth-related infrastructure investment by 2034.¹¹⁵ Once again, there appears to be no related reinforcement investment in the CapEx forecast through 2034 in these areas.

¹⁰⁹ Source: Company response to PA 8-118.

¹¹⁰ Source: Company’s updated response to PA 8-121, Attachment 1. PA is unable to comment on whether LPP or other investments will also reinforce the distribution system.

¹¹¹ Source: Company’s updated response to PA 8-121 received on January 9, 2025. Historical CapEx values are nominal and forecasted values reflect inflation, unless otherwise specified.

¹¹² The three reinforcement projects appear to also be associated with relocations work for highway relocation projects.

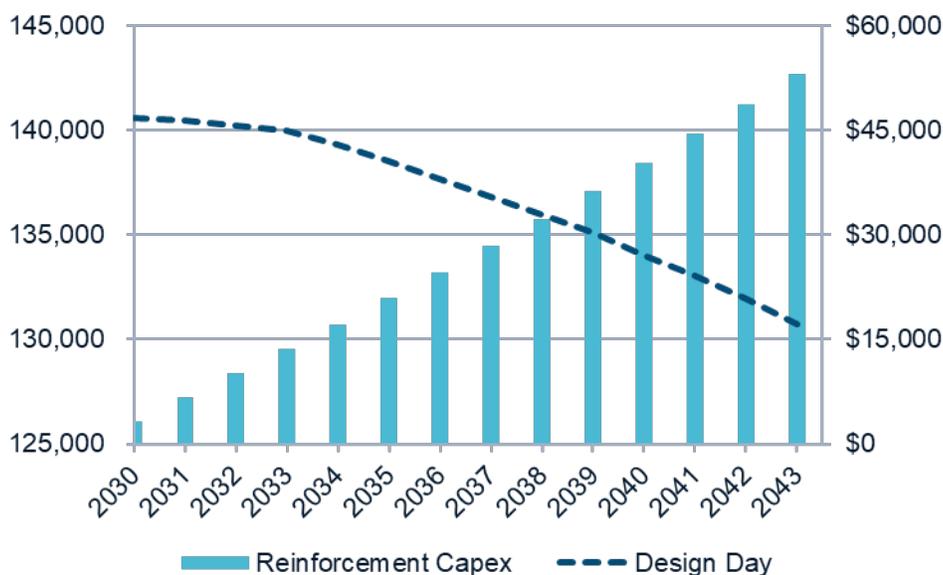
¹¹³ Source: Attachment 1 to PA 8-121.

¹¹⁴ Source: FLT Plan, Appendix A, Table 3. Further, the Highland Falls system is not identified as a highly loaded system on page 35 of the FLT Plan.

¹¹⁵ Source: FLT Plan, p. 35 lists five such systems; Poughkeepsie-Newburgh (PN), Highland Mills (HM), Kingston-Saugerties (KS) High Pressure, Poughkeepsie Medium (PM), and Titusville-Pleasant Valley (TVPV). Appendix A, Section 6 to the FLT Plan provides additional discussion of these systems.

- The design day demand forecast does not appear to support the premise that continued reinforcement of the distribution system will be required, particularly after 2029. That being the case, it appears that reductions to the later years of the 20-year CapEx forecast may be achievable. Figure 5-13 below reflects the Company’s cumulative investment in distribution system reinforcements from 2030-2043, along with the Company’s forecast of design day demand over time under the CCA scenario. While it is reasonable that isolated reinforcements may be needed even as overall demand drops, the declining demand day forecast does not seem to support consistent, ongoing investments to reinforce the distribution system.

Figure 5-13: Central Hudson CCA Design Day Forecast vs. Cumulative Reinforcement CapEx 2030-43 (\$000)



PA recommends Central Hudson address these potential inconsistencies and explain why projected reinforcements of the distribution system are expected to focus on areas that have not been identified as highly loaded. PA acknowledges the Company’s recent updated response to PA 8-121 (provided on January 9, 2025), however as noted previously there still appear to be disconnects between projected system reinforcement investments and the demonstrated need for such reinforcements based on the outputs of the Company’s Monte Carlo and hydraulic modeling analyses.

PA does appreciate that summary information such as the data shown in Table 4-1 cannot always tell the entire story. For example, PA understands that the Poughkeepsie LP (PLP) system is receiving the indirect benefit of reinforcing the system when mains are replaced as part of the Leak Prone Pipe Program. Still, PA recommends that the Company better synchronize the results of its various models and ensure that its CapEx forecast is consistent with those results to the extent they are viewed as reliable modeling tools..

5.4.4 Large Diameter Gas Welded Pipe Replacement Program

The Company describes in the FLT Plan a replacement program targeting large diameter (defined as 6-inch and larger) welded steel pipe. The program targets risks associated with oxy-acetylene welded steel pipe installed prior to 1940. Threats associated with this asset type were first identified in 2012.¹¹⁶ The program has been in place for at least five years;¹¹⁷ since the end of 2017 and through 2023, the Company has reduced its targeted pipe inventory under this program by more than 25% through investments totaling nearly \$44 million.¹¹⁸ The Company plans to invest more than \$3.0 million in the program in 2024, and the five-year forecast for 2025-29 includes another \$15.6 million¹¹⁹ representing approximately 3.8% of the overall CapEx

¹¹⁶ Source: Company response to PA 4-78.
¹¹⁷ Source: Company response to PA 2-42.
¹¹⁸ Source: Company response to PA 2-42.
¹¹⁹ Source: Company response to PA 8-118.

forecast for 2025-29. Some, but not all, pipe to be replaced under this program is also LPP and is prioritized along with LPP generally.¹²⁰

Central Hudson has indicated that completion of this program is scheduled for 2045¹²¹; its 20-year CapEx forecast is consistent with that completion date. PA agrees that the Company should continue to replace these pipelines due to the inherent risks to safety and reliability of retaining them as part of the distribution system.

5.4.5 Distribution Improvement Programs – Rate Case Proposals

While not called out specifically in the FLT Plan, PA has evaluated other programs recently approved in the Commission's most recent rate order for the Company, in Case 23-G-0419, that will address specific safety and reliability risks. These programs were described in rate case documents and included in the forecast detail provided to PA by the Company.¹²²

5.4.6 Transmission Services Elimination Program

The Company will implement a program to eliminate gas service lines that are directly connected to a transmission pipeline operating at a supply pressure greater than 125 psig. These service lines, also known as farm taps, require two stages of pressure regulation, versus traditional service lines that require one regulator (or if served by a low-pressure distribution main, no regulator). The Company no longer installs services to individual customers directly from its transmission system.

As described in the Company's pending rate case (Case 24-G-0462) by the Company's Gas Capital and Operations Panel, "in the event of pressure regulation equipment failure or damage, there is a higher risk of a catastrophic event involving high pressure natural gas venting near a structure intended for human occupancy due to the higher potential volume of gas that could be released from a transmission service compared to a gas service supplied from a distribution system. Transmission services therefore could pose a serious risk to inhabitants and first responders."¹²³

Under this program, the Transmission Service would be eliminated by installing new distribution main along with a new service line. Transmission Services can also be eliminated by implementing NPAs, negating the need for new gas infrastructure. The program represents approximately 3.3% of the overall 2025-29 forecast.

PA agrees that these safety-related investments would serve to mitigate risk. As is the case with replacement of LPP, we recommend the Company continue to test and pursue NPAs to avoid the incremental CapEx required to upgrade facilities and retain these customers.

5.4.7 Compression Coupling Neighborhoods Program

The Central Hudson distribution system includes approximately 20 miles of main installed during the 1940s through 1980s whose joints (or lengths) of pipe were connected via compression couplings rather than being welded (steel) or fused (plastic). While this asset type is not considered LPP, the Company's Distribution Integrity Management Program (DIMP) Plan has identified these facilities as a safety threat due to the potential for freeze/thaw cycles to induce new stresses on the materials. The Company proposed in the pending rate case (Case 24-G-0462) to continue a program to replace the main as well as approximately 1,800 service lines, with 4.4 miles of main targeted for the period 2025-28.¹²⁴ The program represents approximately 4.7% of the overall 2025-29 forecast. PA also observes that, based on the 20-year CapEx forecast, the Company plans to complete this program by the end of 2034. Notably, there is a significant ramp-up starting in 2029, as more than 80% of program investment occurs in 2029-34. PA agrees that addressing these risks is appropriate.

¹²⁰ Source: FLT Plan, p. 28.

¹²¹ Source: Updated Company response to PA 4-78.

¹²² Source: Company response to PA 8-118. As discussed previously, budgets approved specifically for these programs may be lower than the Company's forecast for 2024 and 2025. The Company's Gas Capital and Operations Panel once again discusses these programs in its direct testimony in Central Hudson's pending rate case, Case 24-G-0462.

¹²³ Source: Direct Testimony of the Gas Capital and Operations Panel, p. 38 (August 1, 2024) in Case 24-G-0462.

¹²⁴ Source: Direct Testimony of the Gas Capital and Operations Panel (August 1, 2024) in Case 24-G-0462.

5.4.8 River/Creek Crossing Reinforcements Program

The Central Hudson pipeline system includes five (5) crossings of the Hudson River as well as more than 125 creek crossings. The Company proposed in the pending rate case a program to either re-install its pipelines beneath the bed of the river or creek, or otherwise reroute the pipeline strategically. Central Hudson proposed to address a subset of these crossings with investments each year beginning in 2025.¹²⁵ This program represents approximately 2.5% of the overall 2025-29 forecast. PA agrees that any program that addresses the ongoing safety, integrity and reliability of its delivery system is appropriate.

5.5 CapEx Considerations Summary

PA has identified specific types of CapEx that the Company may have the opportunity to avoid. When taken together, more than 28% of the overall capital forecast for 2025-29 consists of investments in service line replacements (many of which are associated with the replacement of LPP mains), smaller new business projects, customer conversions, and elimination of transmission service lines. Avoidance of these investments depends (in most, if not all cases) on a single customer decision to either discontinue or forego the use of natural gas, rather than the agreement of multiple customers such as when considering whether an NPA is feasible to allow abandonment (rather than replacement) of LPP mains.¹²⁶ PA does not assume that the Company can reduce this level of future investment in its entirety through successful NPA implementation under current policies. Still, to illustrate the potential power of NPAs, even only a 10% reduction in each of these investment types annually in 2025-29 equates to several million dollars of avoided investment. Apart from these areas, and as noted previously, it may be possible to further reduce the 20-year CapEx forecast as potential distribution system reinforcement requirements are evaluated in the context of design day demand growth projections.

5.6 Recommendations to Improve Future GSLTPs

Recommendations for the Company to improve the CapEx components future GSLTPs are summarized below.

1. Ensure that the need for reinforcements of the distribution system is clearly communicated. Synchronize the results of various models and ensure that the CapEx forecast is consistent with those results to the extent they are viewed as reliable modeling tools. Address potential inconsistencies and explain, as necessary, why the majority of projected reinforcements of the distribution system are expected to focus on areas not identified as “highly loaded”.¹²⁷
2. Develop and provide detailed CapEx forecasts for the Company’s preferred scenario, No New Infrastructure.

¹²⁵ *Ibid.*

¹²⁶ As a point of reference, PA notes that Table 11 in Appendix A to the FLT Plan assigns a 44% probability of gas pipe abandonment when only one customer is involved in the decision.

¹²⁷ In its Reply Comments, on p. 11, the Company states that the capital plan described in the RLT Plan V2 includes focused reinforcements on highly loaded systems. Information provided to PA does not appear to be consistent with that statement.

6 Demand Assessment

PA has reviewed the Company’s demand and load forecast as presented in the ILT Plan, RLT Plan V2, FLT Plan, and responses from the Company to several related data requests. Based on our analysis, PA believes three main dynamics will shape the Company’s forecasted annual sales and peak demand:

- Declining organic growth in customer counts driven by evolving service territory demographics (i.e., macro-economic factors),
- Some appropriate level of sustained additions to customer counts due to customers switching from fuel oil, wood, etc. to natural gas as the primary heating fuel, and
- Downward pressure on customer counts, UPC and sales from electrification and EE – a combination of gas customers installing heat pumps and leaving (or reducing reliance on) the gas system and falling UPC - propelled by a combination of climate change, technological change, state and federal policy evolution, and local laws.

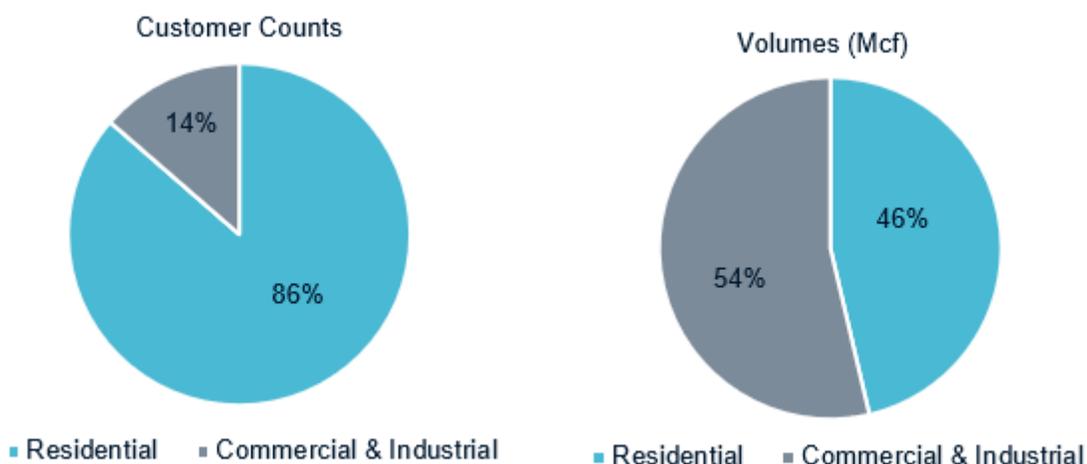
We first discuss the composition of the Company’s customer base and forecasted customer counts, then we observe how these dynamics impact forecasted residential customer counts. Next, we discuss our observations on several factors influencing structural changes to usage patterns, namely residential household size and electrification of end-use trends. Lastly, we examine the implications of changes to customer counts and UPC on sales and peak day demand.

PA anticipates lower customer growth and a UPC decrease faster than projected by the Company. These factors will lead to lower annual sales and peak demand than forecasted by the Company. PA explored the critical demand aspects of the Company’s long-term gas plan, including further Company analyses, Stakeholder comments, and policy considerations in preparation of this Final Report.

6.1 Customer Base Growth

The vast majority of the Company’s customers are residential customers who use gas for heating, although a small number of non-residential customers contribute a larger proportion of gas sales than residential, as illustrated in Figure 6-1. While 86% of customers are residential, only 46% of total volumes are associated with this segment. Approximately 20% of annual gas volumes are for interruptible customers, who are required to curtail gas use in full when called upon. The Company also offers optional interruptible rate plans for large gas customers to pause service for select hours of high demand, as a part of its overall rate structure.

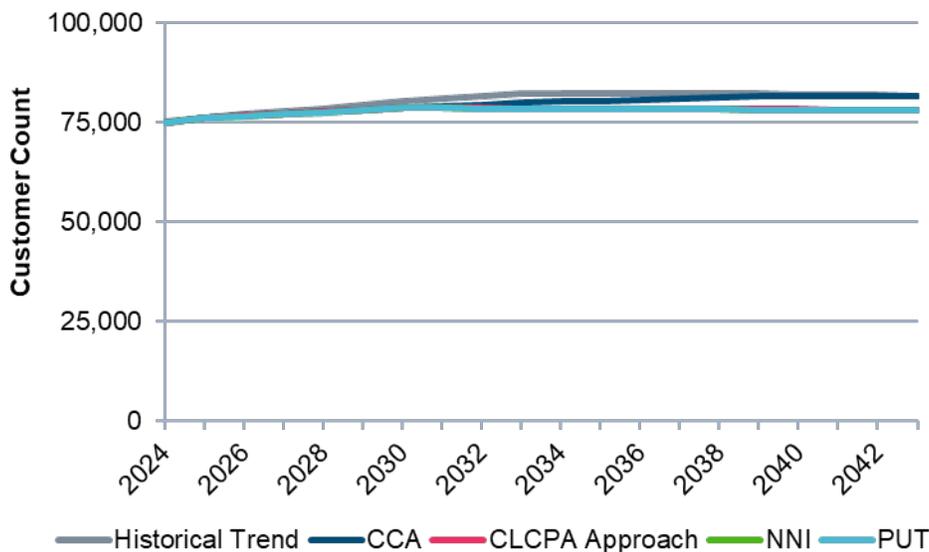
Figure 6-1: Customer Count and Sales Volume by Class (as of December 2023)



PA has reviewed several data sources to assess the Company’s historical and forecasted customer counts. First, PA observed the Clean Heat Program data provided by the Company shows an acceleration of installs in Category 2 (decommissioning) and expects year-end 2024 results much higher than 2023 year-end. Additionally, in Appendix A Section 5.2 of the FLT Plan, PA observed the Company identifies a small share

of customers installing whole home cold-climate heat pumps. In Figure 6-2 below, we observe forecasted residential customer counts to be increasing in the Historical Trend while the scenarios exhibit trajectories with a slight rise to flat growth in customers. In our Preliminary Findings Report, our analysis suggested that the historical trend-based approach used by the Company to forecast future customers does not accurately capture or reflect all the forces impacting customer growth. PA anticipates a slowdown in population growth and continued downturn in household growth will negatively impact the Company’s forecasted constant customer counts after a short period of relative customer count increase for all scenarios. In the FLT Plan, the Company suggests it has revised forecasted customer count methodology to incorporate historical and forecasted household growth in 20 years, leading to lower levels of forecasted account growth than historical trends. In our review of the FLT Plan customer forecast by scenario, PA observed a change in Historical Trend customers, but not the other scenarios (as we had expected). PA believes that a combination of declining share of new construction and a rising propensity of fuel-conversions favoring electrification ought to affect the scenario forecasts – leading to a declining trend, albeit not to the extent seen in the Historical Trend. Our analysis is discussed in detail within the following sections below.

Figure 6-2: Company’s Forecasted Residential Customer Counts Under the Four Scenarios¹²⁸



6.1.1 Heating Fuel Conversions

PA observes a very pertinent characteristic of the Company’s territory is the dominance of FO as the current heating fuel. Based on data provided by the Company, the average annual pace of customers converting to natural gas from other heating fuels appears to be decreasing. A comparison of data for the 2017-23 and 2020-23 time periods suggests a decline in average annual conversions from 472 to 453.

- In a meeting on May 8, 2024, the Company reported that during 2020-23 it had 1,811 conversions from other heating fuels to natural gas – 453 per year on average over four years. (Note: If 93% of the conversions are residential as reported by the Company, the average annual conversion rate of residential customers from other heating fuels to natural gas is 421. The Company further estimated 75% of those conversions were from FO, implying the addition of roughly 315 formerly FO residential customers per annum over the most recent four years).
- However, in response to PA 3-72, the Company indicated 3,304 customers switched from other heating fuels to natural gas during the 2017-23 period, implying an average annual conversion of around 472 customers. (Note: If 93% of the conversions are assumed to be residential, the average annual conversion rate of residential customers from other heating fuels to natural gas is 439.)

Based on this data, the average number of customers switching from other heating fuels to gas over the most recent four years, 453, is lower than the 472 average number of customers that switched to natural gas from

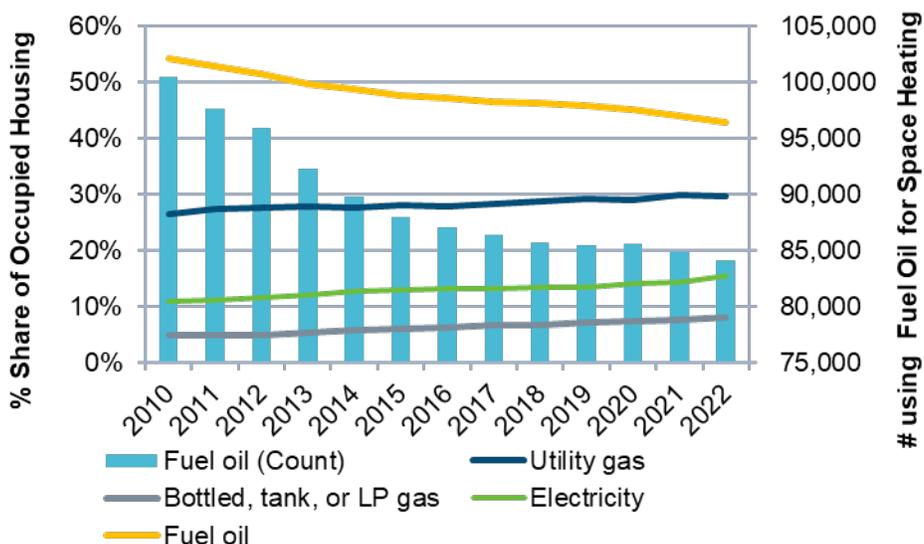
¹²⁸ Source: Company response to PA 16-167, Attachment 1.

other heating fuel sources over the past seven years – an apparent decrease in the average number of converting customers each year.

PA obtained county level data for Selected Housing Characteristics published by the American Community Survey (ACS)¹²⁹ for the largest concentration of population in the service territory, represented in Dutchess, Ulster, and Orange counties, in order to independently gauge heating fuel choices in the Company’s service territory. PA’s analysis of ACS data suggests that the pace of conversions of other heating fuels has risen in recent years. A key characteristic of the Company’s footprint is the wide diversity in space-heating fuels used by residential customers. PA’s review of ACS data finds FO the dominant primary heating fuel, as of 2022. As Figure 6-3 shows, while there has been a steady decline in both the absolute number and the share of these households, FO accounts for a significant percentage of the area’s housing units. The combination of improved technology, changing consumer preferences, and better economics had led to a steady migration of residents switching from FO since 2010. Data shows that between 2010 and 2022, homes with FO heating dropped from over 100,000 in 2010 (accounting for a 54% share) to 84,000 in 2022 (a 43% share).¹³⁰

PA’s assessment of the Company’s New York State’s Clean Energy Program progress data¹³¹ reveals, while a substantial fraction of former oil-consuming households elects to install heat-pumps for space-heating purposes, the implication is that a sizeable number of potential new customers may exist; however, natural gas is likely to absorb only a fraction.

Figure 6-3: Central Hudson Residential Space Heating Fuels¹¹⁹



6.1.2 New Construction

In its FLT Plan, the Company states that the CLCPA and NNI Scenarios assume caps on new connections starting 2026. During PA’s review it was observed that the new construction caps under the NNI scenario were adjusted to 2026, from 2030 (in the ILT Plan and RLT Plan V2). For residential heat-pump installations shows that 8.1% of heat-pump installations by 2043 can be attributed to new construction (i.e., Codes & Standards) in the CCA scenario. However, upon reviewing PA 16-167, PA was unable to confirm the extent

¹²⁹ Source: <https://data.census.gov/table?q=DP04>. PA studied data for Dutchess, Ulster, and Orange counties in New York. The Company’s gas service territory covers practically the entire Dutchess County, roughly 75% of Ulster County that includes the major population and commercial centers and the northeast region of Orange County that accounts for approximately 20% of its population. It is salient to note that while Orange County has experienced substantial growth in recent years, those population gains are almost entirely outside the Company’s footprint. In fact, the population trends in the relevant Company Orange County towns/cities – Newburgh, Woodbury, New Windsor etc. – resemble those in the other two counties. For this analysis, we omitted Columbia and Greene counties as the Census does not provide data, and, therefore made assessments based on Dutchess and Ulster counties – which represent about 85% of its customer-base.

¹³⁰ The rising share of ‘container’ gas (mainly propane) indicates that some homes formerly relying on Fuel Oil, wood, coal etc. are considering ‘container’ gas as the primary heating fuel.

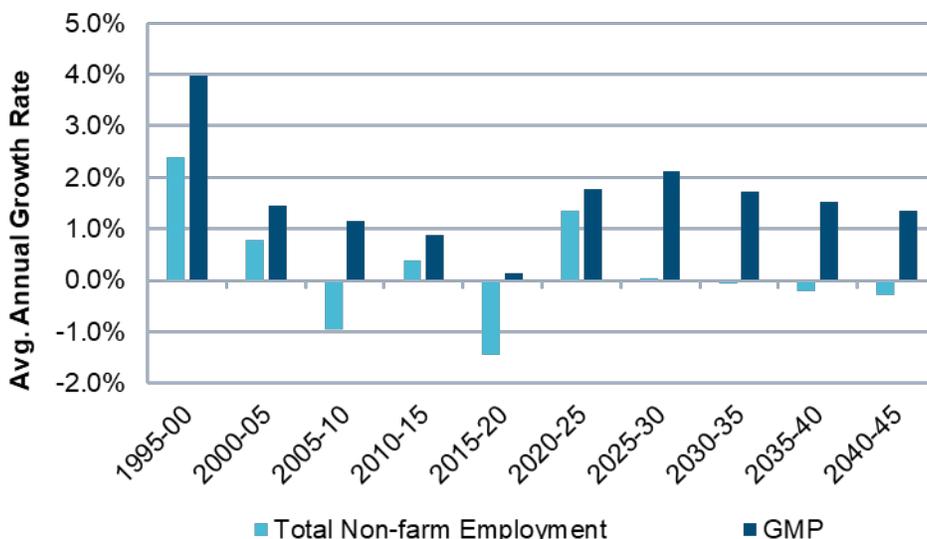
¹³¹ Source: Company response to PA 1-33 and PA 10-138.

to which this assumption is reflected within the customer count, volumetric, and demand forecast. However, PA would expect that lower trends in new construction would result in limited impacts on customer counts.

6.1.3 Service Territory Demographic Patterns

PA’s analysis of data from Moody’s Analytics suggests the region’s economic growth had seen a decline since 2010 and underwent a noticeable setback because of Covid. However, due to the establishment of some state-owned facilities and new businesses, the region’s Gross Metro Product (GMP) has recovered from the previous recessionary period and is projected to show healthy growth. However, reflecting the area’s overall demographic patterns, Employment is forecasted to virtually stagnate. The region’s GMP is slated to grow at an average rate of 1.9% over the next decade as shown in Figure 6-4.

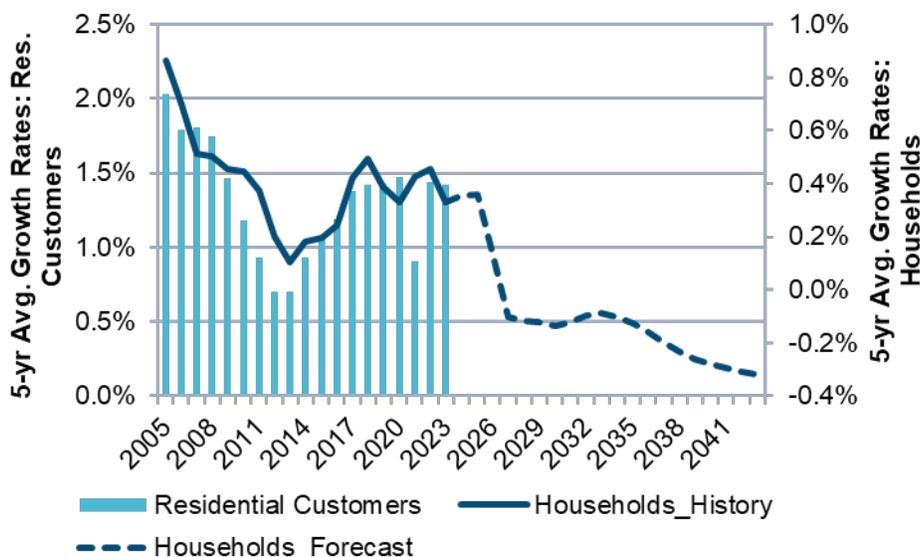
Figure 6-4: Moody's Analytics - Employments & Gross Metro Product



The population fell between 2010 and 2019, as well as the Covid era, then saw an inflow of residents – plausibly from the New York City area – adding to the customer-base. However, projections are for a resumption of a negative trend in population growth. Despite the demographic trends, household growth – the primary driver of residential and commercial customer growth – had also been fairly robust pre-Covid but the macro-economic forecast reflects a sustained decline going forward. Together, these patterns suggest headwinds with respect to future customer growth.

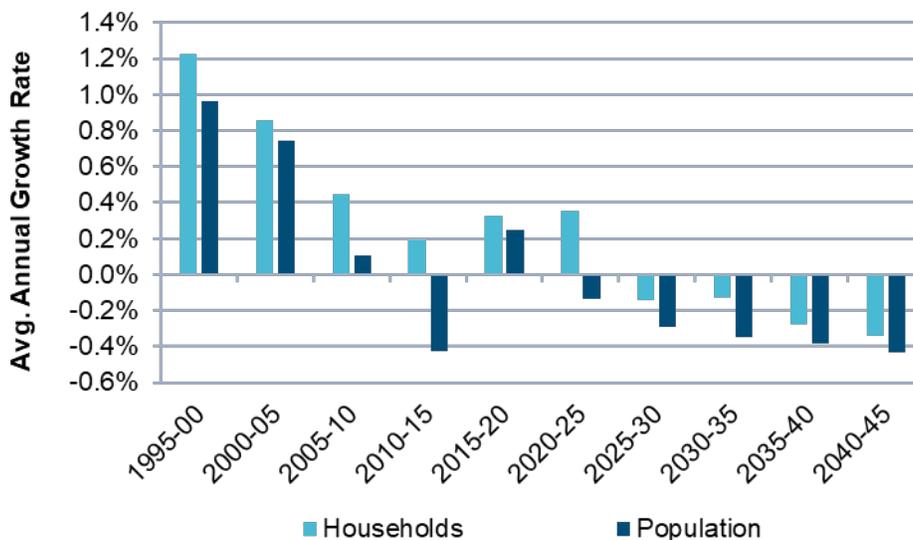
Figure 6-5 demonstrates the strong relationship between households and residential customers. As is the case for most gas utilities, growth of households – the chief driver of the residential customer-base – is accompanied by growth in housing and, hence, residential customers.

Figure 6-5: Moody's Analytics - Households vs. Residential Customers



Population trends also provide insights into gas customer growth. As shown in Figure 6-6, Moody's Analytics population data indicates that the Company's service territory¹³² is forecasted to experience declining population and household growth for the next two decades.

Figure 6-6: Moody's Analytics - Annual Population Growth Rate



Households, on the other hand, continued to exhibit positive growth reflecting an erosion in the number of persons per household (down from 2.8 persons per household in mid-1990s to 2.75 in early 2000s and at 2.56 in 2023). While a brief spurt in residential customers occurred due to a Covid-related influx of residents from elsewhere in the state, regional trends are expected to mirror the demographic patterns in Upstate New York in general with household growth turning negative by 2026 as reflected on the right-hand y-axis of Figure 6-5 above. Taken together, the data patterns signal an end to organic customer growth and, hence, the induced halt to expansion in housing stock and new construction. PA's analysis of data from the ACS¹³³ lends

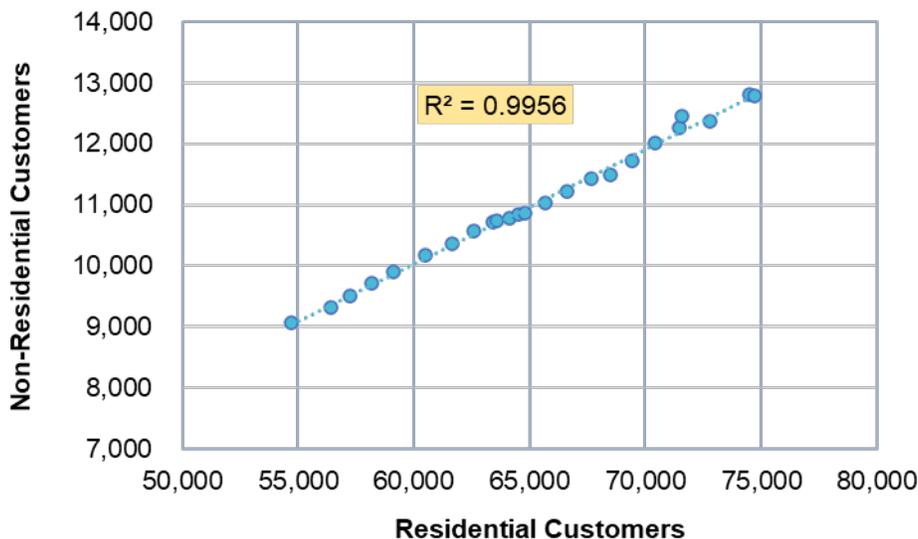
¹³² This assessment is based on Moody's Analytics data for Dutchess and Ulster Counties.

¹³³ Source: <https://data.census.gov/table?q=DP04>. PA studied data for Dutchess, Ulster, and Orange counties in New York. The Company's gas service territory covers practically the entire Dutchess County, roughly 75% of Ulster County that includes the major population and commercial centers and the northeast region of Orange County that accounts for approximately 20% of its population. It is salient to note that while Orange County has experienced substantial growth in recent years, those population gains are almost entirely outside the Company's footprint. In fact, the population trends in the relevant Company Orange County

support to this notion as it shows a sharp rise in occupancy rate since 2018 even in the face of growth in the housing stock.

Similar to many natural gas utilities, non-residential customer counts trend very close to residential customers. As shown in Figure 6-7 the Company’s customer counts for the 2000-23 period clearly illustrate the strong positive relationship. This relationship implies that the trajectory of residential customer count will result in a corresponding pattern for the combination of Commercial, Administrative/Government, and Industrial customer counts. Therefore, as organic residential customer growth turns negative, due to demographic factors, non-residential customer growth should experience a similar impact.

Figure 6-7: Company Customer Counts (2000-23) Non-Residential vs. Residential¹³⁴



PA anticipates a slowdown in population growth and continued downturn in household growth will negatively impact the Company’s forecasted constant customer counts after a short period of relative customer count increase for all scenarios.

6.1.4 Heat Pump Adoption

Driven by policy initiatives, evolving consumer preferences and improving technology, the rising trend in Residential and, to a lesser extent, Commercial natural gas customers installing air-source heat pumps (ASHP), ground-source heat pumps (GSHP), and heat-pump water heaters (HPWH) will lead to a reduction in customer growth and ultimately an attrition from the current customer base, both of which are assumed within the CCA Scenario.

According to the Company, since the advent of the Clean Heat Program in mid-2020 an average of 915 customers installed either an ASHP or a GSHP each year, with the rate seeing a sharp increase during the first half of 2024. In addition, the Company reports roughly 200 existing customers installed HPWH per year. While available data suggests a small fraction of such customers departing entirely from the Company’s gas system since 2020, PA anticipates an acceleration of this phenomenon. Additionally, even if customers switch out of gas for one or more end-uses and do not disconnect totally, their annual gas usage sees a dramatic drop, making them a fraction of the customer that they used to be in terms of sales. This impact on load is further discussed within the following section. Heat pump adoption is discussed in more detail in Section 6.2.4.

Based on the combination of these factors and analysis, PA observes that future residential customer growth is not likely to follow the historical trend. For instance, we understand the CCA Scenario reflects the impact of current and recently adopted policies increasing the adoption of heat pumps. In our Preliminary Findings Report, PA found that in the ILT Plan, the Company did not account for how the Inflation Reduction Act (IRA)

towns/cities – Newburgh, Woodbury, New Windsor etc. – resemble those in the other two counties. For this analysis, we omitted Columbia and Greene counties as the Census does not provide data, and, therefore made assessments based on Dutchess and Ulster counties – which represent about 85% of its customer-base.

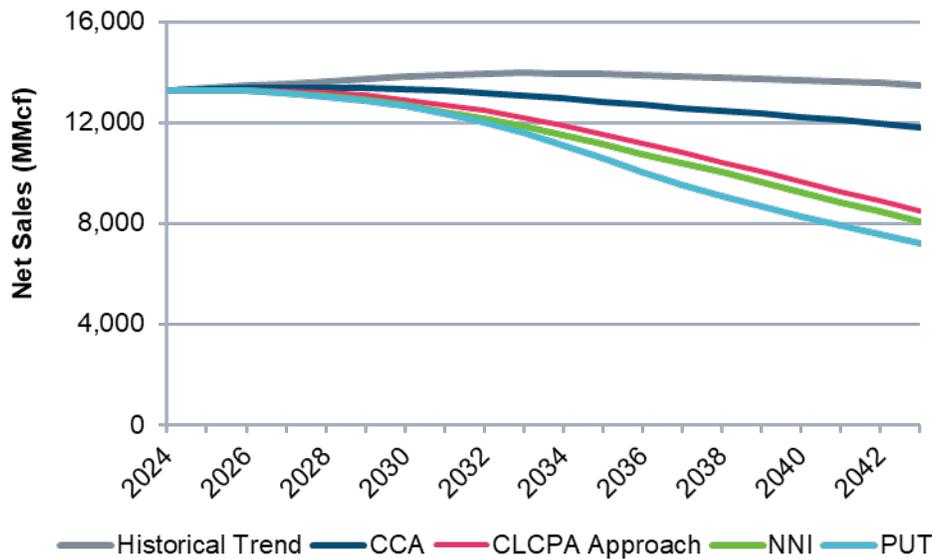
¹³⁴ Source: ILT Plan, Appendix 2, Table 1.

incentives can increase adoption of heat pumps in its service territory especially among the low income and disadvantaged communities. In the RLT Plan V2, the Company made an effort to account for the IRA incentives, but given the last-minute nature of these changes, PA was not able to comment on the reasonableness of these assumptions at that point. PA reviewed and discussed with Company SMEs the methodology and assumption used by the Company in the FLT Plan and believe the approach employed is reasonable.

6.2 Load Forecast

As previously discussed, the Company’s customer base is predominantly residential customers who use natural gas for heating, among other purposes. However, a smaller number of non-residential customers with higher UPC account for a larger proportion of gas sales. The Company presents its 2024-43 forecast of total gas sales for each of the four scenarios compared to a Historical Trend, as illustrated in Figure 6-8.

Figure 6-8: Company’s Forecasted Annual Net Sales Under the Four Scenarios (2024-43)¹³⁵



For the residential class, PA anticipates a decrease faster than the Company, due to ongoing demographic trends as discussed above, an accelerated adoption of heat pump and electric appliances, energy efficiency, and a tendency towards warmer winters. Reductions in gas sales will be further driven by the deployment of electrification-related state policy goals, rebates and incentives, and a shift in customer preferences.

Further support for a reduction of gas load is found in an analysis of the customer base. As noted above, across the service territory, the Company reports 309,000 electric customers, 90,000 gas customers, and 235,000 electric-only customers (those who do not receive gas). Importantly, of the 90,000 gas customers, 90.4% receive electric service from the Company.¹³⁶ Due to the high overlap of gas and electric customers in the service territory improving heat pump economics, potentially magnified if gas rates increase more than electric rates, the future likelihood for a gas customer to adopt an electric heat pump may increase. Heat pump incentive structure and adoption rates across New York are explored further in Section 6.2.4.

In summary, PA understands that the growth presented in the FLT Plan relies on a minority of FO customers choosing to convert to natural gas over electric, over the next 10-15 years. However, it is likely customer preference may trend toward electric conversions over that period especially driven by strong policy goals for electrification in New York. Concerted efforts will be required to incentivize customers to “leapfrog” the FO to natural gas decarbonization pathway and to leverage beneficial electrification when converting from other fuels. However, given the large percentage of the Company’s natural gas customers that also receive electric service from Central Hudson, fuel conversion customers provide a unique opportunity to incentivize

¹³⁵ Source: Company response to PA 16-167, Attachment 1.

¹³⁶ Source: FLT Plan p. 19.

electrification and avoid further investments in the expansion of the gas distribution network. These observations are further discussed within the sub-sections below.

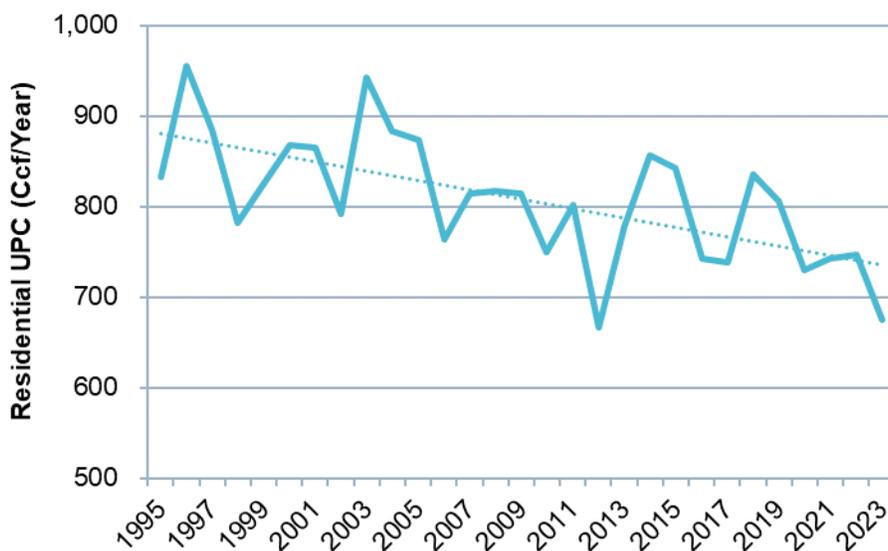
6.2.1 Usage Per Customer

In addition to the evolving customer counts previously discussed, PA observes several factors influencing structural changes to usage patterns, namely:

- Residential household size and
- Electrification of end-uses.

As Figure 6-9 shows, based on the Company’s annual billing data, the residential UPC has exhibited a pronounced negative trend since 1995. This trend has been fueled largely by climate change resulting in fewer HDDs and rising energy efficiency savings – due to a combination of increasingly efficient technology in gas furnaces, improved shell-efficiency, better temperature control mechanisms, etc.

Figure 6-9: Historical (Actual) Residential UPC (1995-23)¹³⁷



The historical trend reflects the sustained influence of legacy forces that have been in effect for years but may only partially capture the impact of phenomena that might have emerged recently. Therefore, merging forces and structural changes (e.g., heat pump adoption) are expected to add to this historical trend.

Household Size

Changing housing structures are likely to influence residential UPCs downward as falling household size is reflected in the rising relative share of multi-family housing units. Data from the ACS shows that in 2022, while multi-family units constituted only 20% of the housing stock, it was the only segment that saw growth in new construction, with apartment buildings comprising of 20 units or more growing 5.5% per annum since 2018. Since growth in the number of single-family units was almost stagnant over the last decade, housing trends point to smaller residential dwellings being added, which, in turn, imply declining average residential UPC.

Electrification

As previously discussed, as existing Residential gas customers electrify one or more end-uses, overall UPC is reduced. Based on end-use statistics data on regional housing structure from the ACS, the typical Residential customer uses 78% of annual gas consumption for space heating, 18% for water heating, and the remainder for cooking and clothes drying.¹³⁸ Even with a conservative assumption that the typical heat-pump

¹³⁷ Source: ILT Plan, Appendix 2, Table 1.

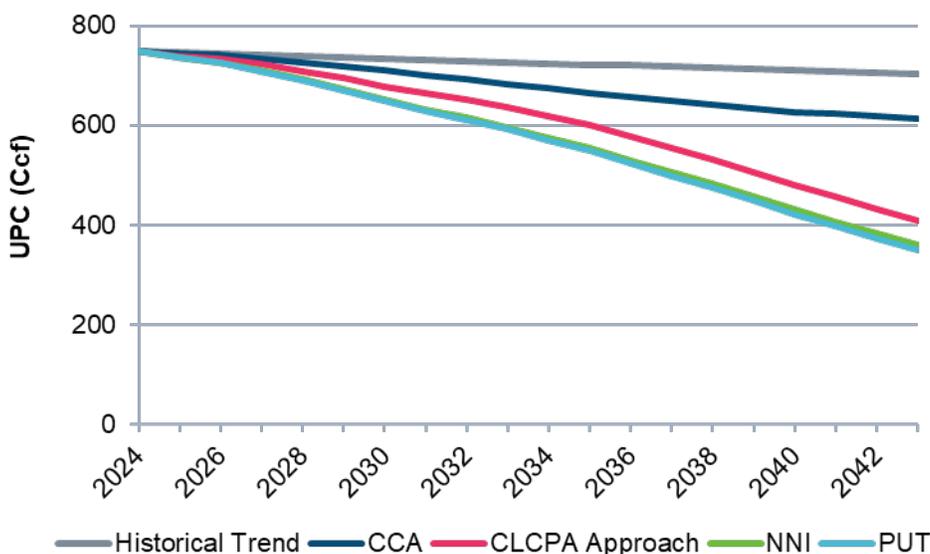
¹³⁸ Source: FLT Plan, p. 22.

offsets 70% of the heating load, a customer installing a heat-pump will see gas UPC drop to 40% of what it used to be.¹³⁹

In terms of usage patterns, in the FLT Plan the Company states that there has been a concerted decline in the average weather-adjusted residential annual UPC since 1995 due to a combination of Codes & Standards and energy efficiency measures.¹⁴⁰ We find it reasonable to expect that with growing efficiency impacts, weatherization etc., that trend will continue. The UPC forecasts shared by the Company for the four scenarios are presented against the historical trend for the residential and non-residential customer classes in Figure 6-10 and Figure 6-11 respectively.

In our review of the FLT Plan, PA observes that the Company’s Historical Trend Forecast for residential customers does now reflect a declining pattern, as shown in Figure 6-10 below; Based upon the Company’s Filed Reply Comments, we understand this change in UPC is the result of incorporating declining HDDs, as is further discussed in 6.2.5. However, we observe that the rate of decline is less than what we might expect if the impacts of heat-pump installations (leading to declining usage due to both decommissioning of connections and Partial-heat HPs) were also considered. PA would expect both the change in HDDs and heat pump installations would contribute to a sharper decline in the Historical Trend forecast, along with declines in the scenario forecasts.

Figure 6-10: UPC Forecast for Residential Customers (2024-43)¹⁴¹

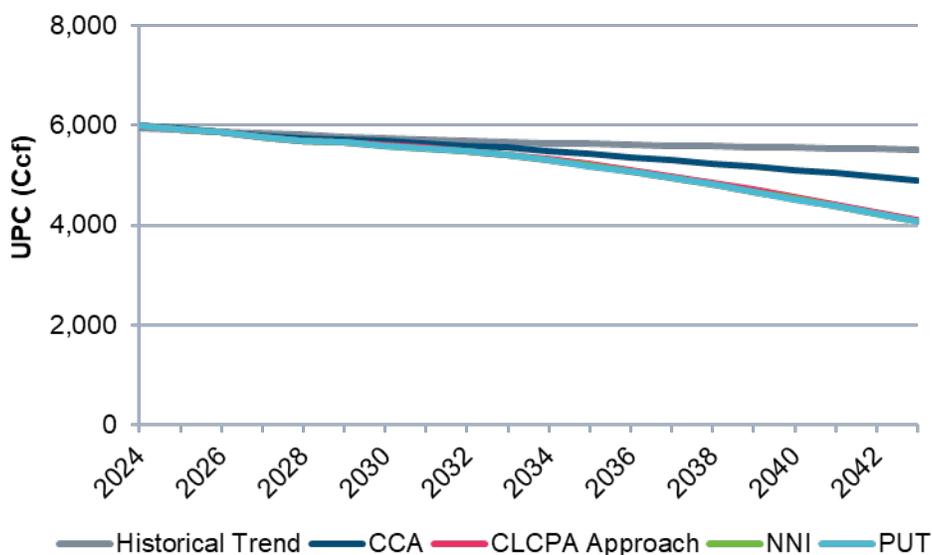


¹³⁹ Correspondingly, installing a heat-pump and a heat-pump water heater reduces the customer’s UPC to 23% of the pre-install level.

¹⁴⁰ "Overall, after controlling for weather, residential energy use declined by 7.1% on a per customer basis since 1995, an annual change in per capita use of 0.26% per year." p. 38.

¹⁴¹ Source: Company response to PA 16-167, Attachment 1.

Figure 6-11: UPC Forecast for Non-Residential Customers (2024-43)¹⁴²



The historical data for the non-residential segment indicates a declining trend as would be expected, and the historical trend forecast in Figure 6-11 above reflects the continuation of that pattern. While the updated historical trend forecast does have a negative trajectory like that exhibited in historical patterns, there appears to be a step-change that leads to the starting point somewhat inconsistent with what the trend would suggest. We think that the historical trend forecast ought to be another 5% lower than in the RLT Plan V2. Accordingly, this adjustment would flow through to the scenario forecasts.

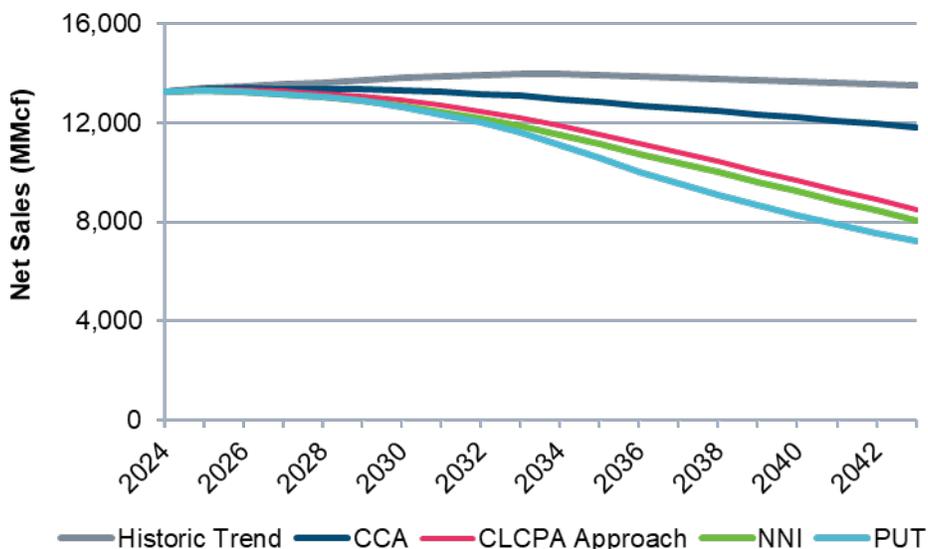
6.2.2 Net Sales

Our understanding is that the Company’s peak demand forecast model incorporates weather variables and is driven by the 12-month moving average residential heating customer level (i.e., the long-term peak demand forecast is a function of the customer forecast). The Company’s customer count forecast begins with a historical trend top-down forecast that reflects historical trends in customer growth and “shows a projection of that continued growth if none of the policy or decarbonization activities are implemented”.¹⁴³ The Company’s historical trend serves as the starting point from which the scenario forecasts are developed via modeled customer attrition, and UPC changes are layered on to yield the net sales forecasts, which then flow into Design-Day Daily Peak forecasts. See Figure 6-12.

¹⁴² *Ibid.* It is to be noted that the Company decided to structure its forecast such that Commercial and Industrial customers were combined in a single non-residential category.

¹⁴³ Source: Central Hudson FLT Plan. p. 36; This approach applies to both the customer counts as well as the typical use-per-customer and, hence, the sales volumes.

Figure 6-12: Central Hudson Forecasted Net Sales¹⁴⁴



Based on our analysis of using historical trends to forecast future customers as discussed in Section 6.1 above, our analysis of UPCs, and the resulting net sales, we observe the following:

Slowing population growth as forecasted by Moody’s Analytics and the resulting reductions in household growth imply organic customer growth (including growth from new construction) will turn negative in a few years.

- As shown above, growth for the non-residential customer base is very closely tied to the residential customer base. Therefore, the dynamics impacting residential customer growth will be reflected in the non-residential customer base.
- The implementation of the All-Electric Buildings Act includes a prohibition on the installation of fossil-fuel equipment and building systems beginning December 31, 2025, for new buildings of seven stories or less, and December 31, 2028, for all new buildings regardless of size or building type, with some exemptions. Therefore, the impact of customer growth driven by new construction will diminish in the coming years and plausibly be eliminated in the next 4-5 years.
- Declining new construction growth combined with demographic projections of low population growth and essentially no household growth after 2026 means practically all residential customer growth will be due to fuel conversions within 4-5 years. Given that ACS data suggests that, on average, over the last five years around 50 customers have switched from FO to other heating fuels – with natural gas, presumably absorbing a portion of that, customer growth could be much lower than the Company’s 1,100 average annual forecast.¹⁴⁵

Although volumetric forecasts did change across all scenarios, customer counts only changed in the historical trend, and we would have expected to see the customer counts to be lower across all scenarios since electrification can result in customers disconnecting from the gas network. Whereas the FLT Plan showcased declining trajectories of the historical trend UPC and forecasted UPC seems to capture the impact of eroding HDD over time, we expect that if the impact of electrification and energy efficiency were also incorporated, the average use per customer would be considerably lower. Although the changes to the volumetric forecast may seem insignificant on its own, it will have an impact on bill impact calculations.

Combined these factors suggest net sales growth will be lower than forecasted by the Company across all scenarios.

6.2.3 Peak Demand

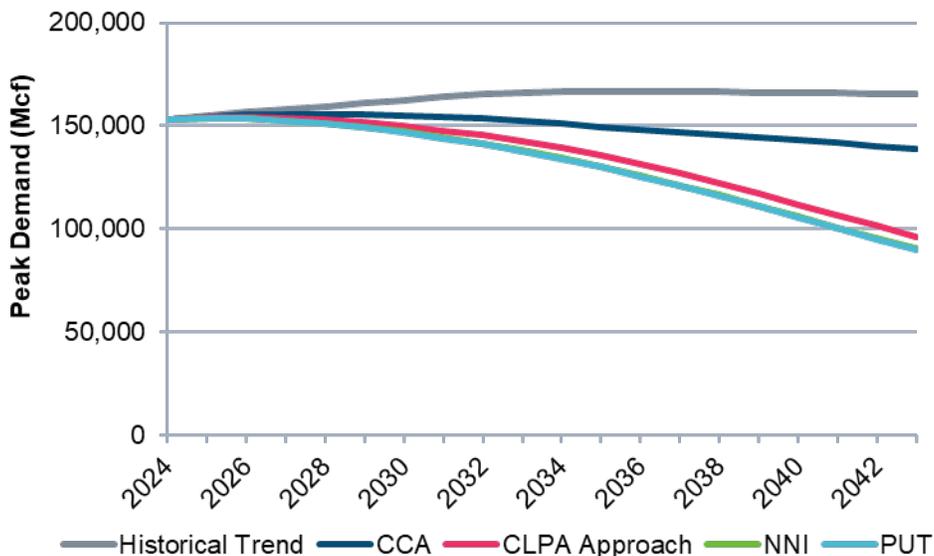
The factors reducing customer and UPC growth discussed above could also impact peak demand. The Company plans capacity under peak day conditions where the average daily temperature reaches -8°F and

¹⁴⁴ Source: Company response to PA 16-167, Attachment 1.

¹⁴⁵ This is further supported by the observation that there has been a steady growth in households choosing container gas.

reinforces its distribution networks when pressure is projected to drop below 50% of normal operating pressure. As discussed in Section 4, PA understands the Company is currently capable of flowing more gas on a design day than is currently required by their customers (with the caveat that the Company may have difficulty procuring additional gas during design day conditions), so as peak demand grows in the near term, as illustrated by the Company’s forecast in Figure 6-13 below, additional investments in facilities to accommodate growth should not be required.

Figure 6-13: Central Hudson Forecasted Peak Demand (2024-43)¹⁴⁶



As noted above, PA’s initial estimate that the Company’s historical trend approach to forecasting future customer counts and hence sales could still overstate net sales forecast. If the historical trend-based forecast were adjusted downward, peak demand forecasts would also be lower.

6.2.4 Heat Pump Adoption

In the ILT Plan, the Company did not account for how the IRA incentives can lead to higher adoption of heat pumps and other electric appliances. In the FLT Plan, the Company accounted for the IRA incentives and PA believes the inclusion of these incentives is an improvement to the plan as it helps the Company develop a more realistic view of heat pump adoption over the forecast period.¹⁴⁷ The IRA offers a tax credit of up to \$2,000 per year for the installation of heat pumps and \$1,750 for heat pump water heaters. The IRA offers additional heat pump incentives for low- and moderate-income (LMI) households, providing an instant rebate at the point of sale for a heat pump of up to \$8,000.¹⁴⁸

In addition to the federal program, the New York State (NYS) Clean Heat program offers incentives for New Yorkers that install heat pumps that can combine with federal tax credits, further advancing the competitive edge for heat pump feasibility.¹⁴⁹ Through the NYS Clean Heat Program, contractors can gain benefits by encouraging residents, small businesses, and commercial and multifamily business owners to install cold climate heat pumps and heat pump water heaters.¹⁵⁰ Lastly, the Company offers up to a \$1,000 rebate per 10,000BTU/h of heating capacity for the installation of a heat pump (roughly 15-20% of total project cost), given the customer abandons their previous fossil fuel heating source, and offers a \$1,000 instant rebate for their customers who opt to install a heat pump water heater.¹⁵¹

PA recommended that the Company develops a view on the economics of heat pumps and electrified appliances compared to traditional fossil fuel technologies to better inform the electrification potential and savings from the perspective of its customers. In the FLT Plan, the Company provided an appliance level

¹⁴⁶ Source: Company response to PA 16-167, Attachment 1.

¹⁴⁷ Source: Company response to PA 14-156.

¹⁴⁹ Source: NYS Clean Heat.

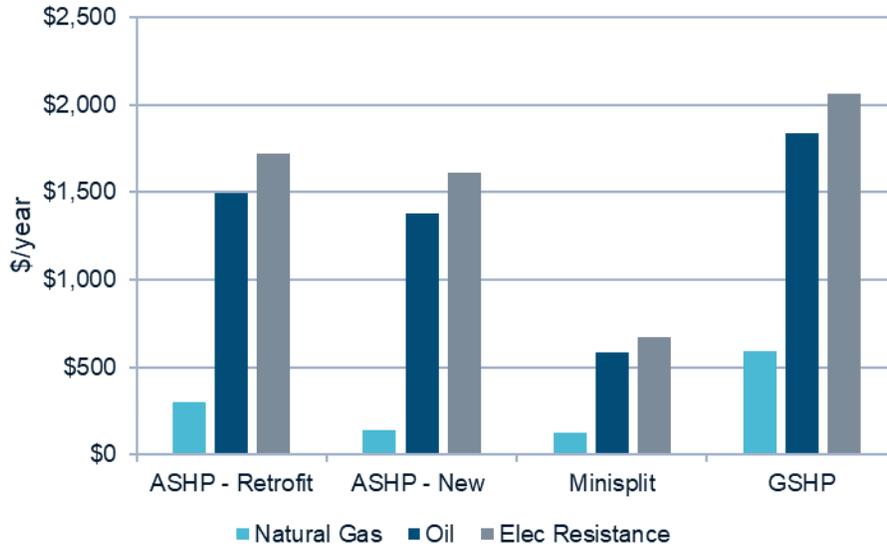
¹⁴⁹ Source: NYS Clean Heat.

¹⁵⁰ Source: Heat Pump Program (NYS Clean Heat) - NYSERDA.

¹⁵¹ Source: Residential Incentives (cenhud.com).

calculator to compare the cost of operating various technologies including ASHP and GSHP¹⁵². PA reviewed a study conducted by NYSERDA on an area similar to the Company’s service territory¹⁵³. This study suggests heat pumps are cheaper to run for residential applications than gas furnaces. As shown in Figure 6-14, in the same geographic region of the Company’s service territory, an average gas customer can save on their annual energy costs if an air source heat pump is installed in a retrofit or new construction, as compared to the use of natural gas, oil, or electric resistance in the same home. Similarly, cost savings associated with the use of a Minisplit, and a ground source heat pump are significant, when compared to heating the same house with natural gas, oil, and electric resistance. In this study, NYSERDA assumes a Minisplit, or a cold climate ductless Minisplit, to be installed to serve only a proportion of the building, with the remaining heat load to be served by the conventional heating system, as opposed to an ASHP that serves the full heating and cooling load, with the conventional heating system left in place to supplement peak heating loads in the winter.¹⁵⁴

Figure 6-14: Hudson Valley Annual Savings – Single Family Residential¹⁵⁵



Similar cost savings for a small multifamily home are presented in Figure 6-15.

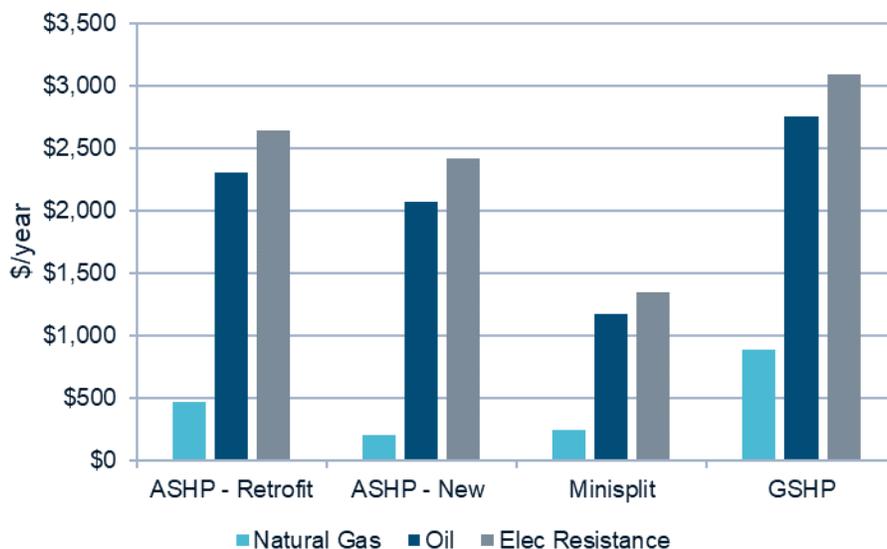
¹⁵² The result from this calculator suggests that using ASHP for space heating is more expensive than gas furnace based on current gas and electric rates in Company’s service territory.

¹⁵³ Source: NYSERDA, “New Efficiency: New York Analysis of Residential Heat Pump Potential and Economics,” 2019.

¹⁵⁴ *Ibid.*

¹⁵⁵ *Ibid.*

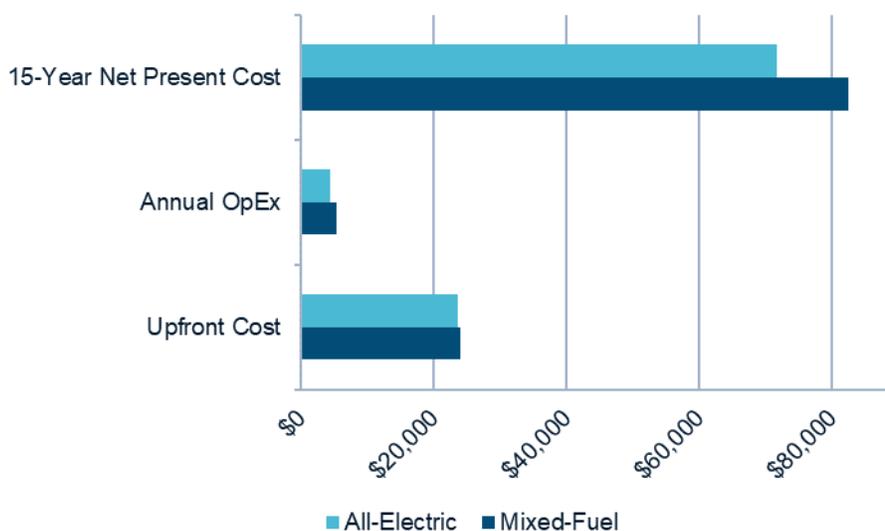
Figure 6-15: Hudson Valley Annual Savings –Multifamily Residential



Cost savings associated with the installation of a heat pump are significant, especially when compared to the alternative of oil or electric resistance heating. This competitive economic advantage in annual energy savings, paired with substantial opportunity for heat pump incentives and rebates, will drive fuel-switching customers to convert to heat pumps over natural gas furnaces.

In addition, a recent RMI study¹⁵⁶ found that for new construction in New York, all electric homes cost less to build and operate than a new home that uses mixed-fuel or natural gas for cooking, space, and water heating. Although the upfront cost of a heat pump is nearly the same as a natural gas-powered furnace or higher for cold-climate heat pumps, incentives like the IRA, NYS Clean Heat, and those offered by the Company, can help lower the upfront costs significantly. This study suggests that heat pumps have a lower 15-year net present cost and annual operating expenses, as compared to a natural gas-powered home in New York, as illustrated in Figure 6-16. It is important to note that Figure 6-16 does not account for heat pump incentives of any kind in the upfront cost.

Figure 6-16: New Construction Cost Comparison between an All-Electric Home and Mixed-Fuel (Natural Gas) Home in New York¹⁵⁶



¹⁵⁶ Source: The Economics of Electrifying Buildings: Residential New Construction - RMI.

An acceleration of heat pump adoption can significantly impact the total volume of gas delivered to residential and small commercial customers, thus impacting the bills throughout the forecast period as discussed in detail in Section 7 of this report. When a customer adopts a heat pump for heating, the most significant driver of that customer's gas usage is removed, greatly lowering the UPC of said customer even if they retain gas service for cooking, water heating, or back-up heat. In New York, for natural gas customers, approximately 77% of the natural gas purchased by that customer is used for space heating.¹⁵⁷ In their filed comments, the Company stated that bill impacts are influenced by whether a customer installing a heat pump abandons the gas system or not. Although information regarding abandonment of the gas system will be beneficial for further defining bill impacts, the most significant impact to the bill impact calculation will be the reduction in volumes of gas when a customer switches from natural gas heating to a heat pump. Heating represents most of the Company's residential gas demand and were a customer to switch their heating from gas to a heat pump, the volume of gas attributed to that customer would be significantly reduced. Accelerated adoption of heat pumps, can result in a significant decline in gas sales volumes over the forecast period.

PA recommends the Company re-evaluate their heat pump adoption forecast and develop a robust view on economics of heat pumps compared to natural gas and other fuels in their service territory. Upon the failure of various appliances (gas furnace, boiler, water heater, stove, etc.), customers will face a decision to either replace the appliance with a similar technology (e.g., replace a gas furnace with another gas furnace) or switch the technology (e.g., from gas to electric or electric to gas). The current modeling approach does not account for the evolving competition between the economics of gas appliances and electric appliances (e.g., gas furnace and heat pump). This dynamic view is potentially a very important dynamic feedback loop as it impacts the total volumes of gas delivered to customers and thus the gas rates. Upon reduction in gas volumes, all else equal, gas rates will increase over time and alternative electric solutions will be even more cost competitive over time. PA expects significant value in providing historical adoption rate of various technologies (e.g., heat pumps) and supplementing the projections with an analysis that accounts for such evolving competition over time. By adjusting the assumptions made in their heat pump adoption forecast, the Company is likely to see higher adoption of heat pumps, even in LMI parts of their service territory, lowering net sales volumes and increasing bill impacts if not planned for in advance and managed properly. Additional information on the implications of heat pump adoption for bill impacts is provided in Section 7.1.

6.2.5 Warming Trends

A warming trend across the US has been documented over the past decades, and this trend is expected to continue in the future. To assess the trend of warming winters, PA has examined the warming winter trend in New York state leveraging HDDs from 1960 through 2021, published by the Energy Information Administration (EIA).¹⁵⁸ Between 1960 and 2021 annual HDDs in NY have declined from 6,573 to 5,537, a 15.8% reduction. All else equal, if we extend this trend linearly into the future (assuming the warming trend will not accelerate or decelerate), annual HDDs are expected to decline by another 5.7% by 2043. PA extended the observed trend in HDDs throughout the forecast period to 2043 as depicted in Figure 6-17.

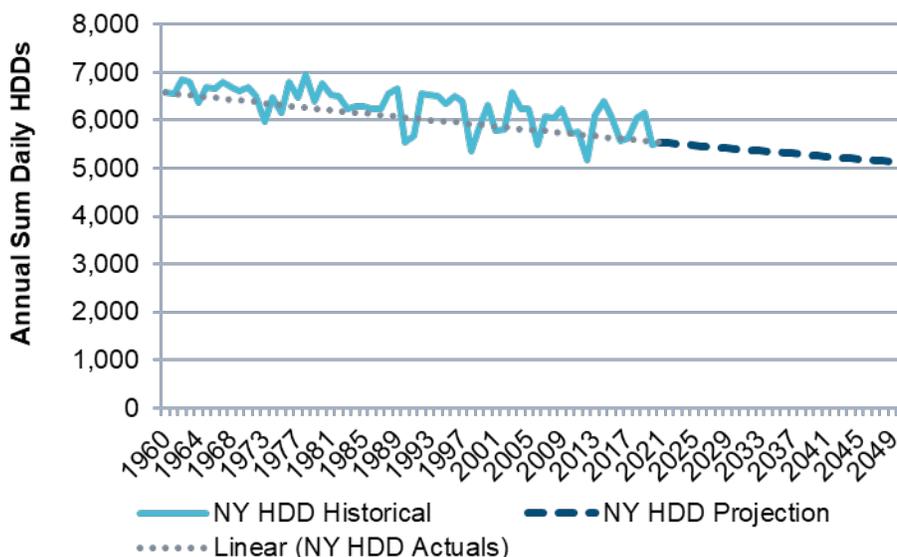
The continued decline in the annual sum of daily HDDs bolsters the assumption that gas volumes consumed for space heating in residential and commercial applications will decrease throughout the forecast period. Therefore, in our Preliminary Findings Report, PA recommended that the Company should account for such reductions in its UPC and annual net sales forecasts. This change will likely result in additional upward pressure on gas rates and therefore the economic favorability of gas over electric appliances may further

¹⁵⁷ Source: [Patterns and Trends - New York State Energy Profile - NYSERDA](#).

¹⁵⁸ Source: EIA State Energy Data Systems (SEDS) released June 23, 2023.

deteriorate over the forecast period. The implications of warming trends on bill impacts are discussed in more detail in Section 7.1, along with the extent to which the Company reflected these changes within its FLT Plan.

Figure 6-17: Historic and Predicted Trend of New York HDDs (1960-43)¹⁵⁹



In a scenario, such as the preferred NNI scenario, in which rapid deployment of electrification is potentially fueled by policy goals, rebates, increased incentives, and/or technological advancement or customer preference, the total volumes of gas delivered to customers could decline faster than projected by the Company, creating even higher upward pressure on bill impact and affordability challenges for customers remaining on the gas network if not proactively planned for.

Based upon the Company’s Filed Reply Comments, we understand that in its FLT Plan, the Company changed forecasted UPC to incorporate declining HDDs. The updates required updating the granular load disaggregation so HDD sensitivity could be incorporated based on a combination of US Department of Energy National Renewable Energy Laboratory (NREL) load shapes and heating load estimated using monthly gas usage data for all gas customers. In examining the impact of HDDs on residential customer UPC in the Historical Trend forecast, absent any decarbonization efforts or policy implications, the Company shows a decrease in UPC of approximately 50 Ccf, as seen above in Figure 6-17. PA understands this decrease in UPC in the historical trend forecast to include the Company’s assumptions around the impact of increasing HDDs on customer UPC. PA is encouraged the Company has included HDDs in their volumes forecast but this inclusion was not to the extent expected by PA. Given the Company’s acknowledgement of the impact of warming temperatures on UPC, PA expects the impact on volumes to be more substantial throughout the forecast period. Additionally, it is important to note that the impact of increasing HDDs applies only to the volumes forecast and not peak demand. PA agrees with the Company’s assessment for the need to continue planning for more extreme weather events in relation to climate change and preparing adequate peak demand readiness.

6.3 Recommendations to Improve Future GSLTPs

Our recommendations for the Company to improve the customer and load forecast components of future GSLTPs are summarized below.

1. Provide further analysis on the costs and benefits of customer fuel switching for each fuel option for each scenario supported by the most current data available.
2. Consider the impact of annual oil-to-gas conversion-led customer acquisitions more consistent with (a) the Company’s own reporting of around 350/year in recent years.

¹⁵⁹ Source: [EIA Commercial Buildings Energy Consumption Survey \(CBECS\) Data](#).

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3. The Company should review FLT Plan Residential UPCs and Customer Counts as compared to RL Plan V2, with consideration of PA's expectations, and make further adjustments as appropriate in its first annual update and future GSLTPs.

7 Economic Assessment

In this section, PA provides our observations regarding bill impacts, disadvantaged communities, and cost-benefit analyses, along with recommendations to improve these aspects of the FLT Plan. Most notably, the FLT Plan includes an expansion of the bill impact analysis for residential customers to make a distinction between customers who choose to electrify heating and those who do not, as well as a share of wallet analysis. Providing Stakeholders visibility into projected costs of each scenario from a residential, non-residential, and average customer view is recommended. The addition of this analysis improves the bill impact assessment presented within the FLT Plan. These observations are discussed in detail in the following sections.

7.1 Bill Impact

PA finds the FLT Plan includes several improvements in the reporting and methodology of its bill impact analysis. Most notably, the Company has accepted the suggestion from PA and Stakeholders to include the bill impacts for residential customers who chose to electrify throughout the forecast period and those who do not. In the FLT Plan, the Company has forecasted a natural gas bill decrease of 7-20% for the residential customer class throughout the forecast period.¹⁶⁰ Additionally, the Company assumes declines in gas consumption will outpace the increase in gas rates, ultimately resulting in lower gas bills. PA agrees that volumes per customer will decline over the forecast period and the revision will better inform Stakeholders of the Company's bill impact methodology.

Additionally, PA observes the results presented suggest that under certain circumstances the cost impact of all alternatives is close. The average amounts shown might lead Stakeholders to the conclusion that pursuing PUT or NNI are the most cost-effective scenarios and bring the lowest cost bills to customers, which may not always be the case. PA believes the bill impact calculations may remain conservative, especially for customers who remain on the gas network throughout the forecast period. The primary driver of this is that the total volume of gas delivered will likely be lower than projected in the FLT Plan, especially for residential and small commercial customers. Therefore, as discussed in prior reports, PA continues to observe projected bill impact results lower than expectations, especially in the residential customer class.

7.1.1 Bill Impact Overview

For the purposes of this analysis, PA provides a directional view of bill impacts based on information provided in the FLT Plan. PA is not attempting to re-forecast bills for any customer class. Based on our review of the Company's bill impact analysis, we understand a directional view of bill impacts can be depicted using the relationship between two primary drivers for customer bills:

1. **Total cost of operating the gas system, including new investments in the gas network** (e.g., leak prone pipe replacement, LCFs blending, and other operational expenses.)
2. **Total gas volumes** delivered to each customer class.

$$\text{Gas Rate} = (\text{Total cost of operating the Gas Network}) / (\text{Total Gas Volumes Delivered})$$

$$\text{Bill Impact} = \text{Gas Rates} \times \text{a typical customer's gas consumption}$$

This analysis can be done on the total system or customer class levels. The relationship among the key drivers of bill impacts is demonstrated in Table 7-1 and are explored in more detail below. Almost all the arrows in this table point to a future with much higher gas rates driven by either higher cost of operating the system in the numerator of the gas rate formula (NPAs, leak prone pipe replacement, etc.), or lower gas volumes delivered in the denominator of the formula (because of energy efficiency, electrification, warming trend, etc.). One would need to believe the average gas use for a typical customer would need to decrease drastically so

¹⁶⁰ Source: FLT Plan, Figure 69.

that it would counter the significant increase in gas rates to result in only a 7-20% reduction in bills for a residential customer. In addition, one would need to believe that customers are willing to pay the same amount of money or even higher per month for using less gas, which is unrealistic and may even accelerate the rate of electrification as the economics of fuel switching would become favorable given the high prices of gas.

Table 7-1: Key Drivers of Bill Impacts

Drivers	Upward Pressure on Cost	Downward Pressure on Gas Volumes
Electrification		↓
Energy Efficiency		↓
Warming Trend in HDDs		↓
Hydrogen Development	↑	
Blending of LCFs	↑	
NPAs	↑	↓

FLT Plan vs. RLT Plan V2

PA’s Preliminary Findings Report recommended the Company include a bill impact analysis that demonstrates the impact for customers who retain full gas service heating throughout the forecast period and customers who choose to electrify some end-uses. PA made this recommendation because customers who electrify their use cases are less likely to experience significant bill impacts. Gas bills for customers that install and use heat pumps for space heating are likely to decrease, while the bill impact for gas customers who retain gas heating will be much higher. In the FLT Plan, the Company accepted several recommendations. The bill impact analysis now includes impacts of both gas and electric, included a share of wallet analysis and, the Company also presents a proprietary tool, available to Stakeholders through a data request that can assist a user in understanding the relative efficiencies of the gas versus electric option for a variety of end-uses under different scenarios.¹⁶¹

PA is encouraged by the inclusion of this analysis and believes this will help inform the Commission and Stakeholders of anticipated impacts of the Company’s four scenarios, especially NNI. The bill impact for customers who electrify (defined as a gas customer that switches both space and water heating to electric) and those that do not, illustrates the deviation between customers who electrify and those that do not, as presented below in Table 7-2.

Table 7-2: FLT Plan - Example of Usage and Bill Impacts with and without Gas Electrification¹⁶²

Scenario	Electrification	Year	Annual Gas Use (ccf)	Annual Electric Use (ccf)	Combined Gas and Electric Usage (MMBtu) ¹⁶³	Annual Gas Bill (\$2024)	Annual Electric Bill (\$2024)	Combined Gas and Electric Bill (\$2024)
CCA	No Electrification	2024	838	7,352	112.0	1,703	1,583	3,286
		2030	815	7,310	109.6	1,660	1,603	3,264
		2043	784	7,324	106.4	1,811	1,589	3,399
	Electrification	2024	64	15,238	58.6	129	3,281	3,410

¹⁶¹ Source: FLT Plan, p. 82.

¹⁶² Source: FLT Plan, Figure 63.

¹⁶³ 10 Ccf is equal to 01.038 MMBtu – [EIA FAQs](#)

		2030	63	15,051	57.9	128	3,302	3,430
		2043	65	14,658	56.7	149	3,179	3,328
CLCPA Approach	No Electrification	2024	838	7,352	112.0	1,703	1,583	3,286
		2030	815	7,310	109.6	1,688	1,580	3,268
		2043	784	7,324	106.4	2,476	1,482	3,958
	Electrification	2024	64	15,238	58.6	129	3,281	3,410
		2030	63	15,051	57.9	130	3,254	3,384
		2043	65	14,658	56.7	204	2,966	3,170
NNI	No Electrification	2024	838	7,352	112.0	1,703	1,583	3,286
		2030	815	7,310	109.6	1,693	1,564	3,256
		2043	784	7,324	106.4	2,675	1,485	4,161
	Electrification	2024	64	15,238	58.6	129	3,281	3,410
		2030	63	15,051	57.9	131	3,220	3,350
		2043	65	14,658	56.7	220	2,973	3,193
PUT	No Electrification	2024	838	7,352	112.0	1,703	1,583	3,286
		2030	815	7,310	109.6	1,701	1,563	3,264
		2043	784	7,324	106.4	2,751	1,486	4,237
	Electrification	2024	64	15,238	58.6	129	3,281	3,410
		2030	63	15,051	57.9	131	3,218	3,349
		2043	65	14,658	56.7	226	2,974	3,200

Table 7-2 shows gas bills for customers who do not electrify are significantly higher than gas bills for those that choose to electrify heating and water heating end uses under all scenarios, as would be expected considering lower gas usage. In the NNI scenario, which the Company has identified as their preferred scenario, a customer that does not electrify can expect their gas bills to increase from \$1,703 in 2024 to \$2,675 in 2043, despite a decrease in gas volumes consumed. The higher costs per volume of gas are primarily attributed to the blending of costly LCFs and fewer customers remaining on the gas network to pay for infrastructure upgrades and resiliency. While not included in the Company’s analysis, it is also important to consider that such a significant increase might also lead more customers to electrify as gas appliances become less economical.

Based on a review of Figure 63 in the FLT Plan, and as presented in Table 7-2 above, PA accepts that the Company accounted for reductions in typical customer annual gas usage for the bill impact assessment.¹⁶⁴ PA agrees that volumes per customer will decline over the forecast period and believes the revised table will better inform Stakeholders of the Company’s bill impact methodology. PA observes the results presented suggest that under certain circumstances the cost impact of all alternatives is close. The average amounts shown might lead Stakeholders to the conclusion that pursuing PUT or NNI are the most cost-effective scenarios and bring the lowest cost bills to customers, which may not always be the case. PA believes the bill

¹⁶⁴ Source: FLT Plan, p. 82.

impact calculations may remain conservative, especially for customers who remain on the gas network throughout the forecast period. The primary driver of this is that the total volume of gas delivered will likely be lower than projected in the FLT Plan, especially for residential and small commercial customers. This outcome is driven by electrification of gas appliances over the forecast period, EE, the warming trend, and the resulting reduction in delivered gas volumes.

If the total volume of gas delivered (i.e., the denominator in the rate calculation) is lower than forecast, the rate impact would be higher. As discussed above the Company's bill impact calculations represent a hypothetical average bill calculated by dividing the projected cost of running the gas system (revenue requirement) by forecasted volumes delivered to a customer class. The Company's updated analysis highlights the fact that some customers will reduce their gas use substantially by electrifying throughout the forecast period under all scenarios, while others will not. This diverging dynamic can result in some customers who will electrify their appliances paying less than projected values, and some customers who cannot electrify their appliances paying higher bills. Customers who are less likely to electrify can include low-income customers, renters, or customers residing in a Disadvantaged Community that may have less control over energy sources for their homes or less resources at their disposal to pursue these solutions. PA believes it is important to properly forecast and clearly communicate this divergence in customer bills to Stakeholders.

In the following sections, PA presents observations and suggestions for refining the residential volume assumptions based on heat pump adoption and electrification and observations regarding the development and integration of low-carbon fuels and the impact this will have on customer bills.

7.1.2 Annual Gas Volumes

For the residential class, PA anticipates gas volumes will likely decrease at a faster rate than forecasted by the Company. Reductions in gas volume could be driven by a combination of factors including heat pump adoption and a rapid deployment of electrification accelerated by policy goals, rebates, and incentives, and a potential shift in customers' preference. Across the service territory, the Company reports 309,000 electric customers, 90,000 gas customers, and 235,000 electric-only customers, those who do not receive gas. Of the 90,000 gas customers, 90.4% receive electric service from the Company.¹⁶⁵ Since more than 90% of gas customers are also electric customers, given improving heat pump economics, the ease and therefore likelihood for a gas customer to adopt an electric heat pump is potentially increased. Recommended changes to the annual gas volumes forecast are described in further detail in Section 6 of this report. PA expects to see a decline in gas volumes and customer UPC throughout the forecast period due to fuel switching customers leaving the gas system or significantly reducing their gas usage by maintaining only some of their gas appliances (e.g., gas stove), or advancements in EE efforts, and/or electrification. In the Company's preferred NNI scenario given the further reliance on EE, NPAs, and electrification, PA anticipates annual gas volumes to decline at an accelerated pace beyond what the Company has forecast, especially under this scenario.

In addition to EE and electrification reducing anticipated gas volumes, volumes are impacted by the average decrease in annual HDDs across New York state. As discussed in Section 6.2.5, a warming trend across the US, including New York, has been documented over the past decades and in absence of a dramatic global reduction in GHG emission this trend is projected to continue in the future. The continued decline in the annual sum of daily HDDs bolsters the assumption that gas volumes consumed for space heating in residential and non-residential applications will decrease through the projected period. The decline in HDDs impacts volumes, creating a downward pressure on volumes and a reactionary upward pressure on rates. This trend will further improve the economic favorability of electric appliances over gas, potentially accelerating the pace of heat pump adoption and other electric appliances over the projected period, beyond what the Company has forecasted, especially given the increase in heat pump incentives associated with the NNI scenario.

In the FLT Plan, the Company acknowledges the impact of a warming trend to lower usage per customer and emphasizes the need to continue planning for extreme weather conditions to ensure reliability does not change given the warming trend.¹⁶⁶ As discussed in Section 6.2.5, PA acknowledges the inclusion of HDDs

¹⁶⁵ Source: FLT Plan, p. 20.

¹⁶⁶ Source: FLT Plan, p. 31.

in the volumes and UPC forecast but believes the impact is under-estimated, resulting in an inflated volumes forecast.

7.1.3 Electrification & Energy Efficiency

Electrification across the Company's service territory could accelerate at a rate faster than anticipated by the Company, lowering the volumes of gas sold, lowering the number of gas customers, and raising the bill impacts to customers remaining on the system to cover required gas system investments. This rate of accelerated electrification is likely to be driven by policy, federal / state / utility-led rebate and incentive programs, advances in technology, and, in some cases, customer preference.

Beyond heat pump incentives and rebate programs discussed in Section 6.1.4, several initiatives are in place in New York to support the electrification of the transport and buildings sectors. NYS Clean Heat is a prime example of a public-private partnership supporting the deployment of low-carbon solutions. Launched on April 1, 2020, this program provides customers and contractors electrification and EE incentives, along with heat pump rebates, to advance the adoption of efficient electric systems for homes and businesses throughout the State. Electric utilities provide incentives to encourage adoption of certain eligible heat pump technologies, including cold climate air source heat pump (ccASHP) systems, GSHP systems, variable refrigerant flow (VRF) systems, commercial and multifamily heat pump systems, and heat pump water heaters (HPWHs).

The NYS Clean Heat Program is implemented in coordination with a portfolio of NYSEDA-led market development initiatives, which aim to build market capacity to deliver building electrification solutions. Federally, the IRA has specific provisions for adoption of more efficient appliances and electrification of various applications (e.g., heat pump, heat pump water heater, electric stoves, heat pump clothes dryer). NYS Clean Heat rebates can be combined with IRA federal and state tax credits, making electric appliances even more affordable than ever before. While the Order does not require the Company to discuss the impact of building electrification on the electric grid, the Company proactively discusses the potential impact of building electrification on the electric grid in terms of system peak demand and the size of electric load in the FLT Plan, which is helpful.

In addition to the heat pump and heat pump water heater incentives discussed above, the Company offers incentives to customers for EE, including natural gas heating equipment incentives. Customers are currently eligible for up to \$1,800 for appliance upgrades to energy efficient natural gas heating equipment.¹⁶⁷ The Company, as described in their Annual System Energy Efficiency Plan for 2020-2025, offers gas heating, ventilation, and air conditioning (HVAC) incentives, including "Smart Wi-Fi and Learning thermostats, boiler reset controls on existing boilers, furnaces, hydronic boilers, steam boilers, combination boilers/water heaters, combination furnace/water heater, and indirect water heaters."¹⁶⁸ Additionally, the Company anticipates increased weatherization across the service territory to improve efficiency.

Lastly, Central Hudson is pursuing NPA opportunities across the service territory. The Company has achieved some success with TMA, a category of NPAs that targets areas along the gas system with low customer saturation and aging pipe infrastructure. Customers along these sections of pipe, if willing, are removed from the gas system, entirely converting the building off natural gas and electrifying. The Company offers electric service upgrades and bonuses to willing customers, ensuring their standard NPA conversion package can be offered to participants at no net cost.¹⁶⁹ The Company has also shared plans to advance load growth based NPA options to gas customers to manage locational constraints associated with peak demand, including EE, weatherization, demand response, and smart thermostats.¹⁷⁰

In the FLT Plan, the Company presents two locations, the Kingston Saugerties, and the Titusville-Pleasant Valley local gas systems, for potential NPAs. The Company describes their detailed analyses conducted at these two locations and defines the strategy of demand side management and electrification to avoid growth-related infrastructure investments.¹⁷¹ In addition to bolstering their NPA analysis in the FLT Plan through the inclusion of a new Appendix C "Non-Pipeline Alternatives Assessment", the Company is requesting Stakeholder feedback on their new NPA approach to further develop, design, and study NPA potential.

¹⁶⁷ Source: Natural Gas Heating Equipment Incentives (cenhud.com).

¹⁶⁸ Source: Central Hudson Annual System Energy Efficiency Plan 2019-2025. Case 15-M-0252 and Case 18-M-0084. April 1, 2022.

¹⁶⁹ *Ibid.*

¹⁷⁰ Source: FLT Plan.

¹⁷¹ Source: FLT Plan, p. 47.

PA predicts the initiatives, rebates, and programs offered at the federal, state, and utility level will spark an acceleration of electrification across the Company's service territory. This potential is further ignited by the fact that more than 90% of the Company's gas customers are also electric customers, easing the electrification process. By increasing the EE of gas customers (programmatic or non-programmatic), accelerating electrification through incentive programs, and entirely removing gas customers through NPAs, the Company's service territory is likely to see natural gas service volumes reduce further than forecast by the Company, thus limiting the potential to decrease gas customer bills and potentially increasing bill levels. In addition, Company should focus on offering demand response programs in highly loaded areas to avoid the need for incremental investment in the gas network in the near-term, as gas volumes are forecasted to decline in the long-term, reducing the stranded asset risk.

7.1.4 Low-Carbon Fuels

In the FLT Plan, the Company has further considered the development and deployment of LCFs in their plans to decarbonize. The preferred NNI scenario assumes volumes of blended LCFs will be lower, as compared to the PUT scenario and, by 2043, the Company forecasts blending approximately 5% of hydrogen and 5% of RNG into the gas stream.¹⁷² PA encourages the Company to keep the following assumptions and cost impacts in mind when further refining and developing their views in future iterations of its long-term plans, as an increased reliance on LCFs in future planning scenarios would place upward pressure on customer bills, unless there are dramatic reductions in cost of LCFs beyond what is forecasted in the current plan.

The Company has worked with a third-party consultant to determine RNG potential in the service territory. The report was made available in an appendix to the ILT Plan, and its results suggest the most available RNG feedstock in the Company's service territory is agricultural residue, which NYSERDA estimates to cost between \$19.87 and \$39.78/MMBtu.¹⁷³ Even though the Company emphasized that it would not be the owners or developers of an RNG production facility, RNG is considerably more expensive than traditional natural gas. In the NNI scenario, the Company is not planning to blend RNG in massive amounts as it was envisioned in the earlier versions of this GSLTP (e.g., in the ILT Plan, RLT Plan). In the FLT Plan, the Company assumes a limited blend of RNG in the conventional natural gas supply to decarbonize customers remaining on the gas system throughout the forecast period.

PA believes the costs associated with agricultural residue fed RNG is likely higher than anticipated by the Company when the time to blend RNG in the gas supply arrives. Agricultural residue fed RNG is costly and less commercially viable in large quantities within the Company's service territory. However, the Company hopes to procure RNG from within their service territory, meaning the RNG production facilities will be smaller than other potential locations with larger concentrations of agricultural residues. On a per unit produced basis, smaller RNG production facilities can be less economically viable to construct and run because of the expense associated with production infrastructure and lower volume output. Smaller RNG production facilities can result in producers charging a higher rate for the RNG produced. By looking to source all RNG locally, the Company runs the risk of higher-than-average production costs.

Additional cost considerations for RNG from agricultural residue is the production pathway in which RNG is produced from this feedstock, referred to as thermal gasification. Thermal gasification is a relatively complex process for RNG production, as compared to the more common anaerobic digestion process utilizing animal waste, municipal solid waste, or landfill gas.¹⁷⁴ Thermal gasification is a proven and operational technology; however, the commercial application of this production process can make it more costly. To date, the gasification of agricultural residues and other biomass for producing RNG remains a relatively niche industry.¹⁷⁵

PA commends the Company for promoting a more targeted deployment of RNG and hydrogen in the preferred NNI scenario for customers with hard-to-electrify end-uses. PA believes a targeted deployment of LCFs to customers left on the gas system, after electrification and heat pump adoption mature in the residential customer class, will alleviate the potential cost burden of RNG development for the entirety of the Company's customer base.

¹⁷² Source: FLT Plan, p. 69.

¹⁷³ Source: Potential of Renewable Natural Gas in New York State, NYSERDA, 2022.

¹⁷⁴ Source: [bc-renewable-and-low-carbon-gas-supply-potential-study-2022-03-11.pdf \(fortisbc.com\)](#).

¹⁷⁵ Source: [Emerging-Gasification-Technologies final-1.pdf \(ieabioenergy.com\)](#).

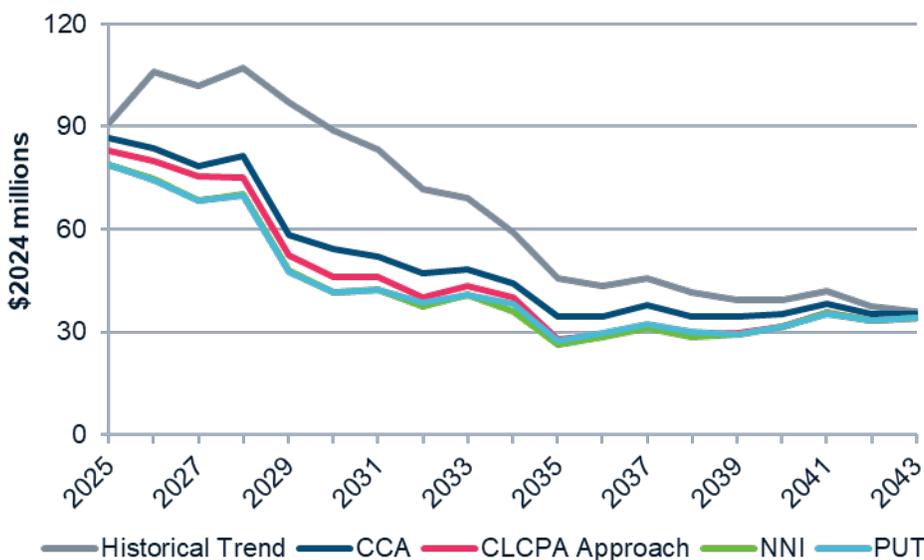
7.1.5 Selection of the NNI Scenario

In both the ILT Plan and RLT Plan V2, the Company presented multiple potential decarbonization pathways without specifying which scenario(s) are best positioned to meet the requirements of the Order and maximize societal benefits, such as reducing GHG emissions, minimizing customer bill impacts, and eliminating reliability and safety risks. In the FLT Plan, due to feedback from PA and Stakeholders, the Company selected No New Infrastructure (NNI) as their preferred scenario. This is commendable considering the challenges associated with long-term planning in face of technology and policy uncertainties. PA believes the selection of a preferred scenario should better inform the Company’s near-term decisions, as it is inefficient (if not impossible) to pursue multiple scenarios at the same time and is aligned with the Order.

However, despite the use of the term “No New Infrastructure,” this scenario may not be aligned with the “No Infrastructure Option” described within the Order¹⁷⁶ which states the Company should “include an entirely ‘no infrastructure option’ and other scenarios relying on alternatives to traditional capital projects”.

Under the Company’s NNI scenario, capital expenditure investments are expected to be approximately \$817 million between now and 2043, approximately 14% less than under the CCA scenario.¹⁷⁷ See Figure 7-1. While opportunities to avoid CapEx investments other than those to serve new customer demand may be possible, there will be an ongoing need to reinvest in the gas delivery system over time under any planning scenario. Investments related to safety, reliability and regulatory compliance are typically not discretionary. PA observes many forecasted investments may not be associated with customer growth in the near term. This may lead to a conclusion that avoiding material CapEx under the NNI scenario may be challenging. As noted in Section 1.3, replacement of assets to maintain service to an individual customer may be relatively easy to avoid via an NPA.

Figure 7-1: Projected Gas Capital Costs by Scenario¹⁷⁸



Now that the Company has identified NNI as the most promising decarbonization pathway, PA encourages the Company to take an additional step: develop a holistic geographical view to determine which customers and use cases are most or least likely to remain on the gas network over time, and which areas could electrify between now and 2050. Such approach will result in developing a directional view on geographical footprint of the gas system over time. It would identify segments of the gas network that could be reduced in size or eliminated altogether, and which sections of the service territory are likely going to remain and therefore investments made to them will be “no regret” and do not run the risk of becoming stranded. In addition, the Company is well positioned to develop this long-term coordinated view of gas and electric decarbonization as its gas and electric service territories have significant overlap. This effort should be iterative, as this endpoint view is likely going to evolve over time with advancements in technology, declining costs, and emerging

¹⁷⁶ Source: The Order, p. 35.

¹⁷⁷ Source: FLT Plan, Figure 59.

¹⁷⁸ Source: FLT Plan, Figure 59.

customer preferences. However, there is still significant value in developing such a view to inform no-regret investment decisions, including identification of:

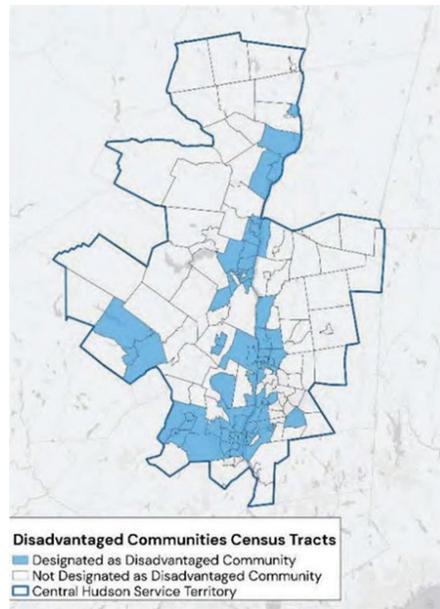
1. Customers or use cases that are most difficult to electrify in their service territory and are likely going to rely on pipeline gas and a targeted use of LCFs to decarbonize their operation,
2. Customers and use cases for which electrification is the most promising decarbonization solution and their geographical distribution,

By overlaying such an additional geographical view of customer needs on top of the condition of the gas network, and electric network (which the Company has already begun) would assist in its multi-decade prioritization of gas system investment decisions.

7.2 Disadvantaged Communities

PA commends the Company for working alongside the Commission to support the Commission’s directive of enhanced reporting for Disadvantaged Communities. The Company has made affordability and energy equity an important component of the FLT Plan and continues to evolve their support for Disadvantaged Communities. Figure 7-2 outlines the Disadvantaged Communities with the Company’s market area.¹⁷⁹

Figure 7-2: Disadvantaged Community Census Tracts in the Central Hudson Service Territory



Electrification and adoption of heat pumps, especially in Disadvantaged Communities, could be higher than forecasted in the FLT Plan. High adoption can be fueled by incentives, at the federal, state, and utility levels that can make the economics of heat pumps and electrification more favorable for some customers in Disadvantaged Communities. This potential outlook is explored further in Section 6. PA encourages the Company to revisit and consider accounting for the dynamic impact of electrification, including impacts of evolving gas rates over time on the adoption curve of heat pumps across their territory to include incentives, such as those made available by the IRA and the NYS Clean Heat program.

The FLT Plan describes continued efforts to advance the Company’s support of Disadvantaged Communities in the energy transition, including research and programs with targeted support and investment in Disadvantaged Communities. New York’s CLCPA established a Climate Justice Working Group (CJWG) that developed criteria to identify Disadvantaged Communities across the state using socioeconomic data, including energy burden and poverty rate. In addition to Disadvantaged Communities, New York state also classifies low-income customers as households with annual income at or below 60% of state median income. The New York Energy Affordability Program (EAP)¹⁸⁰ aids income-eligible customers with a discount on their monthly heating and cooling bills. PA understands that the Company’s EAP is funded through base rates

¹⁷⁹ Source: FLT Plan Figure 23.

¹⁸⁰ Source: <https://dps.ny.gov/energy-affordability-program>.

charged to both electric and gas customers. Additionally, the Home Energy Assistance Program (HEAP) uses federal funding to help income-eligible residents pay their fuel bills.

In 2022 and 2023, qualified customers in Company's service territory received \$4.7 million of HEAP regular and emergency benefits from the Office of Temporary and Disability Assistance (OTDA) to assist with their heating costs.¹⁸¹ In the FLT Plan, the Company states that 23 out of 34 of the NPA projects that the Company pursued (since 2019) were in Disadvantaged Communities and four out of five of the NPA projects that reached completion were Disadvantaged Communities.¹⁸² Given that 71% of the Company's gas meters are located within a Disadvantaged Community, we encourage the Company to continue maintaining a strong focus on the bill impact implications on these customers. All these options have their own limitations and if not managed well, could result in unintended consequences.

7.2.1 Barriers to Electrification in Disadvantaged Communities

In the FLT Plan, the Company has included a robust description of the important barriers to address for electrification in Disadvantaged Communities, in response to Stakeholder comments. The Company includes barriers both from the customer and utility perspective and seeks to collaborate with Stakeholders on how to address these barriers in an effort to advance electrification in Disadvantaged Communities.

From the customer perspective, the Company highlights the following challenges associated with affordability, decision-making authority, building readiness, and customer preference:¹⁸³

1. **High upfront costs** – customers in Disadvantaged Communities may be less likely to have available capital to finance the upfront costs associated with electrification.
2. **Landlord-Tenant Split Incentive** – renters commonly are unable to make decisions about installing a heat pump and landlords may be hesitant to invest in upgrades.
3. **Potential Bill Increases** – heat pumps can at times result in higher energy bills when electricity is more expensive than gas. Customers in Disadvantaged Communities may be more concerned about the uncertainty of future electricity prices.
4. **Changes to Cost Structure in Rental Housing** – in some rental situations, the cost of heating can be included in rent. However, if heating costs transition from being included in rent to being part of individual electric bills, renters can face an overall increase in housing costs.
5. **Electrical and Building Upgrades** – older homes may require upgrades to support electrification that can be expensive. In addition, effective weatherization can help improve the efficiency of heating equipment and can add to the overall costs of electrification.
6. **Customer Preferences and Education** – customers may be hesitant to switch due to a lack of familiarity with heat pump technology and reliability and may not have the time or resources to educate themselves about the impact of converting heating systems.
7. **Workforce and Installation Issues** – a lack of qualified professionals to install and service heat pumps in Disadvantaged Communities can lead to delays and improper installations.

From the utility perspective, the Company identifies the following concerns:¹⁸⁴

1. **Energy Affordability and Rate Impacts** – utilities need to balance the need to electrify with concerns about potential bill increases for customers.
2. **Landlord-Tenant Incentive Misalignment** – utilities must navigate complex regulatory and Stakeholder dynamics to develop solutions that work for both tenants and landlords/building owners.
3. **Split Cost Structures in Multifamily Housing** – split cost structures present challenges in negotiating agreements with building owners and implementing cost-sharing models.
4. **Infrastructure Financing Barriers** – funding and/or bundled solutions that combine weatherization, electrical upgrades, and heat pump adoption can be necessary.

¹⁸¹ Source: FLT Plan, p. 23.

¹⁸² *Ibid.*

¹⁸³ Source: FLT Plan, p. 24-25.

¹⁸⁴ Source: FLT Plan, p. 25.

5. **Customer Education and Preference** – utilities need to enhance education and outreach efforts in Disadvantaged Communities through tailored marketing campaigns, education materials, and demonstration projects.
6. **Workforce Development** – utilities need to support educating and informing a workforce to ensure skilled labor to support heat pump installations.

By including this breakdown of barriers to electrification in Disadvantaged Communities, the Company has identified several areas for internal growth and collaboration with Stakeholders to promote accelerated electrification and maintain equity.

Additionally, in the FLT Plan, the Company included how the IRA incentives can increase adoption of heat pumps in the low income and disadvantaged communities. The Company included federal tax credits through 2032.¹⁸⁵ The IRA alone has the potential to lower the cost of electrification in LMI households by up to 70% for low-income and 40% for moderate income households.¹⁸⁶ With instant rebates, in some cases enough to pay for the majority of the upfront cost of new equipment, heat pump adoption in Disadvantaged Communities is likely to be higher than anticipated by the Company.¹⁸⁷

7.3 Cost-Benefit Analysis

In the FLT Plan, the Company provides updates to three beneficial cost tests - SCT, UCT, and Ratepayer Impact Test.¹⁸⁸ The benefit cost ratios can be seen in Table 7-3.

Table 7-3: BCA – Comparison of Scenarios (\$ Million)

Benefit Cost Test	CCA	CLCPA Approach	NNI	PUT
Societal Cost Test:				
Benefits	\$460	\$777	\$852	\$941
Costs	\$372	\$1,053	\$1,183	\$1,363
Net Benefits	\$88	-\$2,756	-\$331	\$422
Benefit Cost Ratio	1.24	0.74	0.72	0.69
Utility Cost Test:				
Benefits	\$364	\$558	\$618	\$623
Costs	\$307	\$908	\$1,023	\$1,4101
Net Benefits	\$63	-\$350	-\$585	-\$788
Benefit Cost Ratio	1.21	0.61	0.51	0.44
Ratepayer Impact Test:				
Benefits	\$364	\$558	\$618	\$623
Costs	\$397	\$1,046	\$1,363	\$1,579
Net Benefits	-\$32	-\$488	-\$745	-\$956
Benefit Cost Ratio	0.92	0.53	0.45	0.39

The New York CLCPA has set the statewide priority for action in decarbonizing various sectors across New York state, 85% by 2050, in line with science based global targets to minimize GHG emissions and reduce

¹⁸⁵ Source: FLT Plan, p. 67.

¹⁸⁶ Source: [Rocky Mountain Institute, Home Building Electrification.](#)

¹⁸⁷ Source: Inflation Reduction Act of 2022 - What it Means for You | Department of Energy.

¹⁸⁸ Source: FLT Plan Figure 75.

the adverse impacts of climate change.¹⁸⁹ Legislators, regulators, and Stakeholders across New York have agreed that action must be taken to limit the costs and impacts of climate change.

As discussed throughout this Final Report, a number of recommendations remain, many of which are likely to influence assumptions, outcomes and conclusions underlying the Company's bill impact BCA calculations. The results from the BCA tests will ultimately be affected by changes to the volumes forecast and bill impacts, and it is imperative to align those results prior to making decisions based on the BCA ratios provided. While the Company provides three different methods for BCA calculations, it is PA's understanding that the Order requires gas LDC companies to use SCT in their BCA calculations. We also observe there are a number of BCA calculation assumptions worth further assessment in future GSLTPs. For example, PA observes the Company applies a discount rate of 8.36% in their BCA calculations to account for the time value of money.¹⁹⁰ This discount rate is an important assumption in BCA calculations, as it can significantly affect how future benefits and costs are compared.

7.4 Recommendations to Improve Future GSLTPs

PA provides the following recommendations for the Company to improve the bill impact analysis and further refine the assumptions in future GSLTPs.

1. Develop a view on the economics of electric appliances such as heat pumps and how it will change over time as gas rates increase when the Company pursues blending LCFs and other costly measures. The Company should share the assumption and results of this analysis with Stakeholders and consider this analysis in its long-term gas planning and bill impact calculations.
2. Further refine and explore the fuel switching assumptions for each use case (e.g., space heating, water heating, cooking, etc.). Develop a view on what share of customers who electrify their gas appliances do or do not disconnect from the gas system, and if so why.
3. Provide the assumptions used in this modeling effort on cost of home heating for a typical household using various fuels including propane, fuel oil, electric resistance as well as heat pumps as requested by PA and Stakeholders.
4. Provide Stakeholders visibility into projected costs of each scenario from a residential, non-residential, and average customer view.

¹⁸⁹ [Scoping Plan - New York's Climate Leadership & Community Protection Act](#).

¹⁹⁰ Source: FLT Report, p. 15.

8 Environmental Assessment

In this section, PA provides updated observations on the environmental-related aspects of the Company system, along with recommendations to improve these aspects of the FLT Plan. We first highlight the GHG emissions, as reported by the Company, then discuss the role of demand side management (DSM) programs and the Company's efforts to reduce emissions, concluding with a discussion of low-carbon fuel options, including RNG and hydrogen.

In the FLT Plan, the Company identified the NNI scenario as the preferred scenario for long-term planning. Although the NNI relies little on LCFs for decarbonization, PA believes exploration and research into the potential role of RNG and hydrogen is important for Stakeholders and the Commission to understand, especially were the Company to need to increase reliance on LCFs at any point in the long-term planning future.

8.1 GHG Emissions

To reduce GHG emissions associated with the gas system, the Company presents four decarbonization scenarios that offer increasing opportunity for GHG emission reduction relying on a variety of solutions and demand-side management measures including but not limited to (e.g., EE, weatherization, NPAs), electrification, and the blending of low-carbon fuels (i.e., RNG and hydrogen) into the gas supply. DSM measures can actively reduce the amount of gas delivered to customers and have demonstrated success in reducing emissions across the Company's service territory. The effectiveness of low-carbon fuels in reducing GHG emissions will depend on state policy decisions on how utilities account for emissions across the natural gas lifecycle.¹⁹¹ In the FLT Plan, the Company identifies the NNI scenario as their preferred pathway moving forward. The NNI scenario utilizes minimal LCFs blending, as described at this point in time.

In the FLT Plan, the Company reports GHG emissions under the Environmental Protection Agency's (EPA's) Mandatory GHG Reporting Program.¹⁹² Under this program, natural gas distribution companies are required to report GHG emissions annually from mains, services, metering stations, and certain types of combustion units. The EPA sets a 25,000 MT CO₂e/year reporting threshold. The Company has presented a Proposal for an Annual Greenhouse Gas Emissions Inventory Report¹⁹³ and a Joint Utilities' May 31, 2023, Supplement to Proposal for an Annual Greenhouse Gas Emissions Inventory Report¹⁹⁴ for Commission action. If the Joint Utilities Proposal is approved, or approved with modifications, each New York investor-owned gas utility could use a statewide framework to report on its GHG emissions. These emissions would be estimated for the entire supply and delivery chain from gas production through consumption. This Commission decision will impact the calculation of the emissions reduction associated with low-carbon fuels, such as RNG and hydrogen.

Across the four proposed decarbonization scenarios, the use of low-carbon fuels (e.g., RNG, hydrogen) is integral in reducing the GHG emissions throughout the Company's gas system. The Commission's decision on the GHG emission impact of low-carbon fuels will have important implications for the GHG accounting methodology in the decarbonization scenarios presented in the FLT Plan. Despite the Company's selection of the NNI scenario, which employs a targeted deployment of LCFs, the Commission's decision will be impactful for future planning.

In the FLT Plan, the four scenarios describe various levels of emission reductions by displacing conventional natural gas in the supply mix with a blend of RNG and/or hydrogen. Across the four scenarios, the Company presents increasing blends of RNG and hydrogen, as illustrated in Table 8-1.

¹⁹¹ Source: Case 22-M-0149, Proceeding on Motion of the Commission Assessing Implementation of and Compliance with the Requirements and Targets of the Climate Leadership and Community Protection Act ("CLCPA Implementation Proceeding"), Joint Utilities' Proposal for an Annual Greenhouse Gas Inventory Report (December 1, 2022) ("GHG Inventory Proposal").

¹⁹² Source: [Greenhouse Gas Reporting Program \(GHGRP\) | US EPA](#).

¹⁹³ Source: Case 22-M-0149, Proceeding on Motion of the Commission Assessing Implementation of and Compliance with the Requirements and Targets of the Climate Leadership and Community Protection Act ("CLCPA Implementation Proceeding"), Joint Utilities' Proposal for an Annual Greenhouse Gas Inventory Report (December 1, 2022) ("GHG Inventory Proposal").

¹⁹⁴ Source: CLCPA Implementation Proceeding, Joint Utilities' Supplement to Proposal for an Annual Greenhouse Gas Emissions Inventory Report (May 31, 2023) ("Supplemental GHG Inventory Proposal").

Table 8-1: Low-carbon Fuel Blends by Scenario as of 2043¹⁹⁵

Scenario	Blend RNG by 2043 (%)	Blend Hydrogen by 2043 (%)
CCA	5%	0%
CLCPA	5%	5%
NNI	5%	5%
PUT	20%	20%

The preferred NNI scenario includes a 5% blend of RNG and a 5% blend of hydrogen by 2043. The NNI scenario has blending targets similar to the CLCPA scenario and the CCA scenario. The PUT scenario includes significant increases in the blending of LCFs to achieve decarbonization.

Based on a combination of blending low-carbon fuels and continuing efforts on DSM measures, the Company presents their estimates for CO₂e reductions, from 1990 levels, by 2043. The resulting emissions reduction for each scenario range from 200,000 metric tons under the CCA scenario to nearly 600,000 metric tons under the PUT scenario by 2043, as outlined in Table 8-2.

Table 8-2: CO₂e Emission Reductions, by Scenario, in Metric Tons and Percent of Total Emissions per Customer¹⁹⁶

Scenario	Estimated CO ₂ e Reduction (MT)	2043 CO ₂ Metric Tons per Customer (% of 1990)
CCA	200,000	60%
CLCPA	420,000	50%
NNI	450,000	45%
PUT	620,000	35%

The emission reductions associated with each scenario, as presently calculated by the Company, represent a decrease in CO₂e emissions per customer ranging from 35%-60% of 1990 emission levels by 2043. In the preferred NNI scenario, the Company sees considerable reductions in CO₂e of 450,000 metric tons, exceeded only by the PUT scenario. Additionally, by 2043 in the NNI scenario, CO₂e metric tons on a per customer basis are expected to be only 45% of what per customer CO₂e emissions were in 1990.

¹⁹⁵ Source: Source FLT Plan, p. 69.

¹⁹⁶ Source: FLT Plan, Figure 43.

Further detail of the emissions reductions for each scenario were presented in the FLT Plan Figures 3 and 40. The ranges of projected CO₂e emission reductions and percent of CO₂e emissions per customer, per year, for each scenario are outlined below in Figure 8-1 and Figure 8-2.

Figure 8-1: Calendar Year CO₂e Emissions Reductions (2024 Baseline)¹⁹⁷

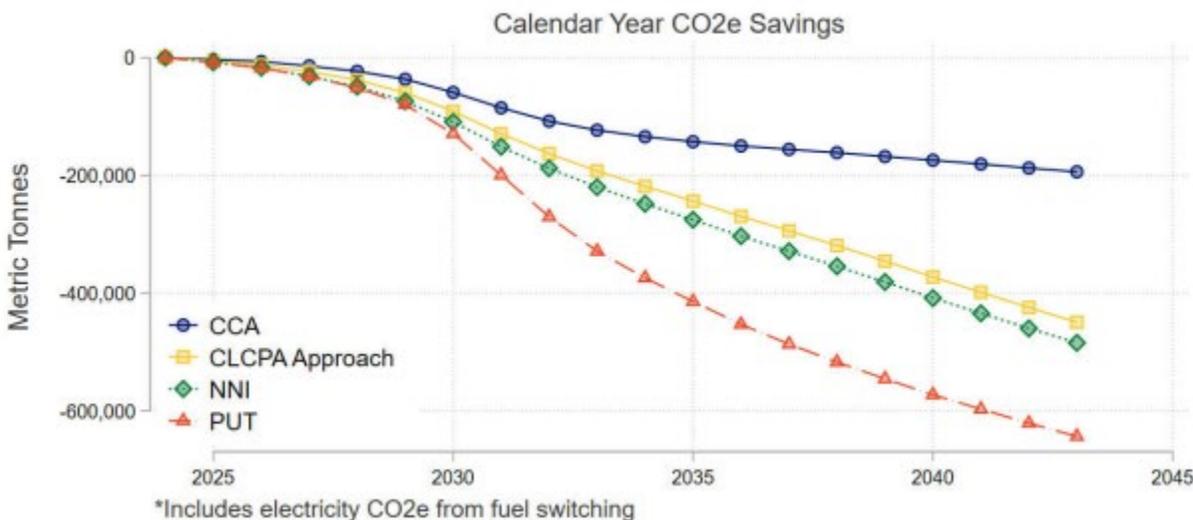
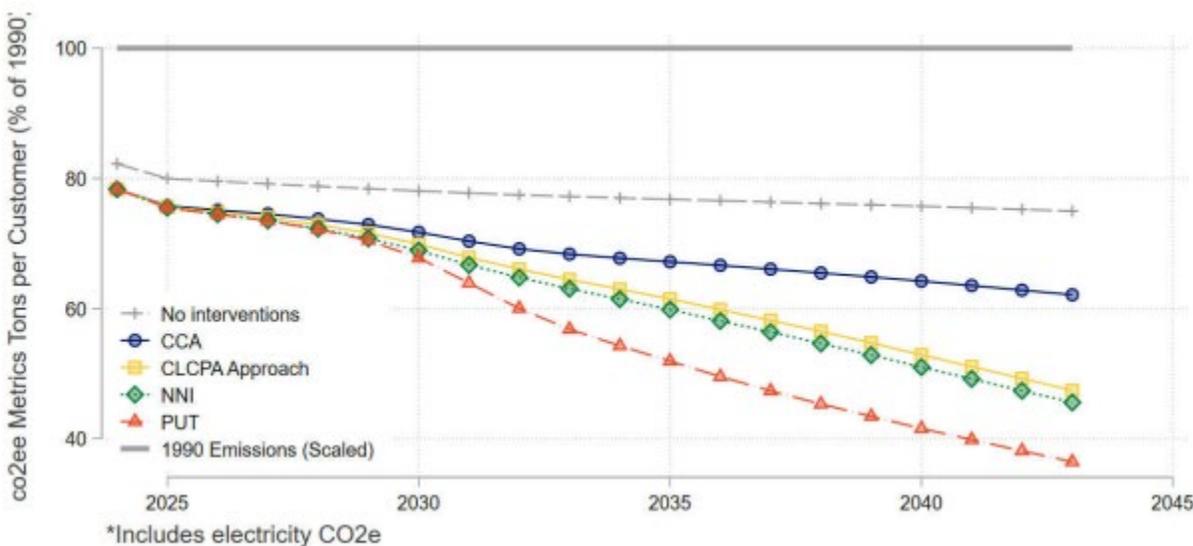


Figure 8-2: Annual CO₂e Emissions as Percentage of 1990 Levels¹⁹⁸



Across the four decarbonization scenarios, the Company anticipates continued reduction in annual CO₂e per customer. The preferred NNI scenario relies on increased incentives for heat pumps and weatherization, EE, building electrification, and a small but practical implementation of LCFs. The NNI scenario reports approximately 450,000 metric tons of CO₂e reductions but 2043, approximately 45% CO₂e metric tons per customer compared to a 1990 baseline.¹⁹⁹

8.2 DSM Programs

In the preferred NNI scenario, the Company relies on DSM and electrification to drive decarbonization. The Company has established EE and clean heat programs targeted at reducing CO₂ emissions. The Company offers several gas (and electric) EE solutions across its customer base and partners with NYSERDA and other New York utilities to develop statewide EE programs targeted towards LMI customers. In the FLT Plan, the

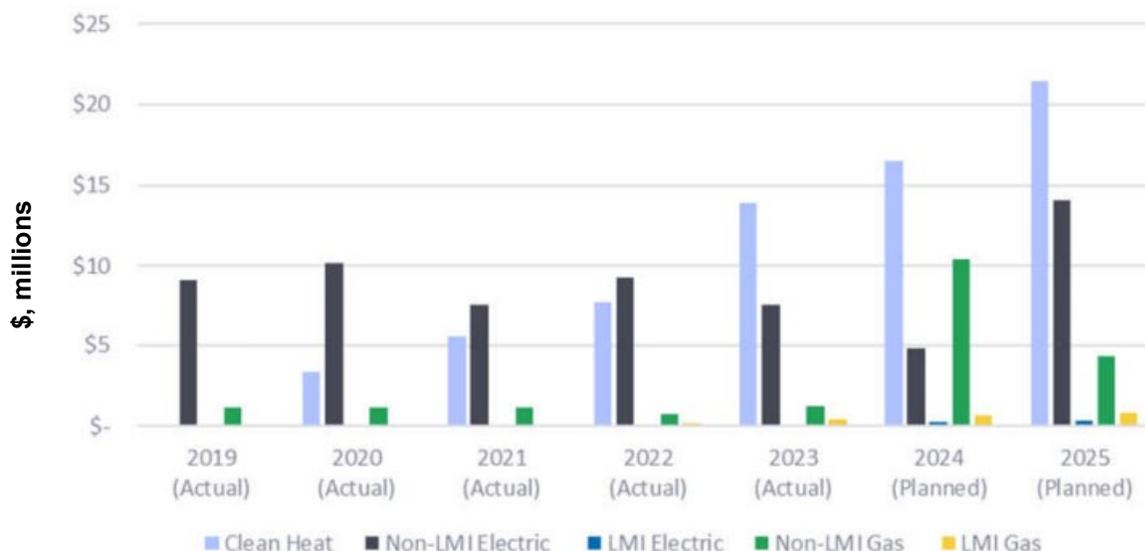
¹⁹⁷ Source: FLT Plan, Figure 55.

¹⁹⁸ Source: FLT Plan, Figure 54.

¹⁹⁹ Source: FLT Plan, Figure 43.

Company indicated a recent rate case approval that enabled them to scale up their EE portfolio on an annual basis from years prior.²⁰⁰ The expanded Company portfolios are shown in Figure 8-3.²⁰¹ The Company has demonstrated success and plans to further advance EE and building electrification measures for their gas and electric customers into the years ahead.

Figure 8-3: 2019-25 Central Hudson Gas and Electric EE Portfolios (\$ million)



Beyond 2025, the Company has filed its EE/BE Proposal²⁰², outlining applicable targets and budgets for these programs for 2026-30. In this proposal, the Company has allocated 92% of this budget to strategic EE/BE measures, with an emphasis on weatherization and building electrification measures in their Clean Heat programs. The budget for 2026-30 is presented in Figure 8-4.²⁰³

Figure 8-4: Central Hudson Electric and Gas Portfolio Budgets 2026-30 (\$ million)



²⁰⁰ Source: Case 20-E-0428, Proceeding on Motion of the Commission as to the Rates, Charges, Rules, and Regulations of Central Hudson Gas & Electric Corporation for Electric Service et al, Order Adopting Terms of Joint Proposal and Establishing Electric and Gas Rate Plan (issued November 18, 2021).

²⁰¹ Source: FLT Plan, Figure 28.

²⁰² Source: Case 18-M-0084, In the Matter of a Comprehensive Energy Efficiency Initiative (“NE: NY Proceeding”).

²⁰³ Source: FLT Plan Figure 30.

As presented in the EE/BE Proposal, the Company's EE/BE budget significantly favors electric programs over gas programs. This focus on electric programs is reflective of state level policy decisions that have begun to reduce reliance on gas, especially in new construction, beginning in 2026.

In addition to EE and BE programs, the Company has been proactive in electrification of customers' heating and appliances. As noted above, the Company offers incentives to their customers who opt to install heat pumps and heat pump water heaters. By continuing electrification efforts, the Company has successfully retired LPP in strategic locations using NPAs. Not only does electrification along LPP reduce emissions, but electrification can also save customers the cost of LPP replacement CapEx. However, to be an effective NPA, all the natural gas customers served by the designated infrastructure must agree to retire and replace their gas service in a timely fashion. The Company calls this type of NPA the TMA and TMA are designed for strategic abandonment of leak prone pipe through electrification where it is more cost effective than replacement and system reliability is not negatively impacted. TMA are most impactful in areas with high LPP replacement requirements and low customer saturation. To date, the Company has identified over 40 separate TMA projects, representing approximately 100 customers. The Company has eliminated 2,139 feet of leak prone pipe through the completion of five NPA projects.²⁰⁴

In addition to TMA, the Company is exploring load-growth based NPAs and is looking to leverage DSM and EE to manage load growth and forego further infrastructure investments, where possible. In addition, the Company conducted a geothermal potential study. The Company's proposed UTEN Thermal Pilot site is the Project Youth Opportunity Union (YOU) and an adjoining neighborhood in Poughkeepsie, NY. The site features 17 non-residential and 38 residential buildings in a densely populated area, which provide diversification of thermal loading and value, and is in a Disadvantaged Community.²⁰⁵

8.3 Low-Carbon Fuels

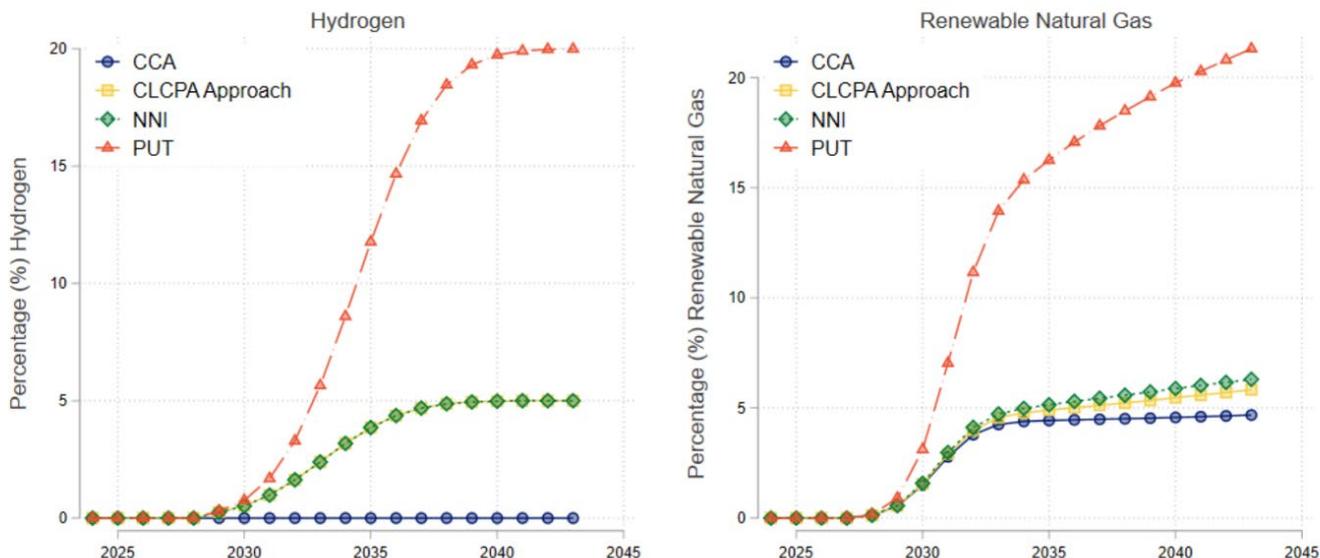
The preferred NNI scenario relies on blending small amounts of RNG and hydrogen in the gas system. The Company states that LCFs will be practically integrated based on prevailing economic and market conditions.²⁰⁶ Even though the blending of LCFs is low in the NNI scenario compared to the PUT scenario, as demonstrated in Figure 8-5, PA expects the assumptions around cost and availability of LCFs to be important indicators of the success of these fuels as decarbonization mechanisms, even when blended in small amounts.

As discussed below, the sustainability of RNG feedstocks in the state, the competitive landscape for a limited RNG supply in New York, and lack of technological readiness for green hydrogen deployment at a utility scale present challenges to deployment at affordable levels. The Company assumed that both RNG and hydrogen will be available at a competitive price for blending into the distribution system beginning in 2028. The bill impacts and costs associated with blending RNG, and hydrogen are discussed above in Section 7.1.4. As illustrated in Figure 8-5, the four decarbonization scenarios assume different blends of hydrogen and RNG as a percent of total gas supply across the forecast period.

²⁰⁴ Source: Company response to PA 1-7.

²⁰⁵ Source: FLT Plan, p. 49.

²⁰⁶ Source: FLT Plan, p. 65.

Figure 8-5: Percentage of Hydrogen and RNG in the Gas System (2024-43)²⁰⁷

The differences pertaining to low carbon-fuels among the four scenarios are described here in further detail.

1. **CCA** – in the CCA scenario, the Company plans to incorporate RNG and hydrogen into the supply portfolio as these low-carbon fuels become cost competitive with conventional natural gas. RNG is expected to sustain a 5% blend of gas supply by 2034, in this scenario.
2. **CLCPA**– in the CLCPA scenario, the Company plans to incorporate both RNG and hydrogen into the supply mix in 2028, with a sustained 5% blend of RNG and a sustained 5% blend of hydrogen by 2043.
3. **NNI** – the NNI scenario presents a strong focus on NPAs and represents a gas system under policies that prevent growth-related investments in the gas system. The scenario therefore focuses on increasing EE, weatherization, and robust heat pump incentives. Therefore, this scenario includes a 5% blend of hydrogen and a 5% blend of RNG of the gas stream by 2040.
4. **PUT** – in the PUT scenario, the Company features a transition of gas supply resources that will displace conventional natural gas with low-carbon fuels. Under this scenario, the Company anticipates hydrogen to reach a peak level of 20% of the gas stream by 2040 and a blend of up to 20% RNG by 2043.

In the ILT Plan, the Company included two appendices, one of which was a third-party report, which provided an overview of RNG and hydrogen potential. The appendices assessed RNG supply and feedstock availability in the service territory and system readiness for blending of hydrogen into the supply mix in the coming years. Updates to these appendices were not made available in the FLT Plan, so our analysis is based on the appendices to the ILT Plan.

In addition to RNG and hydrogen, the Company has proposed enhancing their utilization of differentiated gas (natural gas obtained from suppliers that proactively mitigate their methane emissions), after determining from a recent pilot project that use of differentiated gas can have a significant impact on reducing GHG emissions, as compared to traditional natural gas.

8.3.1 Renewable Natural Gas

Upon further review of the Company's plans for incorporating RNG into their system, PA notes that RNG supply across the state of New York will be limited, and the Company may find difficulty in procuring adequate volumes of RNG to meet their GHG emission reduction targets. The bill impacts of low-carbon fuel blending are discussed in detail in Section 7.1.4.

²⁰⁷ Source: FLT Plan, Figure 46.

The third-party study, provided in the ILT Plan, assessed the RNG potential in the Company's service area from various feedstocks. Results found that RNG sourced from agricultural residues had the highest potential for development within the Company's service territory, followed by RNG from animal wastes, food wastes, and lastly landfills and wastewater treatment facilities. The estimated RNG potential across the service area was reported 3.3M Dth/year. The potential RNG available is broken down by feedstock in Table 8-3.

Table 8-3: RNG Potential by Feedstock²⁰⁸

Feedstock	RNG Potential (%)
Agricultural Residues (predominantly corn stover)	69%
Animal Wastes	10%
Food Wastes	13%
Landfills, Wastewater Treatment	~8%

Additionally, the third-party study provided estimates of the GHG emission reduction potential from RNG development. Estimated carbon intensity and emission reductions are presented in Table 8-4 and found in the ILT Plan Appendix D.

Table 8-4: Estimated Carbon Intensity and Emissions Reductions for RNG Feedstocks²⁰⁹

Fuel	Carbon Intensity (kgCO ₂ e/Dth)	Carbon Intensity (kgCO ₂ e/Dth)	% of Potential for Central Hudson	Emissions Reductions (metric ton CO ₂ e)
Natural Gas	52.9	NA	NA	NA
Landfill RNG	36.8	16.1	0%	0
Corn Stover RNG	23.1	29.8	73%	70,570
WWT RNG	8.2	44.7	3%	4,949
Food Waste RNG	-24.2	77.1	13%	33,683
Animal Waste RNG	-288.2	341.1	10%	116,402
Weighted Average for Central Hudson Service Territory²¹⁰	-16.3	NA	100%	255,604

As presented in Appendix D, the Company's consultant estimated RNG could offset 218,152 metric tons of CO₂e per year, if RNG were fully developed and blended into the Company's gas system. This estimated value of 218,152 reduces the 225,604 metric tons CO₂e presented in Table 84 to account for emissions associated with the transportation of feedstocks. Based off the limited availability of RNG feedstocks in the Company's territory, the Company cannot utilize the most carbon intensive RNG feedstocks to develop more than 10% of their RNG. Rather, the Company will be sourcing approximately 73% of their RNG from agricultural residue, predominantly corn stover which includes the leaves, stalks, and cobs that remain after a corn harvest. The third-party report expresses concern for the sustainability of New York state agricultural

²⁰⁸ Source: ILT Plan Appendix D.

²⁰⁹ *Ibid.*

²¹⁰ This table presents values before taking into consideration the emission from feedstock transportation, which are discussed later in this section. These values represent GHG emissions on a 100-year GWP basis. Natural carbon intensity is based on end-use combustion. Carbon intensity for RNG vehicle use based on CARB estimates in 2018 UC Riverside study, except for corn stover which is based on 2012 ANL study, corn stover represents all agricultural residues.

residue as an RNG feedstock due to the trend in converting farmland to solar PV developments to achieve the state's clean electricity targets.²¹¹ In addition, cost considerations to produce RNG sourced from agricultural residue must be considered. According to a recent report from the International Energy Agency (IEA), landfill gas is the lowest cost feedstock for RNG.²¹²

Although the Company has identified a cost threshold for RNG production and distribution for limiting the bill impacts of RNG blending on their customers, PA observed the third-party study did not address the bill impacts of RNG production and blending. The Company reported, to date, it has been unable to secure RNG production at its target cost.

The third-party RNG study in Appendix D of the ILT Plan expressed uncertainty around RNG feedstock availability. PA agrees with this uncertainty, given the limited supply of the RNG market, considering that other gas utilities across the state are also forecasting to use the limited RNG supply within the state.²¹³ In addition to demand from other gas utilities, anticipated state policy for RNG application in the transportation market and RNG utilization for electric generation present additional demand on a potentially limited supply of RNG.

8.3.2 Hydrogen

In the FLT Plan, the Company presents the NNI scenario as the preferred scenario with small amounts of hydrogen blending into the gas supply, approximately 5% by 2043.²¹⁴ PA recognizes that the Company is in an early stage of hydrogen research and development and details around how the Company plans to acquire and produce hydrogen are still in the early stages.

To bolster the understanding of hydrogen, the FLT Plan was guided by a study that assessed the Company's system for hydrogen blending potential. To assess the potential for hydrogen blending, the Company completed a preliminary "Potential Hydrogen Blending Study" which covered a statistical sample of its distribution system (25 out of 94 system segments were studied) to estimate the amount of hydrogen the Company could blend without any pipeline modifications or reductions in load. Results from this study found that, of the distribution system segments studied, 72% of the system could support a hydrogen blend of up to 20% on a typical winter day without any need for modification of flow or pressure.²¹⁵

PA concurs with the preliminary hydrogen study that further investigation into the adaptability of the Company's entire distribution system is necessary to better understand both the opportunities and implications of planning for hydrogen's role in the future. Additionally, PA commends the Company's approach to understand hydrogen and the impact on the gas system and encourages the Company to continue exploring a targeted hydrogen deployment, rather than blending hydrogen across the entire gas network. Hydrogen may have promising application for hard to electrify applications and industries, some of which are present in the Company's service territory, including potentially decarbonizing electric generation plants in the Company's service territory.

For the reasons discussed above, PA is encouraged that the Company has refocused their FLT Plan to the NNI scenario with lower blends by volume of LCFs. The Company has limited their reliance on RNG and hydrogen for emissions reduction in the NNI scenario. Although PA believes RNG has potential use in future gas planning, PA agrees with the Company's decision to focus LCFs deployment as a targeted decarbonization measure for hard-to-electrify customers who remain on the gas system after other decarbonization measures are deployed for residential uses.

²¹¹ Source: [NYSERDA, 2023](#).

²¹² Source: [Sustainable supply potential and costs – Outlook for biogas and biomethane: Prospects for organic growth – Analysis - IEA](#).

²¹³ Source: [NYSERDA, 2022](#).

²¹⁴ Source: FLT Plan, Figure 46.

²¹⁵ Source: FLT Plan, p.4.

8.4 Recommendations to Improve Future GSLTPs

Recommendations for the Company to improve the environmental assessment components of future GSLTPs are summarized below.

1. Further investigate the technical, environmental, and economic implications of hydrogen production, transport, and distribution across Company's service territory.
2. Research and update the costs associated with RNG procurement and blending sourced from within and nearby geographies to their service territory and reflect this updated cost of RNG on customer bills throughout the forecast period.