Final Gas System: Long Term Plan

November 20, 2024

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Central Hudson
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Contents

I. Executive Summary

A. Central Hudson Approach and Priorities for Gas System Long Term Plan- Managing the Energy Transition

Central Hudson Gas and Electric ("Central Hudson" or "the Company") presents this Gas System Long-Term Plan (GSLTP) in accordance with the New York Public Service Commission's ("Commission") May 12, 2022, Order Adopting Gas System Planning Process.[1] The Gas Planning Order establishes a gas system planning process for gas local distribution companies (LDCs) in New York and includes, among other things, a requirement for each LDC to file a long-term plan.

The foremost objective of Central Hudson's approach to this planning process is to ensure that the Company maintains safe and reliable service for all customers throughout our service territory in the coming decades. In addition, we remain focused on analyzing, planning, and executing an optimal approach to the clean energy transition. This Final GSLTP has benefited from engagement with stakeholders (customers, environmental and other advocacy groups, the Commission, and other State agencies), which have provided information and analysis on how to reduce emissions while ensuring a safe, reliable, affordable, viable energy system. This has entailed analyzing and determining the proper balance of numerous vital priorities. This engagement has also informed Central Hudson's selection of a specific long-term gas plan (the GSLTP Pathway) that it will pursue in the coming years. As is discussed throughout this report, the GSLTP Pathway is based closely on what has been termed the No-New Infrastructure Scenario in the Initial, Revised and this Final GSLTPs.

Central Hudson has applied a flexible and adaptable approach in developing this GSLTP, and we intend to remain flexible in the implementation stage of the GSLTP. We know there will be regulatory and technological advances along the way, and we will adapt to those changes as they come. Finally, we will continue to support our customers' ability to choose their energy options. We know that customers value the ability to make their own energy choices such as heating fuel. We recognize that an optimal approach may be based not on eliminating choices but raising standards (*e.g.*, equipment efficiency standards).

The Company has developed the following priorities for the energy transition:

- **Safety, reliability, and resiliency for Central Hudson's customers and communities are the core objectives for Central Hudson's GSLTP**. This priority cannot be compromised.
- **Central Hudson supports NY policy objectives of reduction in the State's Greenhouse Gas (GHG) emissions and the development of programs to address Climate Leadership and Community**

[1] Case 20-G-0131, *Proceeding on Motion of the Commission in Regard to Gas Planning Procedures* ("Gas Planning Proceeding"), Order Adopting Gas System Planning Process (Issued May 12, 2022) ("Gas Planning Order").

Protection Act (CLCPA)[2] state-wide targets. This GSLTP is designed to pursue decarbonization and make progress toward supporting CLCPA goals, recognizing the context of facilitating safe and reliable service. While New York's climate laws are laudable, this GSLTP takes on the challenge of balancing the need to decarbonize while avoiding unintended consequences regarding costs, safety, and reliability.

- **Central Hudson must focus on affordability for all customers.** Primary focus must remain on affordability for the customers and communities it serves (including emphasis on low- and moderate-income (LMI) customers and Disadvantaged Communities (DACs)). This is done in recognition of the customer demographics of our service territory and aligning appropriately with the goal of preserving the economic base in our communities. Central Hudson supports efforts to ensure that historically under-represented communities have equitable access to clean energy program benefits and do not bear a disproportionate share of burdens. Central Hudson is focused on the resiliency and resource diversity that an underground pipeline provides to our business community.

- **Central Hudson supports beneficial electrification.** Electrification of gas end uses and gas customers are supported by Central Hudson's initiatives to achieve this including the New York State Clean Heat Program ("Clean Heat"). Central Hudson likewise supports the opportunity to electrify customers that use alternative fuels (*e.g.,* wood, oil, propane) for space heating rather than expanding the gas network.

- **Central Hudson will complete its Leak-Prone Pipe Replacement Program (LPPRP) for the safety of its customers.** Central Hudson has been implementing its LPPRP, and continuation of this is vital for safety, reliability, and environmental benefits. The majority of the LPPRP program will be completed in 2028, with a targeted completion date of the LPPRP in 2029.

- **Central Hudson will continue to pursue Non-Pipe Alternatives (NPAs) in place of traditional infrastructure when feasible.** Central Hudson has advanced its NPA program, including filing its NPA Criteria and other information.

- **Central Hudson will explore transforming its pipe for other uses.** Central Hudson is exploring the benefits, costs, and potential of renewable natural gas (RNG), responsibly sourced gas (RSG), and hydrogen for its gas distribution system.

- **Central Hudson's GSLTP will have a flexible and adaptable approach.** That approach will include: 1) Test different concepts that can support the plan; 2) Pursue the most cost-effective approach balanced with other goals; 3) Keep all options on the table; and 4) Be flexible and adaptable to regulatory and technological advances.

- **Energy Efficiency will continue to be supported by Central Hudson.** The Company has long administered and otherwise supported energy efficiency, and will continue to do so, subject to ongoing regulatory processes including requirements related to the July 2023 EE/BE Order, which limits gas energy efficiency measures in utility programs in the future.[3]

- **Central Hudson notes that utility regulatory policy changes may be needed to support broader policy goals.** It will be important to assess and potentially modify gas utility regulatory policies, such as

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2 Chapter 106 of the Laws of 2019. The CLCPA is available at: https://legislation.nysenate.gov/pdf/bills/2019/S6599

3 Case 18-M-0084, *In the Matter of a Comprehensive Energy Efficiency Initiative* ("NE: NY Proceeding*"),* Order Directing Energy Efficiency and Building Electrification Proposals ("EE/BE Order") (issued and effective July 20, 2023).

accelerated recovery of undepreciated costs and depreciation rates, depending on broader policy decisions and outcomes.

B. Central Hudson's Environmental Efforts and Progress to Date

In conjunction with State, federal, and local policies and targets, Central Hudson has adopted decarbonization as a central objective, with a focus on the energy transition.[4] This reflects goals of Fortis, Inc., Central Hudson's parent company, which include that "Fortis has a clear path to achieve a mid-term target of reducing GHG emissions 75% by 2035 compared to 2019 levels, and a 2050 net-zero direct GHG emissions target to decarbonize over the long-term."[5]

Central Hudson supports numerous clean energy programs and initiatives which reduce greenhouse gas emissions and support customer, state, and Central Hudson climate goals. Central Hudson has made significant progress on working toward CLCPA and other clean energy and GHG goals and targets. Advancements pertaining to its gas system operations include: 1) methane reduction through the Company's ongoing Mains Replacement Program (MRP); 2) selection of supply resources; 3) electrification of space heating and water heating; 4) electrification of commercial and industrial (C&I) end uses; and 5) utility thermal energy networks. Central Hudson efforts advance environmentally beneficial electrification, for example, promoting electric vehicles and heat pumps to lower emissions from transportation and building heating. For example, from 2020 through 2023, through the NYS Clean Heat Program, Central Hudson incentivized 9,863[6] heat pump projects across all electric and gas service accounts. Central Hudson's Clean Heat Program from 2020 through 2022 achieved 449,316 MMBTu in energy savings and an estimated GHG reduction of 28,634 metric tons of carbon dioxide (CO_2).[7] Through its energy efficiency programs, Central Hudson has supported energy savings, cost savings for customers, and GHG reductions. The projected GHG emissions reduction from conversions to electric heat pumps from gas programs are 175,000 metric tons of CO_2-equivalent by 2030; GHG reductions from conversions of oil and propane heat to electric heat pumps are 325,000 metric tons CO2 equivalent by 2030.[8]

While Central Hudson has long offered programs to support the adoption of energy efficient gas measures, the Commission's July 2023 EE/BE Order reduces the ability of Central Hudson and the other NY utilities to incentivize gas measures beyond 2025. As described in its November 1, 2023, EE/ BE Proposal[9], Central Hudson remains committed to its energy efficiency programs and will shift funding as appropriate to electric end uses and electrification programs and weatherization.

Central Hudson has also been exploring methods to reduce the greenhouse gas and environmental impacts of its gas distribution system, including RSG, RNG, and hydrogen. RNG and Hydrogen are considered in the scenarios analyzed in this GSLTP. For RNG Central Hudson is fully supportive of the Northeast Gas Association (NGA) interconnect guideline that outlines the process for

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4 https://www.cenhud.com/en/my-energy/our-energy-future/energy-in-transition/
This website reflects both Central Hudson's electric and gas operations.

5 https://www.cenhud.com/en/my-energy/our-energy-future/energy-in-transition/

6 NE:NY Proceeding, NYS Clean Heat Program 2023 Annual Report (filed May 23, 2024) Table 4, p. 9.

7 NE:NY Proceeding, Central Hudson Gas & Electric System Energy Efficiency Plan (SEEP) (filed November 20, 2023) ("2023 SEEP"), Table 3C.

8 Central Hudson GSLTP Stakeholder Presentation, slide 64 (December 19, 2023).

9 NE:NY Proceeding, Central Hudson Gas & Electric's Energy Efficiency And Building Electrification Portfolio Proposal (filed November 1, 2023).

an RNG supplier to work with a local distribution company to supply gas. This interconnect guideline takes into account the most current research across the industry to outline appropriate requirements for RNG developers. Central Hudson has adopted this interconnect guideline within our Gas Transportation Operating Procedures (GTOP) since the initial release in 2019. As of December 2022, NGA with the help of multiple utilities, have enhanced the interconnect guidelines to encompass alternative fuels as well, including hydrogen. In addition, Central Hudson has contracted with a third-party expert to conduct a study of RNG potential within the counties that overlap its territory from various feedstocks. For hydrogen, Central Hudson has completed a Hydrogen Blending Study of a subset of its pipeline distribution systems to estimate the amount of hydrogen Central Hudson can blend without any pipeline modifications or reduction in loading. Among other findings, this study concluded that 72% of Central Hudson's local distribution systems can support up to 20% hydrogen without any network reinforcements.

Central Hudson has been exploring the ability to abandon segments of its network which have a smaller number of customers by inducing customers to adopt electrification, energy efficiency, and other clean energy solutions, referred to as Targeted Network Abandonment. Analysis to date indicates that this may be quite costly. It is addressed in detail in this GSLTP including in the scenarios analyzed. In summary, analysis to date indicates that this may be quite challenging and costly.

The Company is also supporting complementary efforts in its electric businesses, with the recognition that electrification of gas end uses will result in increased electric usage.[10] Central Hudson's overall approach includes pursuing the most cost-effective approach to emission reduction by examining current incentives to determine which offer the highest value in lowering emissions. Central Hudson is investing in upgrading electric transmission and distribution lines, including support for statewide transmission upgrades to deliver renewable energy sources to areas of high electric demand, including the Hudson Valley and in the metropolitan area, and investments in the regional electric distribution system to facilitate greater levels of locally sited renewable generation. Central Hudson is integrating gas benefits for fast-start electric generation to complement intermittent renewable resources. The Company is also substituting gas for higher-carbon petroleum-derived fuels used in heating and manufacturing. In addition, Central Hudson is expanding heat pump and energy efficiency programs (including weatherization), a cost-effective method to reduce emissions.

C. Gas/Electric Integration

As a key component of the energy transition, Central Hudson is focused on shifting the paradigm of distinct and separate "gas and electric" planning and investments to a single "energy delivery" paradigm. This GSLTP embodies this changing paradigm, as the modeling and analysis of Central Hudson's gas system, core to this planning document, are linked with comparable planning models and data for the Company's electric system. Specifically, the analytic models and concepts for the GSLTP are similar to, compatible with, and linked with those on the electric side, *i.e.*, as used for and described in the Company's electric Distribution System Implementation Plan (DSIP).[11]

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[10] https://www.cenhud.com/en/my-energy/our-energy-future/energy-in-transition/

[11] Case 16-M-0411, *In the Matter of Distributed System Implementation Plans* ("DSIP Proceeding"), Central Hudson Distributed System Implementation Plan, Revised (June 30, 2023).

A primary example of the linked use of gas and electric planning data in this GSLTP is the layering of gas system loading information with granular data on heat pump penetration. This enables assessment of the overlap between highly loaded gas systems and corresponding electric grid components– circuit feeders, substations, and utility transmission areas– to understand the available capacity for electrification of heating. This combined gas and electric planning approach supports key outputs such as benefits and costs (*i.e.*, benefit cost analysis or "BCA") of scenarios, GHG emissions, sales, and customer rate and bill impacts. When considering customers' shifting from gas to heat pumps for heating, the Company can assess if and/or when electric distribution system upgrades would be required to accommodate increased electric peak load and calculate and account for the associated cost projections. This combined analysis similarly provides visibility and information regarding opportunities for and potential impact of tools such as NPAs. These and other uses and insights from this combined analytic approach are described throughout this document, particularly in Section V which describes the modeling scenarios, assumptions and results.

While this transition toward a "single energy delivery" platform is reflected this GSLTP, this focus extends beyond this planning process. This GSLTP is one component of a broader Central Hudson process to advance system specific electric and gas integration/planning work, with additional initiatives that started in 2024.

D. Central Hudson Scenario Modeling

Central Hudson recognizes the importance of engagement with regulators, policy makers, and other stakeholders in the GSLTP process. For this reason, Central Hudson developed a granular modeling approach that is flexible and can be adjusted to take into account numerous assumptions and variables (Scenario Modeling). This modeling framework has supported discussions with New York Department of Public Service (DPS) Staff and stakeholders and will enable more efficient, less resource-intensive scenario modeling in the future. Furthermore, as the gas long term planning process goes forward with future iterations of the GSLTP, Central Hudson will seek to increase integration of Scenario Modeling with the electric DSIP modeling. Likewise, in future DSIP filings, Central Hudson will look to expand analysis of the electric planning time horizons and impacts to better align the GSLTP.

Central Hudson's Scenario Modeling approach as used in this GSLTP was built to evaluate the Company's service territory at a granular, local level. This allows us to identify the portions of our system that require investment to maintain safety and reliability due to loading factors and demand projections. It also enables us to identify the regions that would most benefit from targeted efforts at demand mitigation to avoid the need for incremental investment. Evaluating the needs of specific systems within the Central Hudson service territory will lead to more effective NPA program identification and design, better customer engagement, and a clearer indication of decarbonization potential. This will optimize investments at Central Hudson to mitigate bill impacts from capital investments. The analytical approach is designed to provide necessary information to understand the viability of reducing the need for investment in the gas system.

All of the analyses in this GSLTP reflect data and assumptions regarding what is feasible considering current technology and costs, including the feasibility of customer adoption, allowing the Company to present realistic achievable plans that will continue to provide safe, reliable, and resilient service for customers. The GSLTP also provides a basis for requesting approval for specific investments and programs, with particular focus on necessary actions during the next three years. In short, the

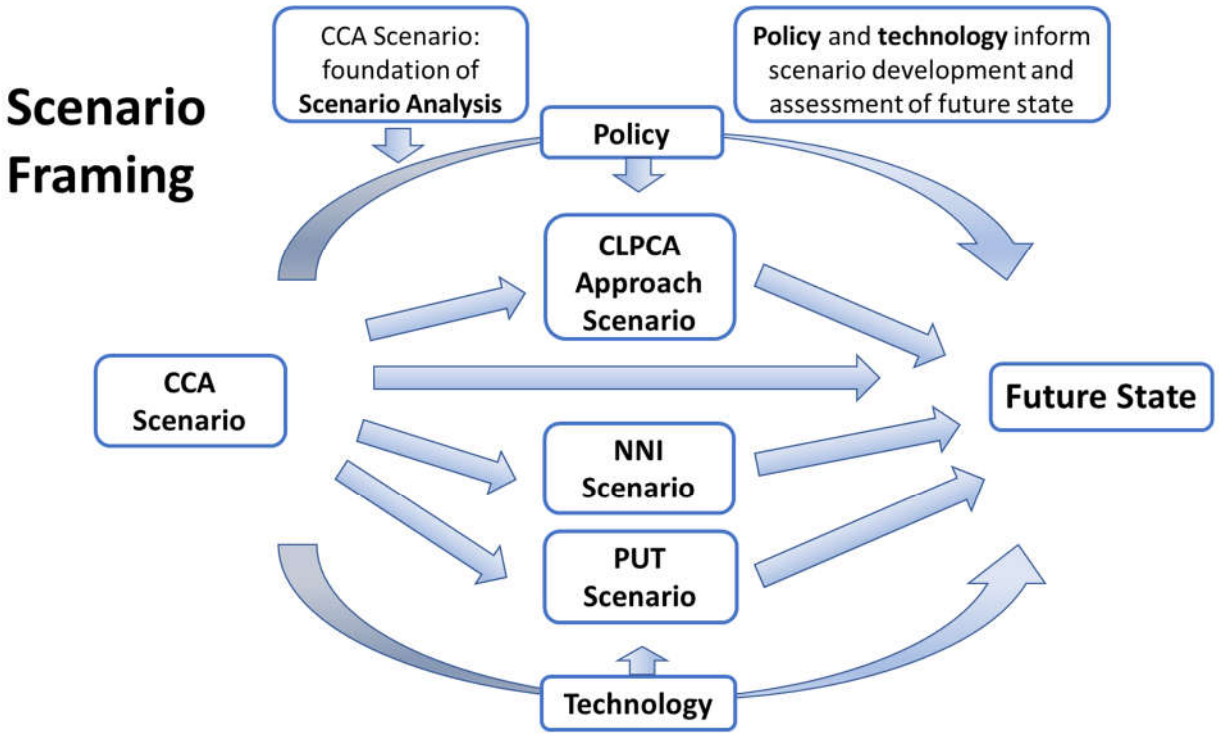
GSLTP must be technically feasible and provide valid projections of costs, bill impacts, and GHG emission reductions that can inform subsequent utility proposals and decisions. Potential improvements or new challenges related to policy, markets, technology, customer behavior, infrastructure development, and other developments that may evolve over time will be incorporated into future GSLTP filings.

E. GSLTP Scenarios

As a central component of this GSLTP, Central Hudson has conducted detailed modeling of various sets of assumptions and planned activities, referred to as scenarios. The scenarios modeled and included in development of this GSLTP are referred to as: 1) Current Clean Agenda (CCA) Scenario; 2) CLCPA Approach Scenario; 3) No New Infrastructure (NNI) Scenario; and 4) Pipe Use Transformation (PUT) Scenario. As is described in detail in Section V, below, these scenarios include overlapping elements, such as heat pump incentives, RNG, and hydrogen blending. Each scenario builds on the next. For instance, the PUT Scenario includes the assumptions from the NNI Scenario but layers on additional RNG and hydrogen. As part of the scenario modeling, the beneficial electrification and energy-efficiency portfolio was optimized through the measures and customers that provided the highest net benefit per dollar and were selected from highest to lowest and continued as long as the portfolio benefits exceeded the costs under the societal cost test. As reflected throughout this GSLTP, the Company has selected the NNI Scenario as its GSTLP Pathway.

Figure 1, below, illustrates the scenario framing.

Figure 1: Illustration of Central Hudson's Approach to Scenario Development



i. Current Clean Agenda (*i.e.*, current policy/statutory framework)

The Current Clean Agenda (CCA) Scenario reflects the legal and policy framework that applies today, at current funding levels. It presents the expected trajectory for the gas system (in terms of

customers, footprint, volumes, *etc.*) that can be projected under current policies that apply to the gas system, including investments the New York Public Service Commission (Commission) has approved. This is the Company's current base case which includes substantial decarbonization actions. Under these assumptions, customer growth will continue as described in further detail below. The Current Clean Agenda Scenario assumes that gas business or market transformations that occur naturally during the next two decades reflect the current set of laws that direct Central Hudson's investments and operations, and the existing funding mechanisms for energy efficiency programs (*i.e.*, heat pump incentives). It reflects a higher level of investment than in the past in clean heat and weatherization and incorporates not-yet-enacted policies such as code requirements for heat pumps for new buildings. RNG and hydrogen will be integrated into the supply portfolio to the extent they are cost-competitive with conventional natural gas resources. The Current Clean Agenda Scenario assumes continuation of Central Hudson's Clean Heat and energy efficiency programs while recognizing ongoing shifts in energy efficiency policy in the state, including an increased emphasis on weatherization programs.

ii. CLCPA Approach

The CLCPA Approach Scenario generally incorporates programs and policies that Central Hudson expects will be needed to meet the economy wide GHG reductions envisioned in the CLCPA, though this does not seek to achieve a specific level of emissions reductions for the gas utility sector. The CLCPA Approach Scenario entails doubling (2x) heat pump incentives to convert current customers to the electric system. It relies on technological advancements (*e.g.*, improvements in the economics of ground source heat pumps, a decline in heat pump system costs, *etc.*) and a system-wide transition approach rather than one targeting specific regions within the Company's service territory. It also assumes progress in incorporating hydrogen (5% by 2043) and renewable gas (5%) into the supply mix. It also caps new connections starting in 2026.

Each of the scenarios the Company has evaluated requires deep collaboration among gas and electric system planning organizations within Central Hudson. The analyses project that the electric system likely has sufficient capacity to accommodate projected winter peaking loads over the next five to ten years but would experience overloads thereafter.[12] However, as penetration of electric heating grows, it will require resizing of poletop and padmount transformers, and upgrades to feeder circuits, substations, and utility transmission system (69-115kV). As a result, the CLCPA Approach Scenario will require a large investment in the electric transmission and distribution system to support incremental electric load and provide assurances of safe, reliable, and resilient service, including upsizing poletop and pad mount transformers and reinforcing circuit feeders, substations, and the utility transmission system (69-115kV).

iii. No New Infrastructure (i.e., GSLTP Pathway)

The No New Infrastructure (NNI) Scenario (i.e., which Central Hudson selects as the GSTLP Pathway) represents the profile of the gas system under policies that prevent growth-related investment in the gas system. Note, however, that the NNI Scenario does not entail the elimination of capital

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[12] The assessment is based on the DSIP analysis, which had different scenarios than the GSLTP. The findings generally apply to the CLCPA approach, NNI, and PUT savings scenarios. Central Hudson does not have a tool to fully coordinate gas and electric planning at this time. The overlay between gas and electric planning will be refined further in future GSLTPs.

spending altogether: under any scenario Central Hudson will continue to make the investments necessary to ensure that safe and reliable gas distribution service remains available to customers that continue to rely on the system. This includes infrastructure investment needed to address safety and reliability.

Efforts to limit capital investment in gas infrastructure will be supported by an assertive effort to identify highly loaded areas and develop NPAs where possible, consistent with State policies (pertaining to *e.g.*, NPA suitability, benefit cost analyses for alternatives to traditional infrastructure, *etc.*). It includes an up to five-fold increase in incentives for heat pumps and weatherization in local gas systems that are highly loaded and also caps new connections starting in 2026. In addition, energy efficiency and building electrification program design will emphasize decarbonization through electrification. Electrification-oriented incentives will focus on targeted areas of the system where load presents challenges and would otherwise require infrastructure investments to meet safety and reliability requirements. This scenario includes small amounts of RNG and hydrogen blending.

iv. Pipe Use Transformation

The Pipe Use Transformation (PUT) Scenario features a focused transition of Central Hudson's gas supply resources to the extent feasible, safe, and practicable. Conventional natural gas resources will be displaced with alternative, low-carbon fuels (LCFs) that will produce a net reduction in GHG emissions to a greater focus than other scenarios. Central Hudson will continue to pursue the integration of RNG, including in situations in which RNG interconnections prevent the need for investments in distribution infrastructure. Green hydrogen will be blended with conventional supply resources in a manner consistent with safety and reliability guidelines (*i.e.*, at an expected level up to 20% of the gas stream by volume). In addition, the scenario assumes increased use of RNG (20% by 2043) from feedstock and livestock.

The PUT Scenario includes the same concerted and targeted effort to identify highly loaded gas systems and target resources to avoid infrastructure upgrades as in the NNI Scenario. Clean electricity and LCFs will be used to contribute to the State's economy-wide GHG emissions goals. The PUT Scenario also envisions the use of existing pipeline infrastructure to help decarbonize industrial facilities that currently rely on more carbon intensive fossil fuels such as oil and propane. This scenario provides the greatest emissions savings among the scenarios evaluated in this GSLTP.

F. High Level Results

Central Hudson has approached and implemented the GSLTP process to present information and analysis to DPS Staff and stakeholders, soliciting input and feedback at various stages of the planning process. This sequence of interactions included an iterative modeling process used to evaluate the planning scenarios described above. The interactions with stakeholders helped to clarify and refine modeling options, assumptions, and a range of features of Central Hudson's selected GSLTP Pathway. As discussed above (and as is described in detail in Section V) Central Hudson's selected GSLTP Pathway is aligned with the NNI Scenario.

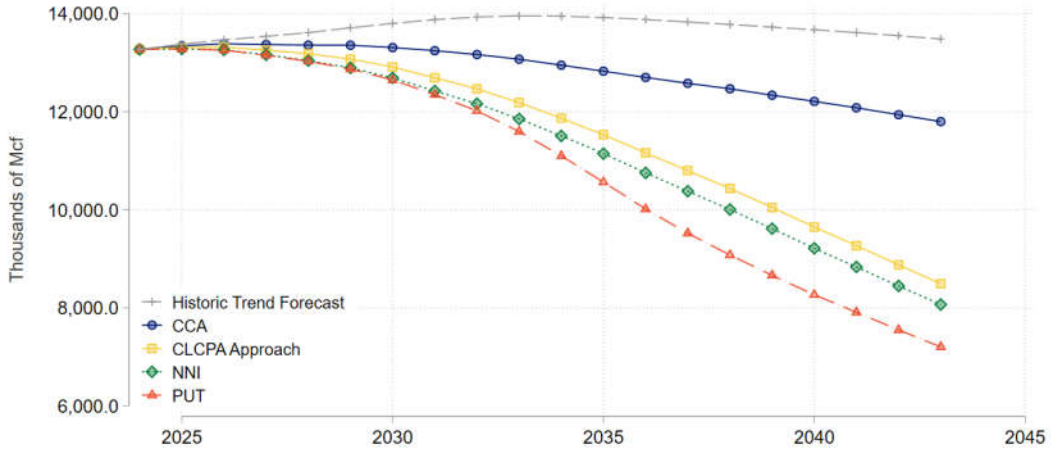
As directed in the Gas Planning Order, Central Hudson's modeling analyses evaluated a variety of planning objectives, including supply and demand projections, estimates of carbon emissions reductions, dimensions of customer outcomes, and cost-effectiveness at a scenario-level.

The Company's modeling indicates that all scenarios would result in significant reductions in total sales and peak demand (Figure 2). As discussion in Section V, sales declines are projected to decline most significantly for residential customers.

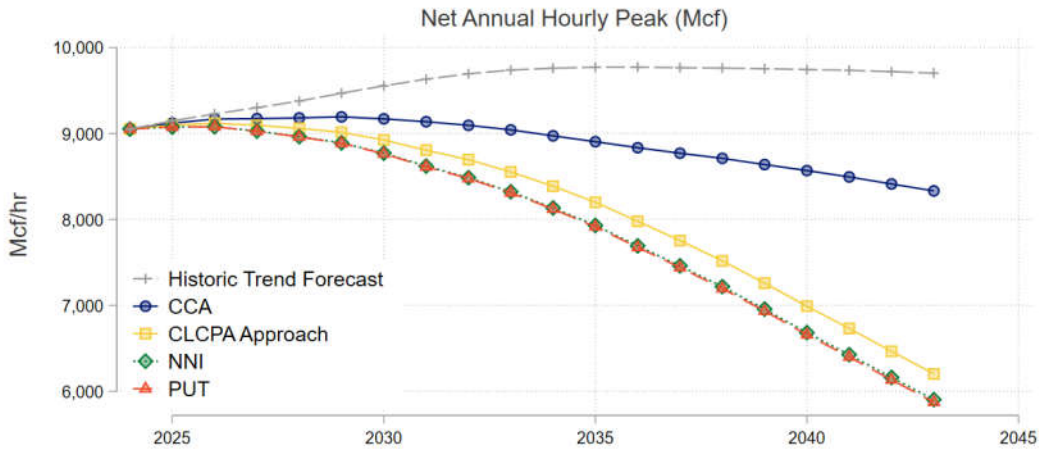
Where "NNI" and "NNI Scenario" are identified in Figures and narrative throughout this Final GSLTP, this represents Central Hudson's selected GSLTP Pathway.

Figure 2: 20-Year Annual Sales, Hourly, and Daily Peak Demand Projections (2024-2043)[13]

Annual Sales:



Net Annual Hourly Peak (Mcf/hr):



Annual Peak (Mcf/Day):

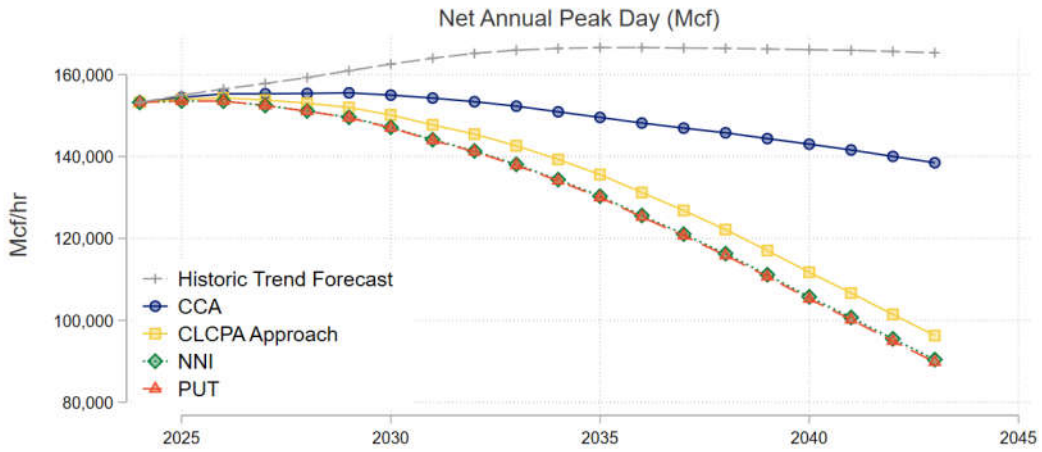
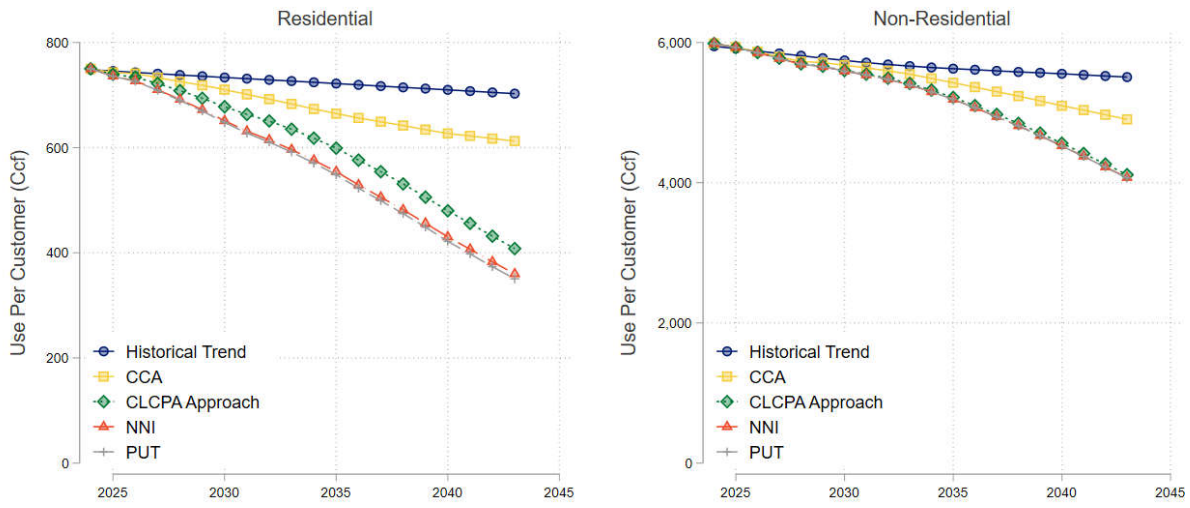
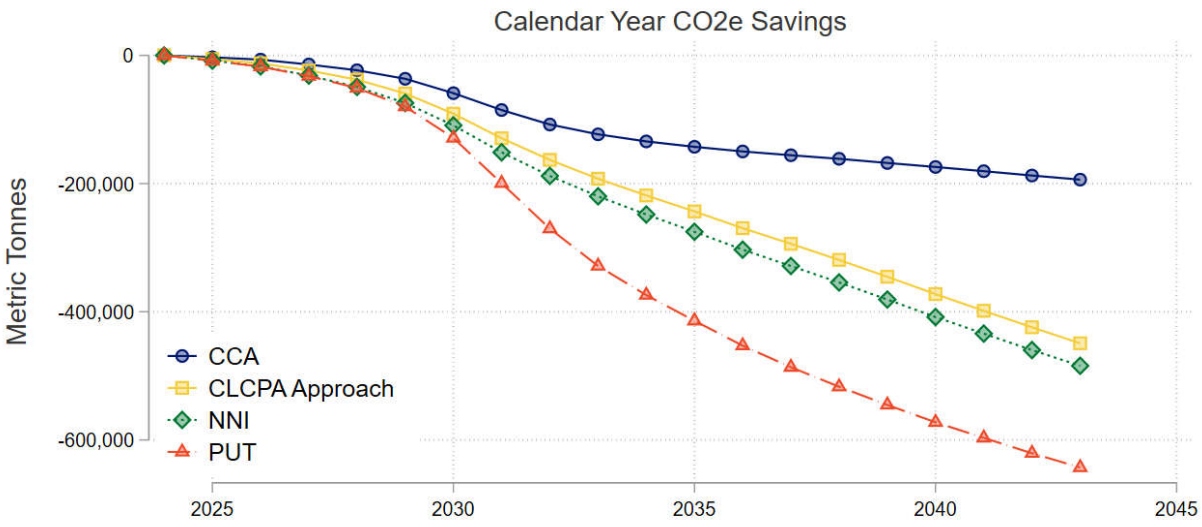


Figure 3: Use per Customer (CCF) for GSLTP Scenarios (2024-2043)



The GSLTP scenarios project GHG emissions reductions of between 200,000 metric tons (under the Current Clean Agenda Scenario) and over 600,000 metric tons (the PUT Scenario) by 2043. The scale of these reductions will continue through 2050 and beyond.

Figure 4: Calendar Year CO_2 Emissions Reductions from a 2024 Baseline



The reductions in CO2e emissions over time are due to the fact that building electrification technologies and heat pumps, specifically, use less energy to heat homes or water and also rely on a cleaner fuel

[13] The GSLTP relied on a bottom-up approach for the peak day forecast, which has historically been based on a top-down allocation of peak day load to rate classes. Future studies will work to improve the alignment between the historical top-down forecasts and bottom-up analysis.

source as the electric grid becomes cleaner. Thus, the combined electric and gas use for the current gas customers is expected to decrease, as measured by total MMBtu. The decrease in total energy use does not lead to a lower total bill for the average customer, however. The combined gas and electric bill is expected to remain at similar levels despite the decrease in energy use due to the changes in electric and gas rates.

Figure 5: Typical Gas Customer Combined Electric and Gas Usage and Bill Impacts (2024-2043)

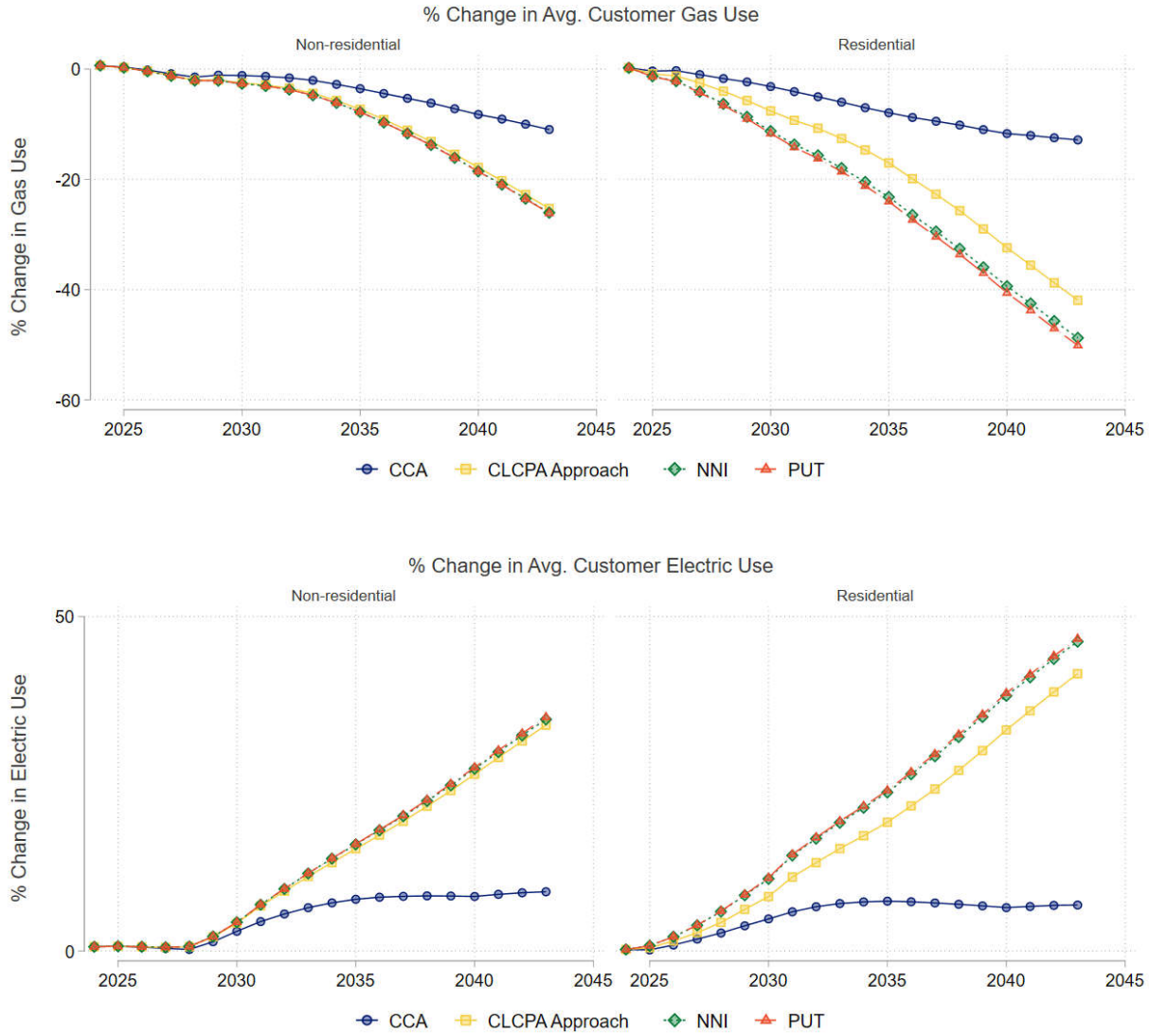
		Typical Gas Customer Combined Gas and Electric Annual Usage (MMBtu)			Typical Customer Annual Total Bill ($2024) Gas + Electric			Wallet Share (%)		
Rate Class	**Scenario**	**2024**	**2030**	**2043**	**2024**	**2030**	**2043**	**2024**	**2030**	**2043**
Residential	Reference	103	101	98	$3,104	$3,154	$3,157	3.64%	3.70%	3.70%
	CCA	103	100	90	$3,111	$3,130	$3,112	3.65%	3.67%	3.65%
	CLCPA Approach	103	97	78	$3,111	$3,116	$3,384	3.65%	3.65%	3.97%
	NNI	103	95	74	$3,112	$3,088	$3,401	3.65%	3.62%	3.98%
	PUT	103	95	73	$3,112	$3,089	$3,409	3.65%	3.62%	3.99%
Non-residential	Reference	781	760	735	$13,261	$13,350	$13,350	N/A	N/A	N/A
	CCA	786	758	687	$13,346	$13,292	$13,168	N/A	N/A	N/A
	CLCPA Approach	786	752	646	$13,346	$13,332	$14,625	N/A	N/A	N/A
	NNI	786	751	643	$13,346	$13,361	$14,740	N/A	N/A	N/A
	PUT	786	751	643	$13,346	$13,403	$14,859	N/A	N/A	N/A

(1) Estimated residential income per household is $85,339 ($2024)

(2) Each gas premise was matched to median income for their census block group to estimate income

(3) Wallet share is the share of income per household, for the typical customer, dedicated to combined gas and electricity costs.

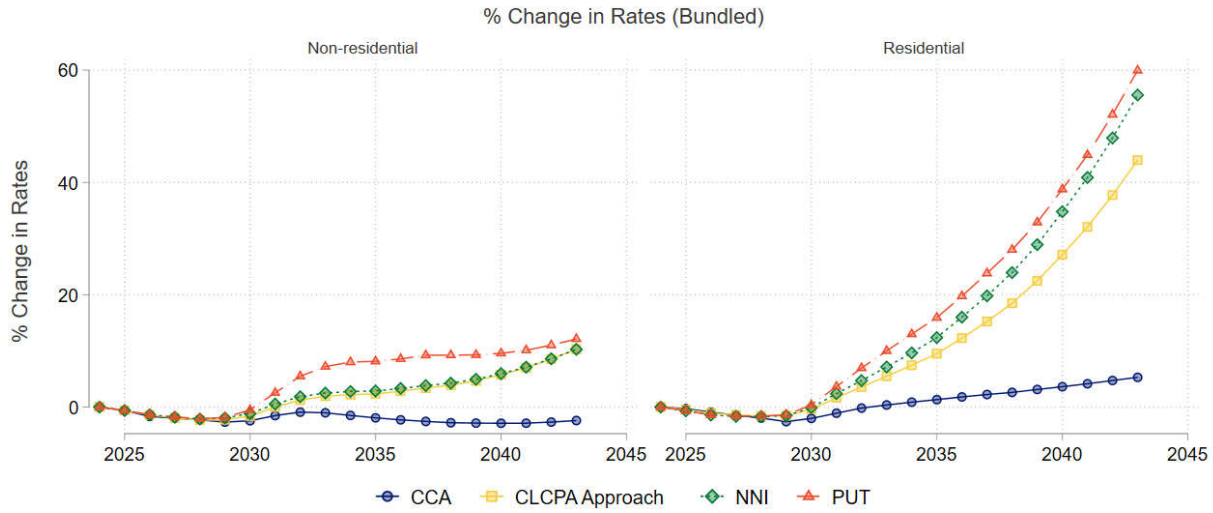
Figure 6: Percent Change in Gas and Electric Use for Average Account (2024-2043)



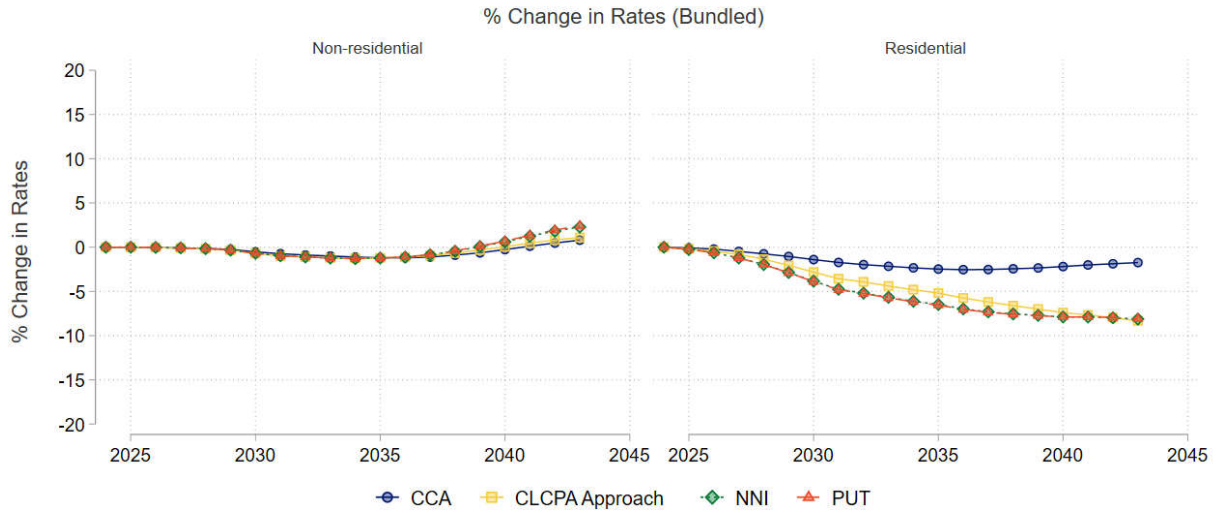
The change in sales and demand have a direct impact on rates. The cost of incentives to drive the evolution of customer preferences and the supportive infrastructure for lower-emitting services will drive gas rates up in the short term. As adoption of advanced energy efficiency and electrification technologies continues, the demand for gas on a per customer basis will fall and gas delivery rates will increase. By contrast, per unit electric rates are expected to remain relatively flat, but some increases are expected in later years as the electric grid reaches its operation limits, leading to infrastructure reinforcements and upgrades, which in turn affect rates.

Figure 7: Percent Impact on Bundled Gas and Electric Rates for Non-Residential and Residential Customers (2024-2043)

Gas Rates (Delivery + Supply):



Electric Rates (Delivery + Supply):



Gas planning strategies must be considered in the context of the costs and benefits that will materialize under various planning assumptions. In addition, the Company and stakeholders must acknowledge that the effects of gas planning extend beyond the gas utility. Scenarios have measurable impacts on gas system capital costs, but also lead to incremental electric system capital costs. Both benefits (*e.g.*, emissions reductions) and costs (*e.g.*, electric infrastructure and commodity cost increases) will materialize as decarbonization efforts continue to mature. Taking measurable costs and benefits into consideration, the planning scenarios Central Hudson has evaluated in this GSLTP yield

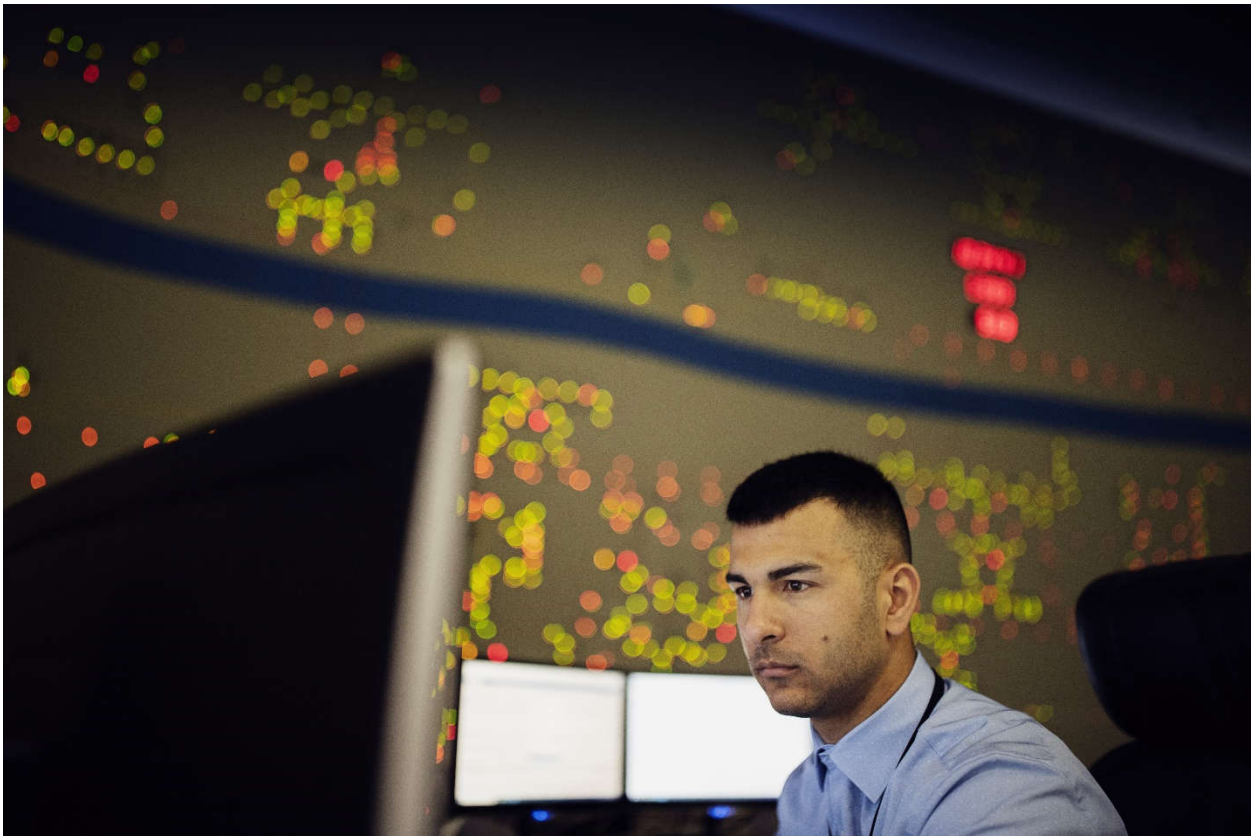
benefit-to-cost ratios of between 0.69 and 1.24 under the SCT, indicating that costs may outweigh benefits for some scenarios. However, the Company emphasizes that there are some benefit cost categories that are challenging to quantify and that are not internalized in the BCA calculations (*e.g.*, health benefits associated with lower carbon emissions, *etc.*). Figure 8 below provides a summary of BCA results, as discussed in greater detail in Section V.E.Xii.

Figure 8: Benefit Cost Analysis Summary – Comparison of Scenarios ($ Millions, 2024)[14]

Test	Metric	CCA	CLCPA Approach	NNI	PUT
Societal Cost Test	**Benefits**	$460.1	$776.8	$852.0	$941.0
	Costs	$372.4	$1,052.6	$1,183.0	$1,363.3
	Net Benefits	$87.7	-$275.8	-$331.0	-$422.3
	Benefit Cost Ratio	1.24	0.74	0.72	0.69
Utility Cost Test	**Benefits**	$364.2	$558.0	$618.2	$623.0
	Costs	$301.6	$908.4	$1203.1	$1410.8
	Net Benefits	$62.5	-$350.3	-$584.9	-$787.8
	Benefit Cost Ratio	1.21	0.61	0.51	0.44
Ratepayer Impact Test	**Benefits**	$364.2	$558.0	$618.2	$623.0
	Costs	$396.6	$1045.6	$1363.4	$1579.0
	Net Benefits	-$32.4	-$487.6	-$745.2	-$956.0
	Benefit Cost Ratio	0.92	0.53	0.45	0.39

Central Hudson has considered all input from stakeholders throughout this GSLTP planning cycle. The insights from PA Consulting, DPS Staff, and other stakeholders have led to significant refinements to the GSLTP Pathway definition, as envisioned from the beginning of this proceeding.

[14] Benefits and costs presented in this Figure 8 are discounted to 2024 using an 8.36% discount rate.



II. Introduction – GSLTP Process

A. Context for GSLTP

This GSLTP represents Central Hudson's commitment to provide safe, reliable, and affordable energy service to its 90,000 gas system customers that delivers sustainable reductions in GHG emissions. This GSLTP focuses primarily on Central Hudson's gas business, but also references, as appropriate, its electric distribution business, as several components of this GSLTP address electric programs and initiatives, including electrification efforts, which result in growth in electricity usage from the conversion of heating and other end uses from natural gas (and other fuels) to electricity. (Central Hudson serves approximately 309,000 electric customers.) Similarly, one focus of this GSLTP is advancing integration of gas and electric planning.

B. Gas Planning Proceeding and Gas Planning Order Requirements

The Commission initiated the Gas Planning Proceeding in March 2020 to evaluate opportunities to improve gas system planning and operational practices and to enable LDCs to meet evolving policy goals and customer expectations transparently and equitably.[15] Within this context and in recognition of the need to assess LDC plans for the future of the gas system, the Commission issued the Gas Planning Order in May 2022, which required each LDC to file a GSLTP, among other requirements.

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[15] Gas Planning Proceeding, Order Instituting Proceeding (Issued March 19, 2020) ("Initiating Order").

The Gas Planning Order provides context for the GSLTP by identifying the overall objectives for the gas planning process, including requiring that gas planning be consistent with the CLCPA and a robust stakeholder engagement process to inform the development of LDC long-term plans. The Gas Planning Order also establishes several specific requirements to be addressed in long term plans:

1. a demand forecast that estimates the expected sources of growth and/or reduction in peak demand resulting from demand-side investments;
2. a supply forecast that explicitly includes the level of demand-side programs and those that prioritize developing innovative clean demand response programs;
3. the methodology by which reliability will be forecast and measured;
4. solutions to reliability and meeting demand, including a "no infrastructure" scenario and reasonable non-pipe alternatives (NPAs) to address gaps between demand and supply;
5. and an estimate of the bill impacts and net present value of costs of each alternative.

In addition, the Gas Planning Order directs LDCs to provide necessary information to assess the potential impacts of their long-term plans and alternatives, both benefits and burdens, on disadvantaged communities. LDCs are to ensure that the Commission, Staff, and stakeholders have the information necessary to appropriately evaluate the potential GHG emissions of the long-term plans and alternatives. The Commission also addresses the methodology to be applied when performing a BCA.

Finally, the Gas Planning Order required staggered filings by the utilities with National Fuel Gas' filing due on December 15, 2022, Con Edison and O&R due on May 31, 2023, NYSEG/RG&E due on September 30, 2023, Central Hudson due on January 15, 2024 (subsequently shifted to February 6, 2024), KEDLI/KEDNY/NMPC due on May 31, 2024, Corning Gas due on September 30, 2024, and St. Lawrence Gas due on January 31, 2025. As such, Central Hudson's filing is informed by other utilities' prior filings and stakeholder engagement to be as targeted and useful for this process as possible, including proactively addressing known stakeholder concerns and views identified to date. In addition, Central Hudson understands that some stakeholders are less familiar with the LTP process, and we have worked to ensure all concerns and ideas are appropriately considered.

C. Regulatory & Stakeholder Engagement

The Gas Planning Order provides for a robust stakeholder engagement process to inform the development of LDC long-term plans. Central Hudson is committed to undergoing detailed analysis and sharing the information and results with stakeholders as part of this GSLTP process and consistent with the Gas Planning Order. Engagement with stakeholders on this GSLTP is a central focus of the Gas Planning Order and a priority of Central Hudson. Below are key dates in this process:

- Pre-Filing Stakeholder Information Session: December 19, 2023
- GSLTP Filing: February 6, 2024
- Initial PA Consulting Report Filing: April 6, 2024
- Stakeholder Technical Conferences(s): March 6, April 4, May 8, May 15, and November 6 2024
- Subject Matter Expert ("SME") Technical Discussion(s): April 10, 11, 12, 22, 24, May 6, June 10, and July 11, 2024.
- Stakeholder Comments Due: May 25, 2024
- Central Hudson Reply Comments Filed: June 11, 2024

- Revised GSLTP Filing: June 25, 2024
- Revised GSLTP, Version 2 Filing: July 26, 2024
- Stakeholder Comments Filed Through: October 25, 2024
- Preliminary PA Consulting Report Filing: October 9, 2024
- Central Hudson Reply Comments Filed: October 23, 2024
- Final Central Hudson Report Filing: November 20, 2024
- Final PA Consulting Report Filing: January 14, 2024
- Central Hudson Final Report Comments: timing to be established by NY DPS.

The process established in the Gas Planning Order begins a continuing cycle with each LDC filing a long-term plan every three years plus annual updates filed on May 31st in the interim years. The three-year cycle is designed to provide for future comprehensive updates that reflect new information and insights that inform the long-term plans.

Central Hudson has participated in the stakeholder engagement processes that Staff has directed following the filing of the initial GSLTP on February 6. The Company has considered all stakeholder feedback and integrated improvements to the plan as appropriate and consistent with the Company's regulatory and statutory obligations.

The Company has actively engaged with stakeholders to evaluate a range of issues addressed throughout the GSLTP process. The Company has participated in six stakeholder meetings on technical and modeling approaches, participated in eight SME technical discussions and have responded to approximately 200 information requests, often with several subparts, pertaining to data sources, assumptions, and analyses relied upon throughout the GSLTP process. In addition, Central Hudson has closely reviewed stakeholder feedback and recommendations that have been shared during technical conference discussions and in written comments from stakeholders. Most of those comments and recommendations have been addressed in the sections that follow.

D. Content of GSLTP and Appendices

This GSLP is comprised of seven major sections. Following the Executive Summary (I.) and this Introduction (II.), the remaining sections are: III. Central Hudson Service Territory Description, IV. Forecasting, Planning and Decarbonization Programs; V. Decarbonization Scenarios; VI. Near-Term Actions for Future Decarbonization; and VII. Conclusions and Report Implications.

The GSLTP also includes the following Appendices:

A. 20-Year Forecast and Location-Specific Avoided Gas Distribution Costs
B. GSLTP Dynamic Model Overview
C. Non-Pipe Alternative Assessment
D. Potential Hydrogen Blending Study
E. Renewable Natural Gas Analysis, Final Report (Guidehouse)
F. Utility Thermal Energy Network (UTEN) Potential Study
G. Central Hudson Utility Thermal Energy Network Final Pilot Proposal (June 2024)

III. Central Hudson Service Territory Description

A. Service Territory Overview

Central Hudson Gas and Electric Corporation is a regulated electric and gas utility serving the mid-Hudson Valley of New York State. The Company provides electric and gas transmission and distribution (T&D) services to approximately 309,000 electric customers and 90,000 gas customers. The Central Hudson territory extends from the suburbs of metropolitan New York City north to the Capital District at Albany, covering approximately 2,600 square miles. The Central Hudson gas system is comprised of approximately 20,000 miles of services and mains and delivers approximately 13 million MCF of gas annually to residential and non-residential customers.[16] Compared to its electric system, the Central Hudson gas service territory is fairly concentrated, as shown in the map below.[17] It includes 96 distribution local systems (smaller networks) and the gas loads and pressure levels of these smaller systems drive distribution infrastructure planning and decisions. (See Figure 9, below.)

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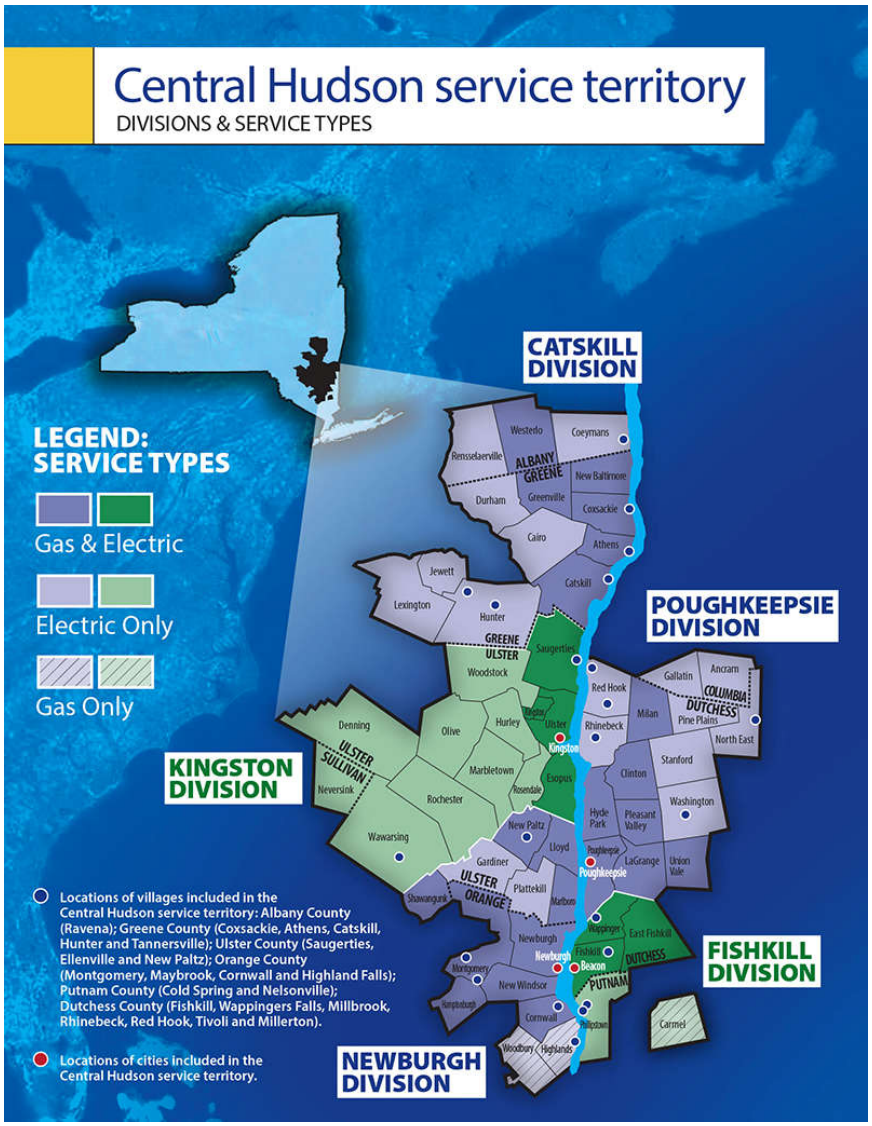
16 The value excludes interruptible customers (GS08, G09) and transportation customers (GS11).

17 There are approximately 235,000 electric customers in the Central Hudson that do not receive gas service from the Company.

Figure 9: Map of Central Hudson's Gas and Electric Service Territories



B. Central Hudson's Customer Base

Of Central Hudson's 90,000 gas customers, 90.4% also receive electric service from Central Hudson. There are only three service districts in which Central Hudson provides gas service but not electric service (Carmel, Highland Falls, and Woodbury). Customers fall into six general categories: residential, commercial, industrial, public authority, interruptible, and large firm transportation. Residential gas customer accounts have grown at a compound annual growth rate of about 1% over the last five years and commercial gas customers have grown at a compound annual growth rate of about 2% over the last five years. In comparison, industrial gas customer accounts have grown at a compound annual growth rate of 3.6% while public authority customers have grown at a rate of almost 5%. This growth on the C&I side has been fueled largely by new installations of warehouse and distribution centers, fulfillment centers, medicinal cannabis grow houses, sizeable gambling establishments, and some tourism industry, along with concrete manufacturing facility expansion. On the public authority

side, growth has been driven by supporting county economic development agency initiatives to extend gas to areas where they are seeking to attract commercial and industrial customers.

The vast majority of Central Hudson's gas customers are residential customers and use gas for heating. However, the relatively smaller number of non-residential customers contributes a larger proportion of gas sales. The following graphics show a breakdown of overall customers by customer class as well as a breakdown of residential and commercial load by end use. Figure 10 highlights that gas usage in Central Hudson's system is highly concentrated in a small number of customers.

Figure 10: Central Hudson Gas Customers by Customer Class and Sales Volume

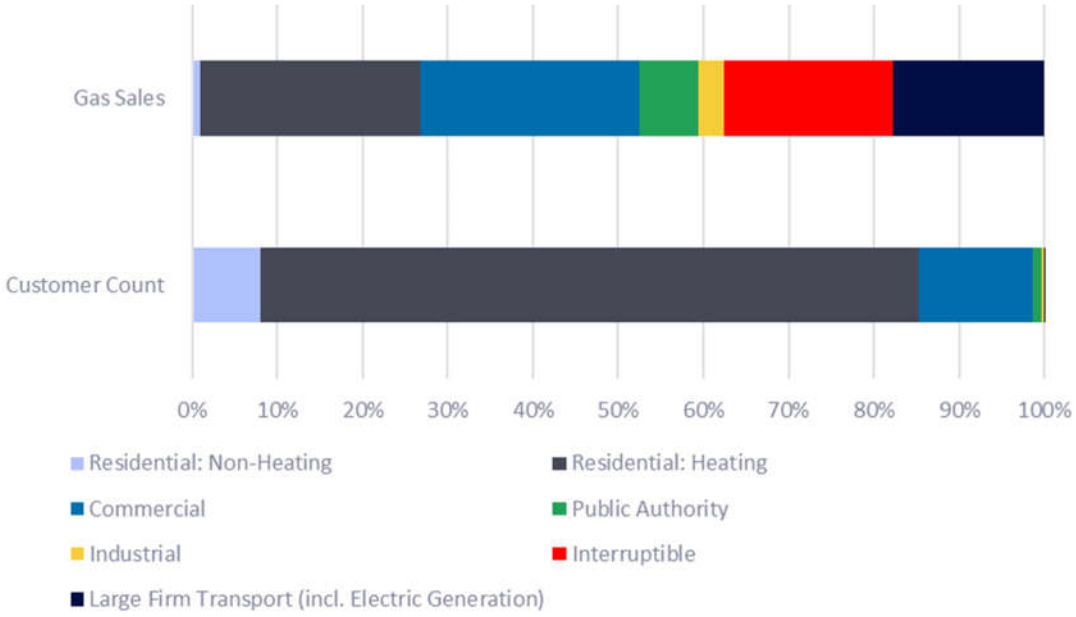


Figure 11 presents residential end uses by building type and Figure 12 presents commercial end uses by building type in Central Hudson's service territory.

Figure 11: Residential End Uses by Building Type in the Central Hudson Service Territory

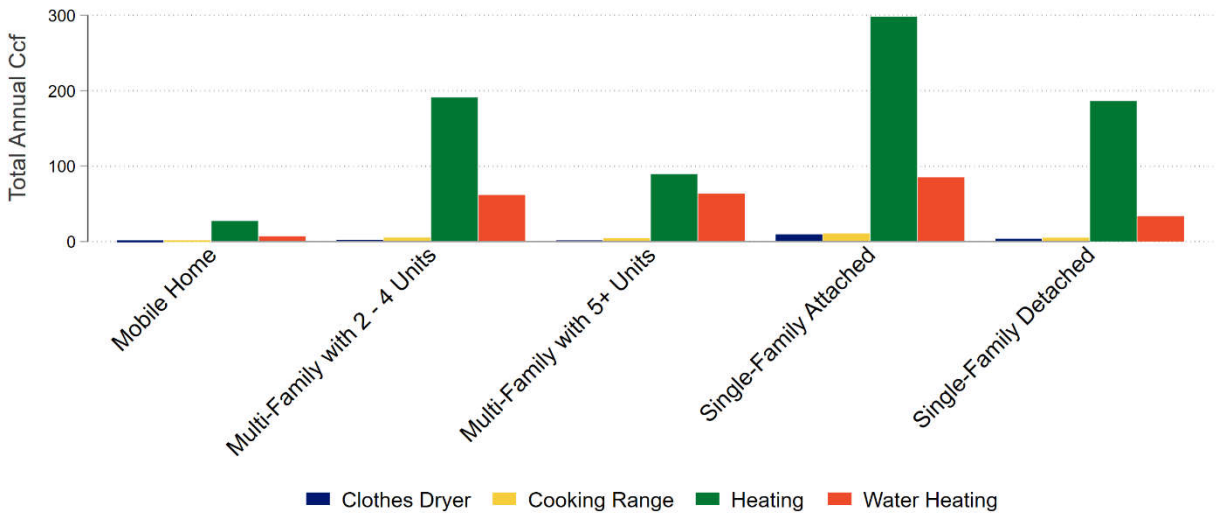
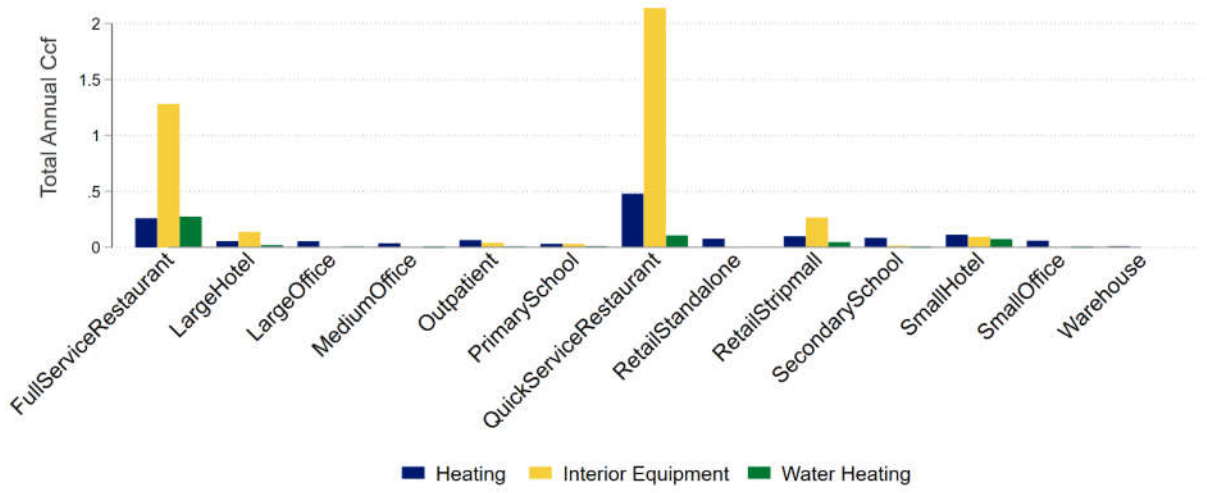


Figure 12: Commercial End Uses by Building Type in the Central Hudson Service Territory



C. Disadvantaged Communities

The CLCPA established a Climate Justice Working Group (CJWG), which was charged with the development of criteria to identify DACs across the state based on socioeconomic data (*e.g.*, energy burden, poverty rate) and to develop a process to gather public input. The CJWG identified 45 indicators and used them to classify certain census tracts as DACs, which according to the CLCPA must receive 35% (with a goal of 40%) of the benefits from clean energy program spending.[18]

The map below in Figure 13 highlights the identified DAC census tracts within Central Hudson service territory:

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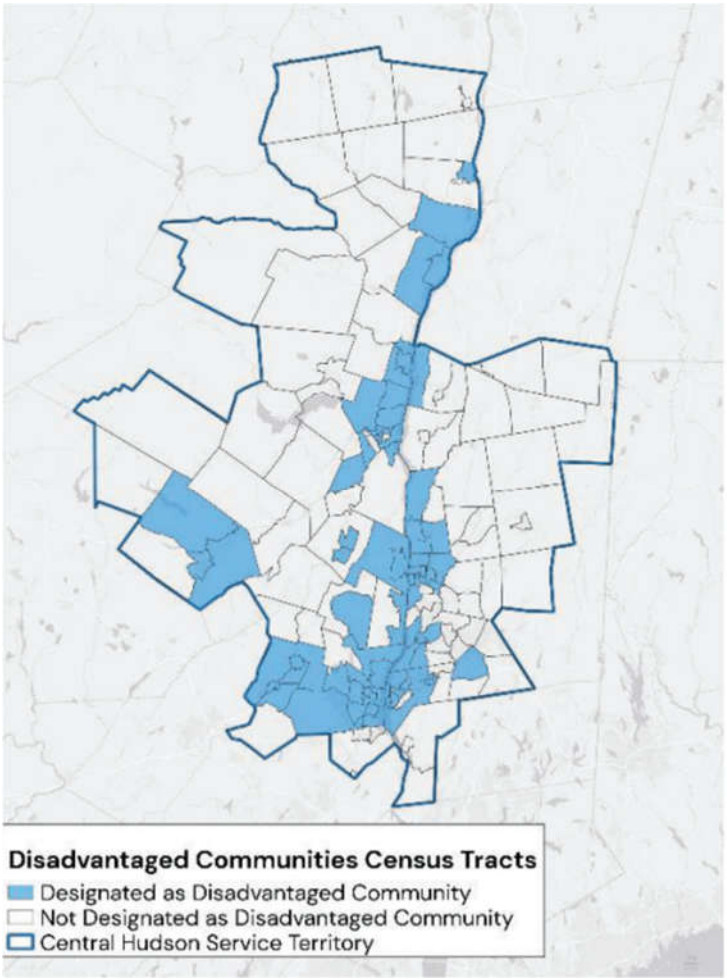
[18] *See,* CLCPA § 75-0117 Investment of Funds; CLCPA §7 Climate Change Actions by State Agencies.

Figure 13: DAC Census Tracts in the Central Hudson Service Territory



Central Hudson estimates that 71% of its gas meters are located within a DAC. Of 34 Central Hudson NPA approval cases investigated since 2019, 23 cases are located within a DAC. Of five NPA cases that reached completion, four are in a DAC.

In addition to using the geographical indicators identified by the CJWG, the State also classifies households with annual income at or below 60% of state median income as low-income customers, which is a sub-category of DACs. Central Hudson offers funds for low-income customers and households, such as through the Home Energy Assistance Program (HEAP), which provides assistance with paying heating and cooling costs. For the 2022-2023 HEAP year, Central Hudson has distributed over 15,000 regular HEAP grants and almost 1,000 emergency grants, paying out approximately $4.7 million to assist low-income Central Hudson customers with heating costs. Central Hudson also provides an additional bill discount to customers who are approved for HEAP by the NYS Department of Social Services. The discount is proportional to the grant allotted.

Central Hudson is engaged in the ongoing effort directed by the Commission to enhance reporting for DACs. Central Hudson filed its first DAC report on investments and energy saving benefits

in DACs from 2020 through 2022 on December 28, 2023.[19] DAC data is currently included in the GSLTP modeling and analysis to inform insights and planning, as is described in Section V. Going forward, Central Hudson will look to further integrate the results of its DAC reporting into its gas planning.

As also noted by stakeholders, the Company recognizes that there are important barriers to address for electrification in DACs. The Company identifies the following barriers from both customer and utility perspectives and seeks to collaborate with stakeholders for further input. These efforts aim to address challenges and advance electrification in DACs and throughout the Company's territory through ongoing initiatives. Barriers the Company has identified include, but are not limited to the following:

From the Customer Perspective the barriers identified highlight challenges in affordability, decision-making authority, building readiness, and customer preference:

- **High Upfront Costs**: Many customers in DACs may not have the savings or access to financing needed to afford the higher upfront cost of cold-climate heat pumps. This financial barrier can deter adoption even with available incentives.
- **Landlord-Tenant Split Incentive**: Renters face a unique challenge since they do not own the property and cannot make decisions about installing a heat pump. Landlords, who are typically responsible for paying installation costs, may be hesitant to invest in upgrades unless they see direct financial benefits, leaving tenants unable to access the technology.
- **Potential Bill Increases**: Switching to heat pumps from gas systems may result in higher energy bills, especially at times when electricity is more expensive than gas. Customers are also concerned about the uncertainty of future electricity prices, which can create hesitancy in switching. The payoff period for the total costs incurred in switching from a natural gas-fired system to a heat pump system can be many years and potentially exceed the life expectancy of the heat pump.
- **Changes to Cost Structure in Rental Housing**: If heating costs transition from being included in rent (via a central system) to being part of individual electric bills, renters may face an overall increase in housing and energy costs, which could be unaffordable for many.
- **Electrical and Building Upgrades**: Older homes often require costly electrical upgrades and weatherization to support heat pump installations. Adding heat pumps, especially ducted systems, may involve extensive modifications to existing ductwork or the installation of entirely new systems, further increasing expenses. Effective weatherization is critical for heat pump performance, yet many utility territories include older buildings with inadequate insulation. For instance, old brick buildings frequently have lathe and plaster interior walls, leaving little to no room for additional insulation between the interior walls and the exterior brick. These factors, including structural challenges and inadequate insulation, can lead to high costs and deter customers from adopting heat pumps. Without proper insulation and sealing, heat pumps may struggle to maintain efficient and cost-effective temperatures.
- **Customer Preferences and Education**: Customers may be hesitant to switch due to a lack of familiarity with heat pump technology, concerns about reliability, or a preference to retain their current systems for perceived security, even when incentives are offered. Customer outreach and education can often overcome these concerns, and are crucial in advancing the adoption of heat

[19] NE:NY Proceeding, In the Matter of Reporting Investments and Benefits to Disadvantaged Communities (filed December 28, 2023).

pump technology. Disadvantaged customers may not have the availability or time to consider the education and impacts with converting heating systems.

- **Workforce and Installation Issues**: A lack of qualified professionals to install and service heat pumps in DACs can lead to delays or improper installations, discouraging customers from adopting this technology.

The Utility Perspective recognizes challenges in designing incentive programs that effectively reduce the upfront cost to a manageable level for DAC customers while also maintaining program cost-effectiveness. In tenant and landlord scenarios, financial abilities and/or preferences may not align.

- **Energy Affordability and Rate Impacts:** Utilities must balance the need to electrify with concerns about potential bill increases for customers. Depending on various factors including electricity, gas, and other fuel prices, switching to heat pump systems may increase bills for customers (i.e., particularly in switching from gas systems to heat pumps). A related barrier is uncertainty regarding electricity or alternative fuel costs for heating which is often cited in customer conversations.
- **Landlord-Tenant Incentive Misalignment:** Utilities must navigate complex regulatory and stakeholder dynamics to develop solutions that align incentives for both landlords and tenants in a way that can promote electrification.
- **Split Cost Structure in Multifamily Housing:** Addressing the challenge of split cost structures requires innovative approaches, such as negotiating agreements with building owners or implementing cost-sharing models. Ensuring tenants don't face higher overall costs is a key equity concern.
- **Infrastructure Financing Barriers:** Substantial funding or bundled solutions that combine weatherization, electrical upgrades, and heat pump adoption may be required.
- **Customer Education and Preference:** Utilities need to enhance education and outreach efforts to increase customer trust and understanding of heat pump technology. Tailored marketing campaigns, education materials, and demonstration projects can help address hesitancy but require substantial resources. Utilities can benefit from partnering with trusted local outreach organizations, such as NYSERDA Clean Energy Hubs.
- **Workforce Development:** Utilities must actively support educating and informing a workforce to ensure a sufficient and skilled labor pool exists to support heat pump installations. Partnerships with trade schools, community organizations, and contractors are crucial.

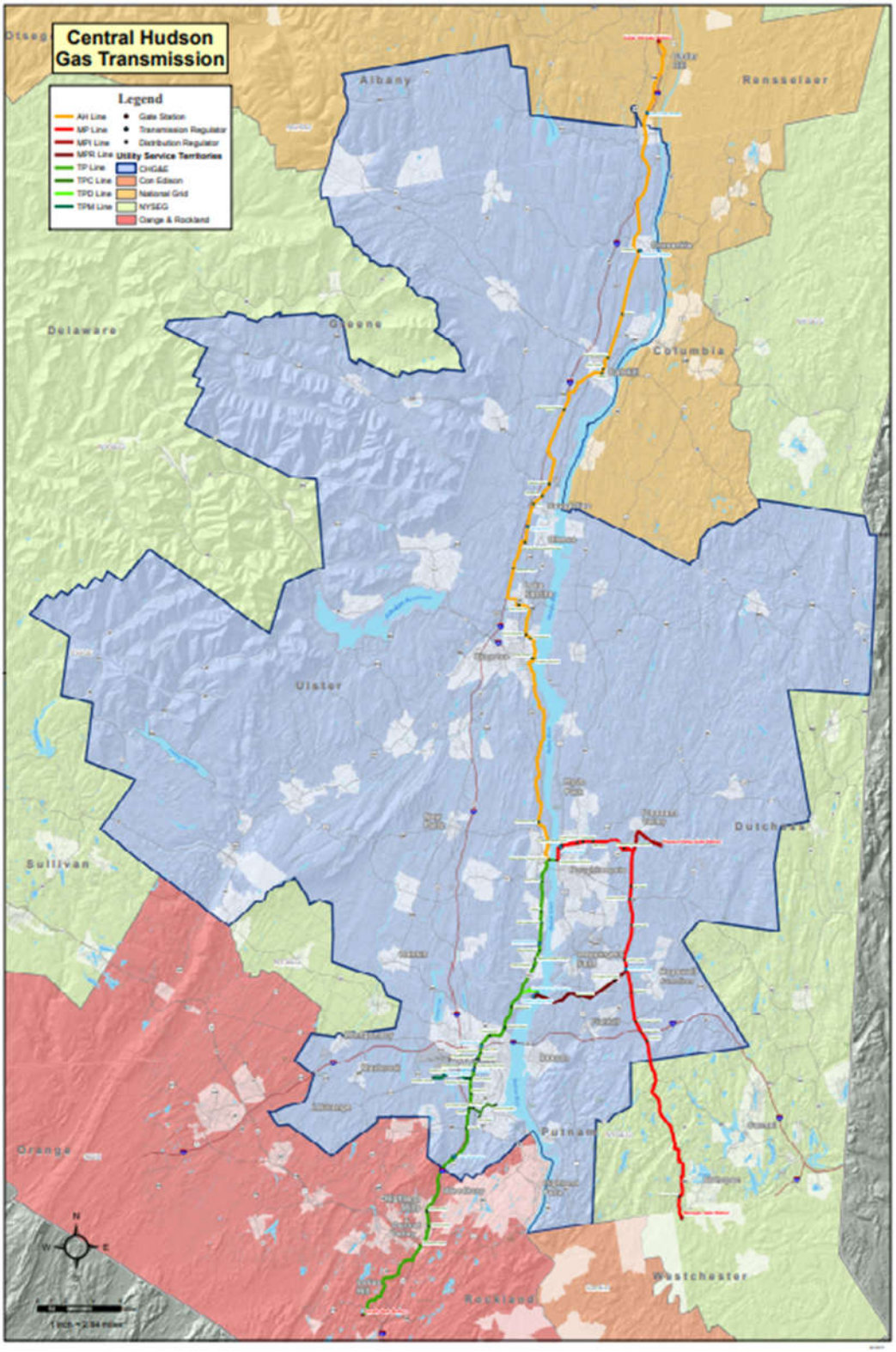
D. Capital Investment Plan

i. Distribution System Overview

Central Hudson maintains approximately 1,300 miles of mains and 67,000 services across five regions: Catskill, Fishkill, Kingston, Newburgh, and Poughkeepsie.

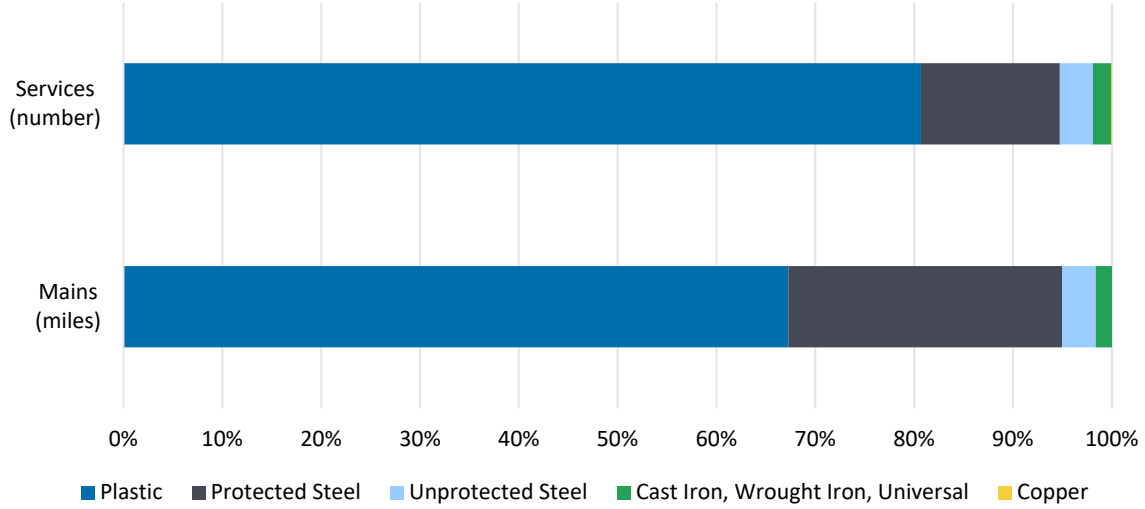
The following map in Figure 14 depicts Central Hudson's entire gas transmission system.

Figure 14: Central Hudson Gas Transmission System



67% of mains are plastic and 31% are steel, while 81% of services are plastic. Figure 15 provides a breakdown by all materials.

Figure 15: Distribution Mains and Services by Material



ii. 20-Year Gas Capital Plan

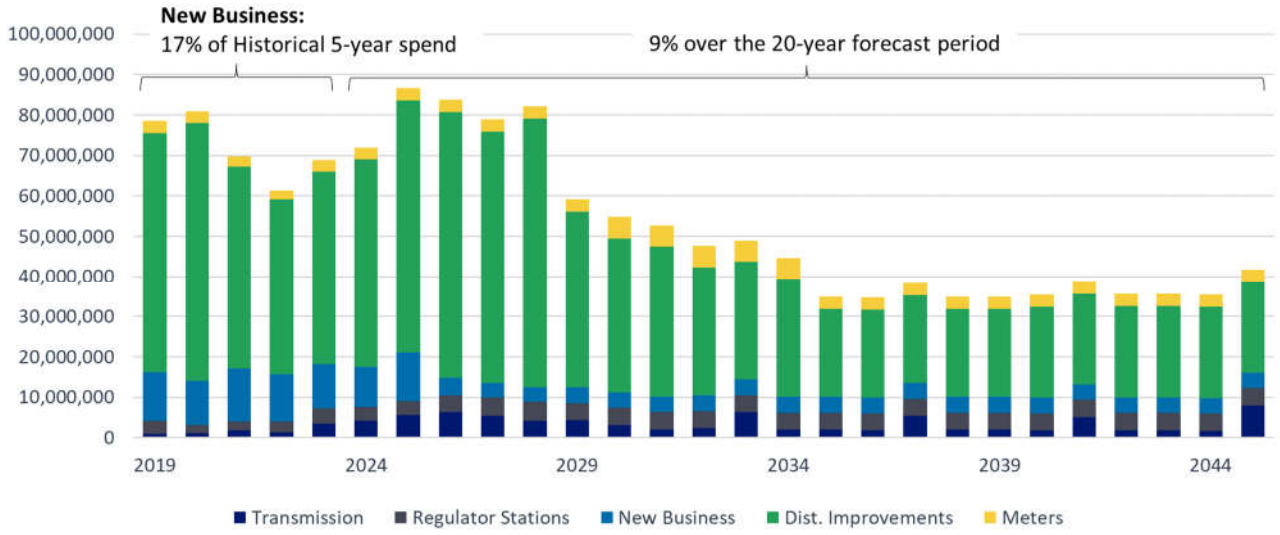
Central Hudon has developed capital expenditure forecasts for the 20-year study evaluation period for each of the scenarios evaluated in this GSLTP. These projections are an extension of the Company's Five-Year Gas Capital Plan, which is filed annually. The Five-Year Gas Capital Plan allocates investments in the Company's gas infrastructure including transmission, regulator stations, new business, distribution improvements, meters, and removals. Over the five-year period of the most recent Gas Capital Plan (2024-2028), approximately 62% of the plan budget is dedicated to replacing aging or obsolete equipment. 52% of this amount is dedicated toward the removal of leak-prone pipe (LPP), which is an essential factor in enhancing the safe delivery of gas throughout the Company's service territory. The LPPRP also reduces the number of gas leaks in the system, which increases pipeline system safety as well. Central Hudson classifies LPP as cast iron, wrought iron, or steel that is either bare or ineffectively coated and not cathodically protected. As of the end of 2023, the Company had 66.8 miles of leak-prone mains. Under its 2021 rate plan, Central Hudson must eliminate at least 15 miles of LPP per year, which means that the Company is projected to replace all LPP main as currently defined in approximately just over four years. In conjunction with the LPP Program, Central Hudson has received approval for a Leak Prone Services program to replace services that are considered LPP but are not included within the LPP main program because they are not served by a leak-prone main. Central Hudson currently has 1,224 Leak Prone Services that fall outside of those to be replaced through the LPP program. Central Hudson's LPP Program spending will be complete in 2028, after which the Company's capital spending is projected to diminish significantly. In addition, investment capital to serve new business is projected to fall considerably in 2027 as new codes and standards are implemented. These effects are illustrated in Figure 16, below, which includes the 20-year capital plan under the CCA Scenario.

An additional replacement program, the Large Diameter Gas Welded Pipe Replacement Program, targets large diameter gas welded steel pipe, which is categorized as higher risk. Replacement of this pipe is prioritized along with LPP and accounts for 4% of the distribution improvements budget.

Approximately 6% of the five-year budget is allocated to maintenance and upgrades of the Company's gas transmission system that operates above 125 psig. This includes replacement of transmission line valves with those that can accommodate installation of remote operators and In-Line Inspection (ILI) tools as well as replacement of an interconnection station and 1.8 miles of transmission lines to comply with a United States Pipeline and Hazardous Materials Safety Administration (PHMSA) order. The Company is also pursuing a Line Valve Addition Program, partly to address deficiencies in spacing of transmission line valves due to population increases and addition of new buildings adjacent to the pipeline corridor. The current Line Valve Addition Program proposes the installation of three transmission valves over three years.

Figure 16 demonstrates that Central Hudson's capital budget is largely focused on maintenance, and not on system expansion projects.

Figure 16: Gas Capital Historical Spend and Future Budget ($2024, CCA Scenario)



E. Vulnerable Locations

i. Service Areas with Known Constraint Vulnerabilities

As outlined in its 2020 Supply and Demand Analysis Related to Service Areas with Known Supply Constraint Vulnerabilities,[20] Central Hudson defines a "vulnerable location" as a portion of the system where gas may not be able to be delivered safely and reliably within the next five years, *i.e.*, where design day pressures are anticipated to drop below 50% maximum operating pressure (MAOP) under planning conditions in the next 5 years. In the 2020 study, four areas were identified as potentially

[20] Gas Planning Proceeding, *Central Hudson Gas & Electric Corporation Supply and Demand Analysis Related to Service Areas with Known Supply Constraint Vulnerabilities* (filed July 17, 2020).

vulnerable locations, primarily due to steadily increasing load growth that will spike projected peak demand above delivery capacity. These areas are East Fishkill & Hopewell Junction (Location A), an area in the Town of Poughkeepsie (Location B), a second area in the Town of Poughkeepsie (Location C), and Highland Mills (Location D). As described above, much of the Company's capital investment plan is focused on infrastructure maintenance and improvement, with a small portion allotted to load growth. Central Hudson has engaged in mitigation activities at Location C, which required immediate action, and is closely monitoring the other locations as they consider the best path forward, including targeted energy efficiency and NPAs.

As part of this GSLTP Central Hudson conducted a detailed assessment of all local distribution systems and identified additional locations that are highly loaded. A 2024 report on historical trends and location-specific gas distribution costs has been prepared in conjunction with this report (included as Appendix A). It identifies five "beneficial locations" that would potentially benefit from demand or supply management, as the likelihood of triggering a growth-related infrastructure investment by 2034 in that area was 5% or greater. These areas include the Poughkeepsie-Newburgh, Highland Mills, Kingston-Saugerties High Pressure, Poughkeepsie Medium, and Titusville-Pleasant Valley, .

ii. Potential Investment to Address High Loading of Select Systems

As part of its ongoing planning, Central Hudson is assessing a subset of its systems that currently have relatively higher levels of loading. This assessment includes factors such as: 1) recent trends in growth in customers and demand on each of the systems; 2) a review and updating of the planning parameters used to determine the loading calculations; and 3) potential reductions in usage on higher-loaded systems due to changes in customer behavior, including adoption of energy efficiency measures. The results of this analysis will be used to inform future planning and investments.

F. Economic Conditions

As illustrated in the sections above, Central Hudson's gas customer growth has been slightly positive across all customer classes over the last five years, demonstrating relatively favorable overall economic conditions. The territory benefits from the downstate New York City commuting workforce that either worked from home during the COVID-19 pandemic or relocated to the Company's service territory altogether. Many of these customers had existing familiarity with gas and an affinity for it. An ongoing housing deficit in the territory, especially for affordable housing in several counties, is driving new construction. Central Hudson's underground residential development (URD) installation rate remains consistent, with an affordability component typically enforced by municipal planning boards. While many apartment complexes elect to forgo gas in favor of all-electric facilities, new construction of garden-style apartments, townhouses, and single-family home developments frequently elect to install gas where it is available.

It is important to note that the growth observed in commercial and industrial sectors has generally not resulted in demand for a skilled workforce with accompanying high-paying jobs. Homeowners may find it difficult to convert their heating system from gas to air- or ground-source heat pumps, which tend to be more costly. The Company understand that some customers struggle to keep up with their utility bills.

The growth in industries noted above has also been balanced by a contraction in small, private, and commercial business and bankruptcies of national big box chains. The Company's operating district

staff has observed persistent commercial vacancies or high turnover in suites of commercial plazas. Large national retailers such as Sears and Bed Bath & Beyond have closed locations in the Company's service territory. Brick and mortar establishments continue to suffer loss of business to online retailers. Shopping malls in Newburgh, Kingston, and Poughkeepsie contain second-tier retailers and have difficulty leasing all available space. Regional and national banking institutions have reduced the quantity of branch locations. Elementary school closures and school consolidations in Kingston and Poughkeepsie public districts have accelerated.

Overall, a duality exists within the Company's service territory where wealthier residential transplants, institutions with means, and new construction developers with a preference for gas are maintaining customer growth, while at the same time a broad base of Central Hudson's customers, both residential and commercial, are experiencing a measurable amount of economic hardship. Gas remains the most affordable option for many, especially those whose facilities are already configured for gas. Existing gas is needed to support the economic livelihood of many in Central Hudson's service territory.

G. Climate Conditions

Central Hudson's service territory has a relatively mild climate that is consistent across the territory, with the exception of a small area in the Catskill Mountains that can experience slightly colder temperatures. In its Climate Change Vulnerability Study[21] filed in September 2023, Central Hudson assessed its risk of vulnerability to extreme cold and ice as "low" for the majority of asset types and "moderate" or "not applicable" for a smaller minority. As discussed in the gas planning section below, there is a strong relationship between gas pressure drops and weather and therefore, the Company closely watches the weather to manage gas pressure drop risks. Due to the critical implication of pressure drops, the gas system is designed to withstand extreme cold conditions that occur rarely. Moreover, as weather volatility has intensified with climate change, the planning standards have been updated to withstand increased risk of extreme weather. Central Hudson currently plans its gas system for -8°F (73 HDD) daily average temperature conditions, which occurred in 1994.

Central Hudson has seen numerous extreme weather events in recent years. Those events have significantly impacted its electric transmission and distribution networks but have not had a comparable impact on Central Hudson's gas systems. This reflects that gas systems are far less susceptible to extreme weather (*e.g.*, wind, snow, and ice), and therefore have greater reliability metrics than electric networks. This is due primarily to the vast majority of electric transmission and distribution lines being above ground, where they can be impacted by extreme weather, as opposed to the gas system, which is below ground. From 2014 to 2023, Central Hudson's electric system experienced 5 weather events that resulted in 50,000 or more customer outages (*i.e.*, the number of outages associated with Class 3 events, the most severe) and 33 storms with 10,000 or more customer outages (*i.e.*, the number of outages associated with Class 2 and Class 3 events).[22]

In contrast, Central Hudson has experienced far fewer weather-related outage events on its gas side. Damage from severe flooding events in 2011 (Tropical Storm Irene), 2021 (Tropical Storm Ida), and

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[21] Case 22-E-0222, *Proceeding on Motion of the Commission Concerning Electric Utility Climate Vulnerability Studies and Plans*, Central Hudson Climate Change Vulnerability Study (September 25, 2023).

[22] Central Hudson Electric Emergency Plan, December 15, 2023. *See* Central Hudson's Incident Classification Guidelines, p. 8.

2023 (Heavy Rain event in July) caused gas lines to become uncovered and exposed to water, but none resulted in widespread interruption to customer service. Only when an exposed pipe was struck by debris and caused to break was service interrupted for a small handful of customers during emergency repairs. To enhance the safety and reliability of its gas system Central Hudson received approval for The Creek Crossing Risk Remediation Project in its recent rate filing. This project proactively targets creek crossings that pose a high risk to the Company and install a bypass by either boring or rerouting the pipeline strategically.

While such weather events have infrequently impacted Central Hudson's gas pipes and associated reliability metrics, extreme cold does have the potential to impact the delivery of gas supply to Central Hudson's system. For example, during Winter Storm Elliott in December 2022, gas supplies coming into the state became limited as production facilities experienced issues with freezing and weather-related access issues that prevented maintenance. Other utilities in the state experienced problems with maintaining service to their customers, but Central Hudson's system remained reliable, and there was no interruption to customer service. Central Hudson's strong gas system reliability is a result of significant Company focus and investment, and the Company remains committed to ensuring such reliability going forward.

Distribution and supply planning is largely focused on extreme cold weather. However, climate change has two main effects: a higher amount of volatility and extreme weather events, and an overall warming trend for the Hudson Valley. Figure 17 shows the annual heating degree days (Base 65°F) from 2000 to 2023. As the term implies, heating degree days is directly related to the amount of heating needed. The impact of the warming trend is a lower use per customer. However, the need to plan for extreme weather conditions to ensure reliability does not change.

Figure 17: Declining HDD Over Time

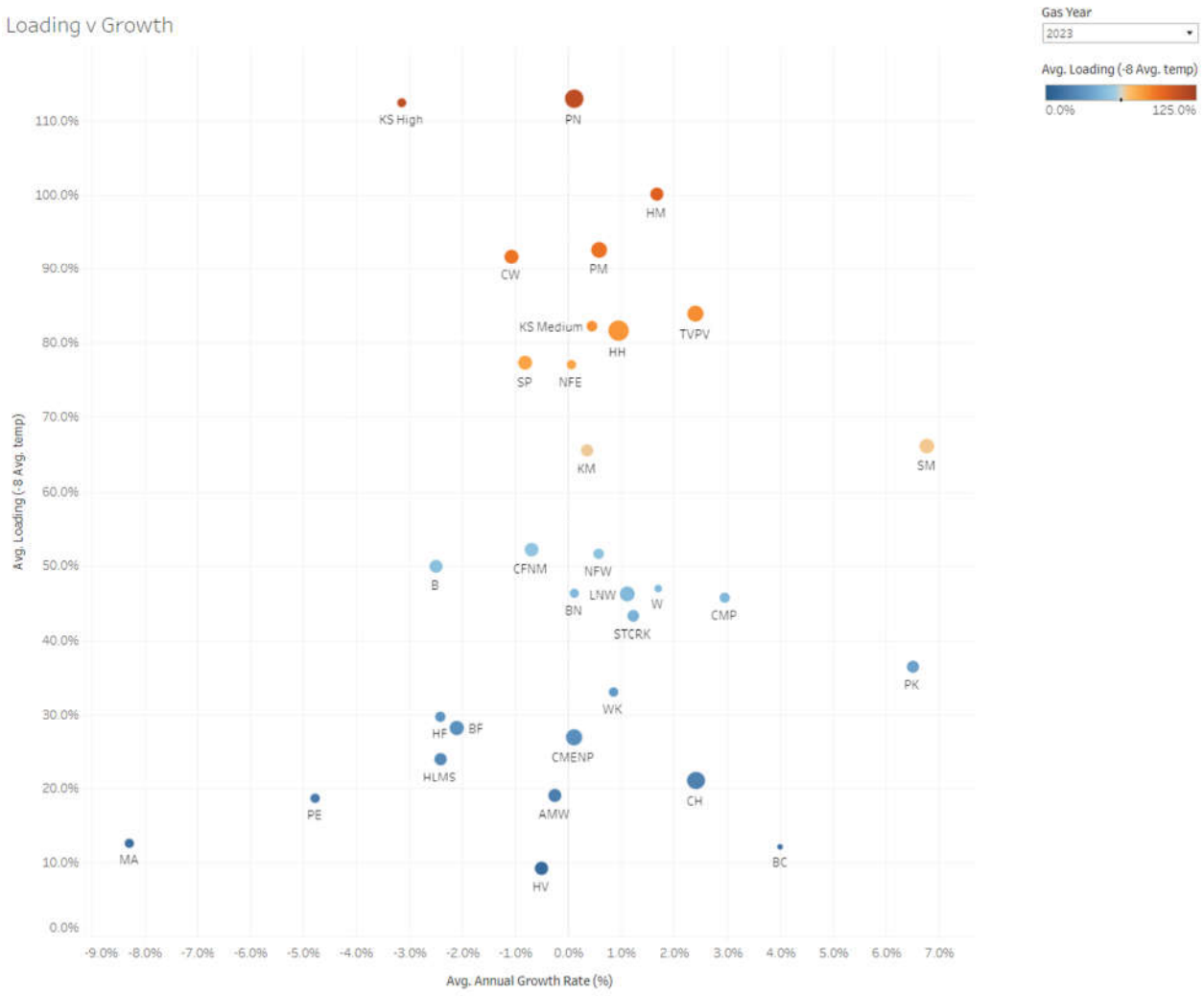
H. Capacity Constraints

Central Hudson has not historically experienced (nor does it expect to experience) issues with capacity or deliverability constraints at the interface between the interstate pipeline system and the four citygates that bring gas into the Central Hudson service territory. However, if a citygate were to

experience an unexpected outage (*i.e.*, in an "n-1" scenario), it is possible that the gas system would be unable to redirect gas between Central Hudson system segments to the region most affected by the outage to effectively meet demand.

Central Hudson uses Scenario Modeling to evaluate factors such as loading and pressure on all system segments, including those that have experienced high loading on a percentage basis as compared to historical planning standards. Figure 18, below, shows the loading of systems, as compared to the growth rate over time. These assessments help the Company evaluate opportunities to maintain and enhance reliability.

Figure 18: System Loading Factor as Compared to Growth Rate in Loading

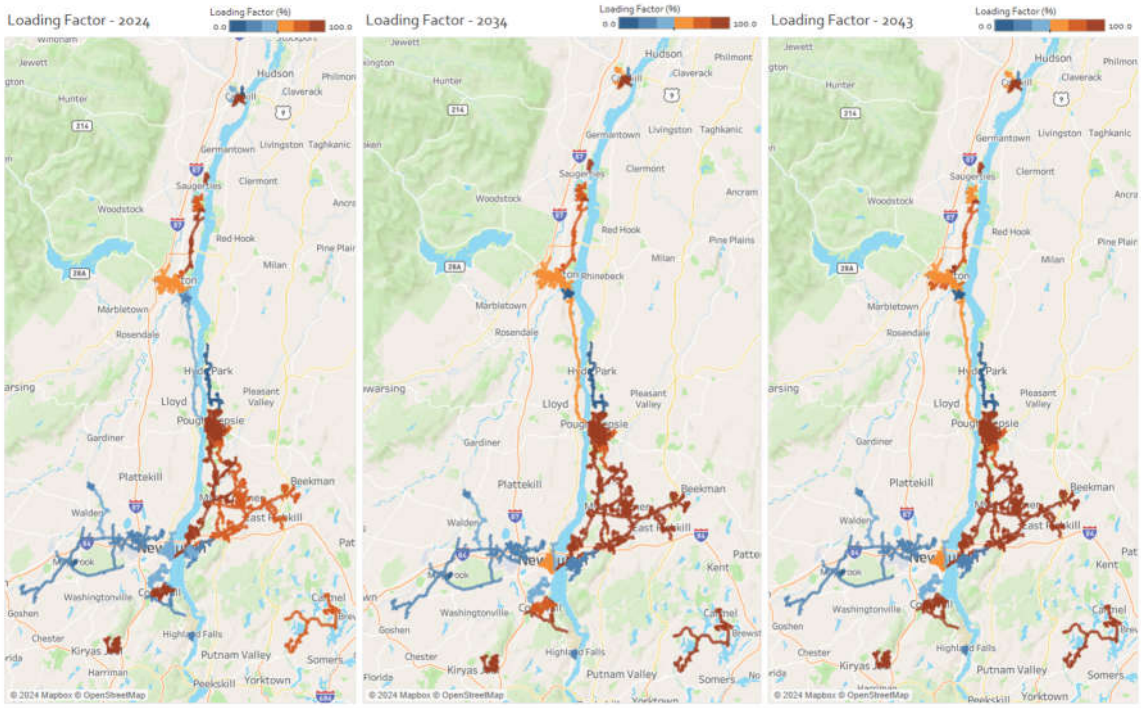


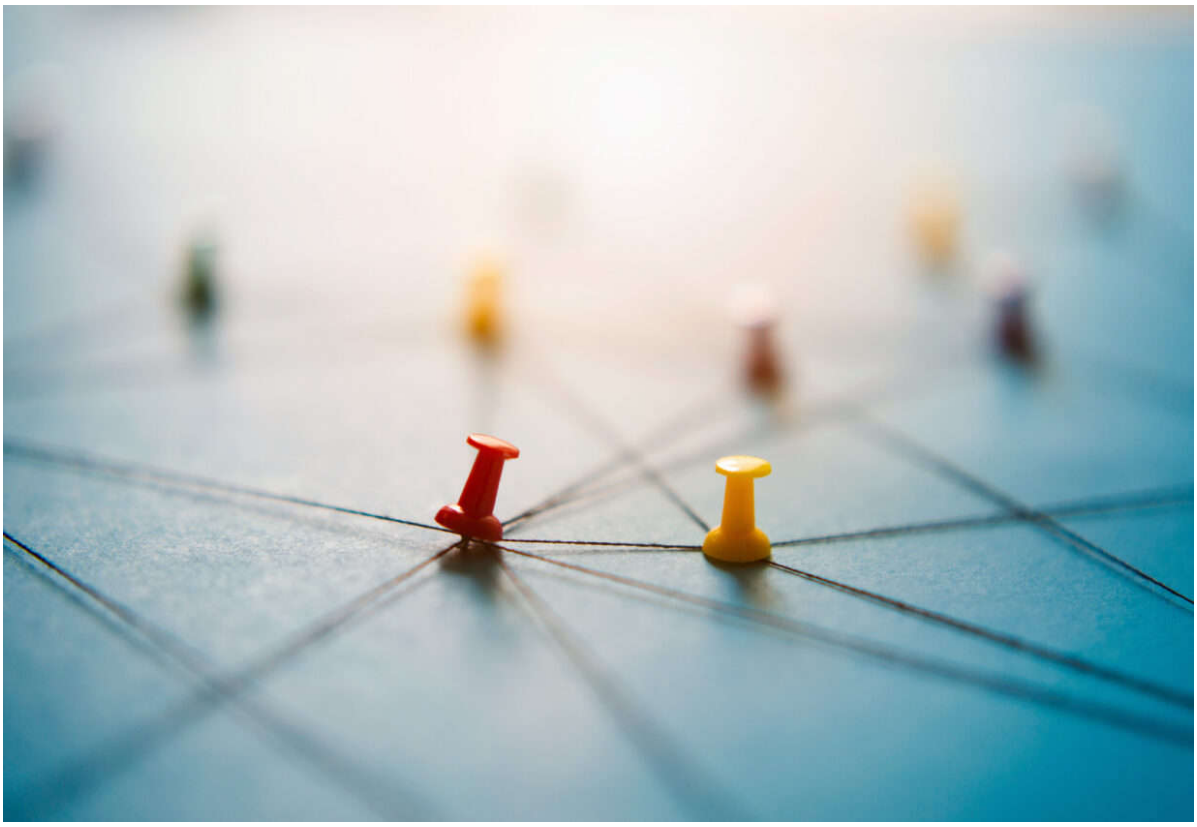
Bubble Size is proportional to the annual peak Mcf of the gas system. The color reflect the overall loading for each gas system. The data is filtered on Gas Year, which keeps 2023.

The visual represents each local system as a single value (or color) – the difference between the inlet and lowest pressure point (i.e., the most extreme pressure drop). In practice, different customers within each local system experience different levels of pressure, and most customers do not experience the most extreme pressure drop.

Figure 19 provides an additional visualization of Central Hudson's system analysis for the PUT Scenario. Understanding location-specific growth rates and the room for growth is critical for gas planning.

Figure 19: Map of Loading Conditions for the PUT Scenario



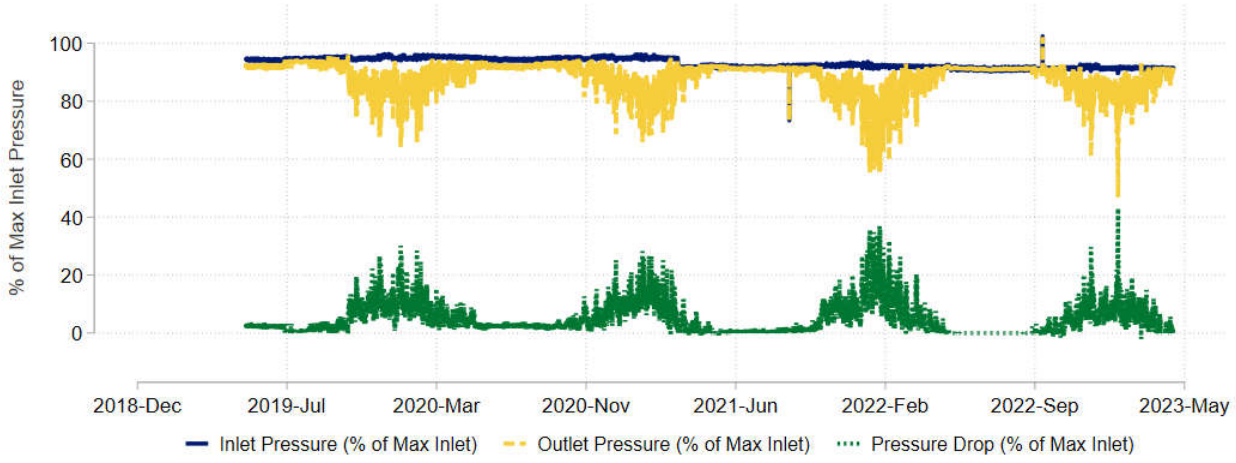


IV. Forecasting, Planning and Decarbonization Programs

A. Gas Planning Criteria

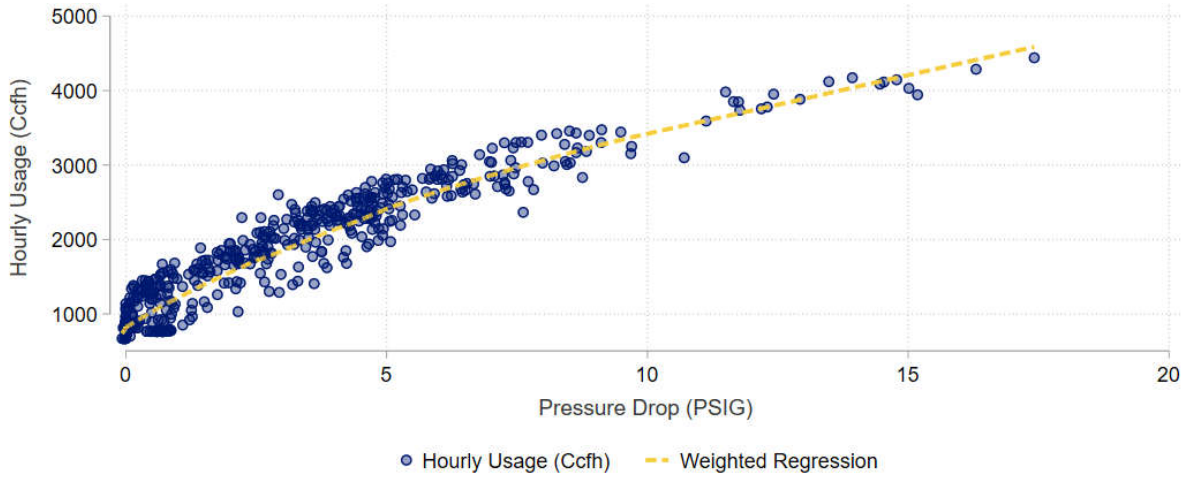
The following set of figures walks through some key concepts that frame the approach to gas planning. At a fundamental level, gas planning and infrastructure focuses on maintaining system pressure above a minimum level to ensure normal system functionality. Central Hudson reinforces distribution networks when gas pressure is projected to drop below 50% of the normal operating pressure under conditions where the average daily temperature reaches -8°F.

Figure 20: Gas Planning Requires Maintaining Pressure Above a Minimum Level



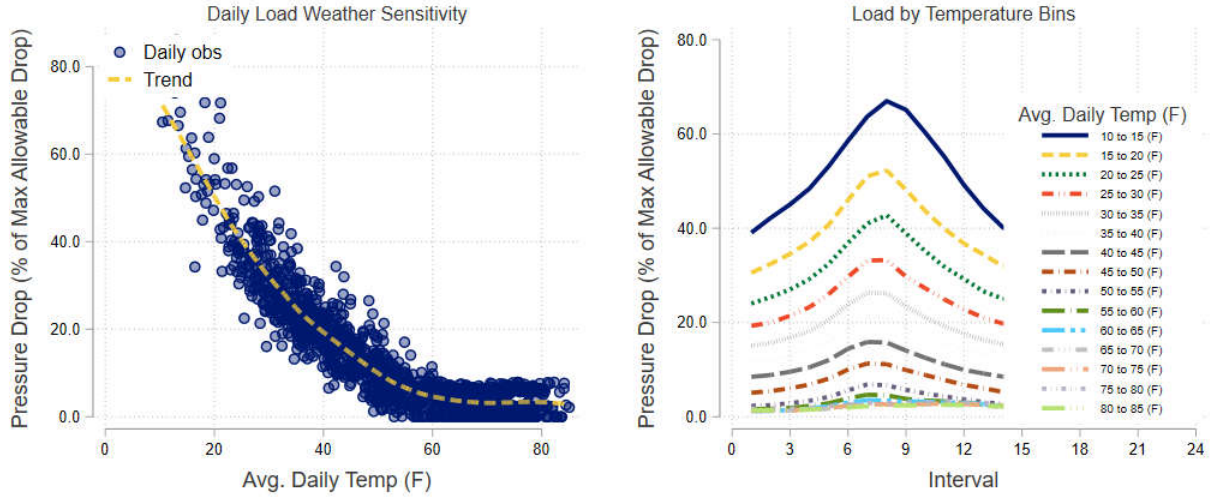
Increases in peak demand lead to pressure drops for local gas systems, as shown in Figure 21, which can affect service functionality.

Figure 21: Peak Demand Correlation to System Pressure



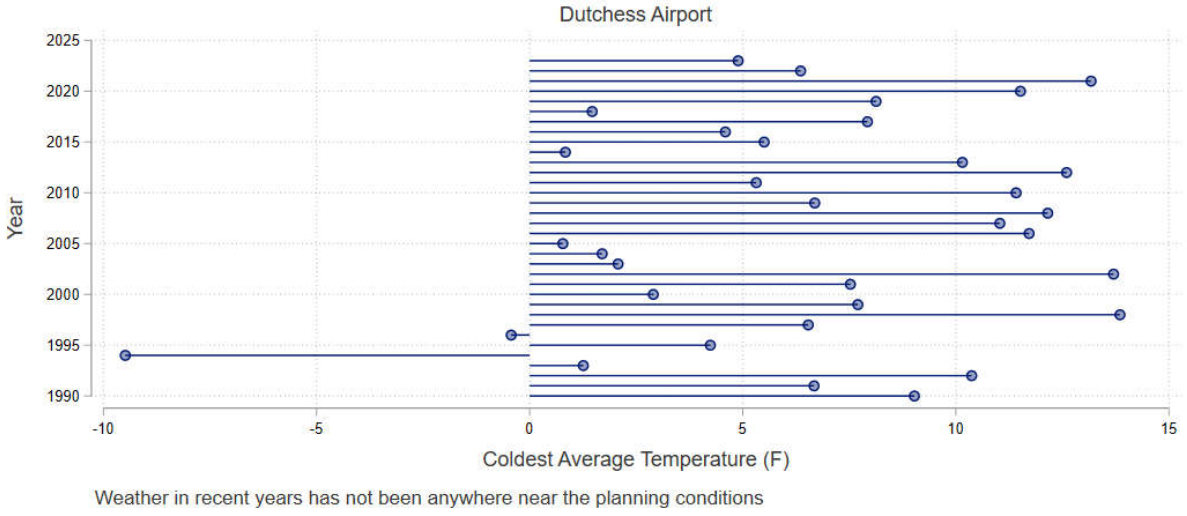
There is a strong relationship between gas pressure drops and weather, as shown in Figure 22.

Figure 22: Relationship Between Gas Pressure Drop and Weather



Therefore, gas system planning must consider extreme conditions that occur rarely, as shown in Figure 23, but have large consequences.

Figure 23: Extreme Weather Conditions



B. Sales Volumes and Peak Demand Forecast

Central Hudson develops a top-down 5-year sales volume and peak demand forecast annually for the purposes of procuring gas supplies, identifying asset needs, and implementing new rates. That analysis uses historical customer, volume and peak demand information and applies an econometric model and trend projections to develop the 5-year forecasts. For planning purposes in this GSLTP, the Company has employed a bottom-up approach to estimate historical year-to-year growth patterns and variability in growth for individual areas of Central Hudson's distribution system, which is distinct from the Company's five-year forecast. The historic load growth forecasts are developed using probabilistic

methods rather than straight-line forecasts. The approach takes into account the reality that there is much greater uncertainty 10 years out than a year out, and it accounts for the risk mitigation value of resources that manage local peak demand. Forecasts are inherently uncertain and become more uncertain further into the future. The historic load growth forecasts are then used to develop the 20-year forecast.

The data relied on for this analysis includes:

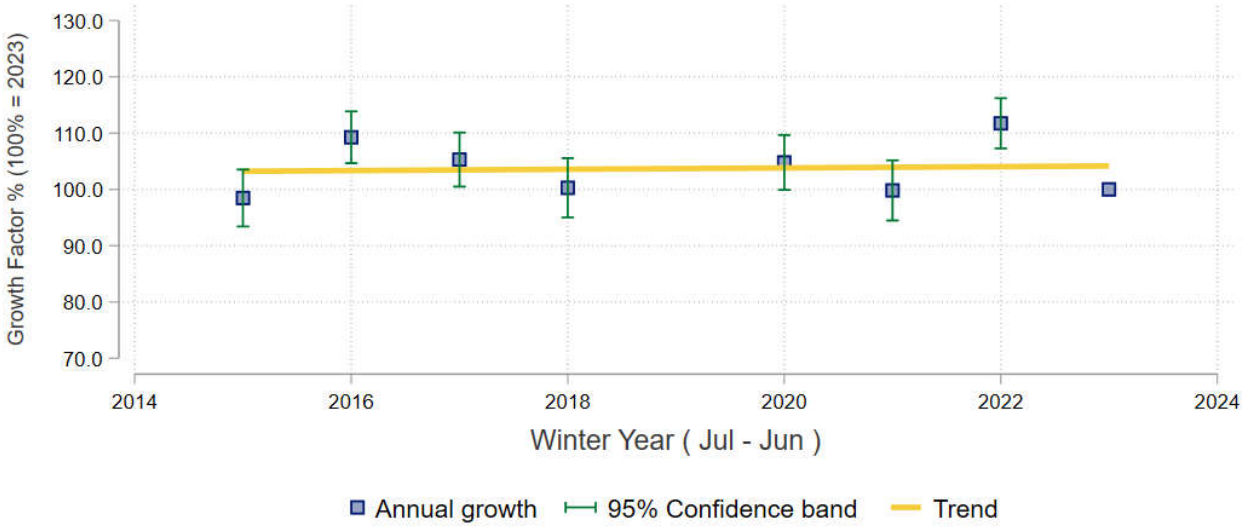
- 2014-2023 15-minute gas system pressure at inlet and outlet metering points;
- 2020-2023 monthly billing data in hundred cubic feet (Ccf), for all customers served by each gas system;
- 1990-2023 weather data from the Dutchess County Airport station;
- Planning standards – gas systems are designed to exceed the minimum allowable pressure when the average daily temperature is -8°F;
- Operational characteristics such as minimum and normal pressure levels for each gas system; and
- Cost estimates for infrastructure upgrade projects.

Ultimately, a key goal of the study is determining how growth in gas consumption during peak periods affects the change in gas pressure and, by connection, the need for infrastructure upgrades or upstream asset agreements. The analysis was implemented for 43 of Central Hudson's gas systems to better understand the amount of growth each system could accommodate, the timing of peak loads, the concentration of peaks, and the relationship between peak demand and weather.[23] Once the historic growth demands were estimated they were used to assess the growth trend, the variability of growth patterns and the degree to which growth in a given year was related to growth during the prior year – this is known as auto-correlation. The econometric models were purposefully designed to both estimate historical load growth and allow the Company to weather normalize loads for average winter conditions. The 2018-2023 winter peaks were normalized for planning conditions (daily average temperature of -8° F) based on the Central Hudson gas system design. Specifically, they estimate the annual percent change in peak loads after controlling for weather conditions and day of week effects.

Figure 24 illustrates the historical growth factor for one of Central Hudson's highest loaded systems. First, the analysis produces year-by-year estimates of the historical growth or decline in loads after controlling for differences in weather, day of week, and season. Second, the year-by-year estimates allow us to estimate the growth trend. In the example below, loads are increasing at a rate of 0.95% per year. Third, the results enabled us to estimate the variability in year-to-year growth patterns (also known as the standard error of the forecast).

[23] Central Hudson has 96 gas systems in total, but this analysis included gas systems with hourly or 15-minute gas pressure data. The 43 gas systems included cover well over 80% of the customers and gas consumption.

Figure 24: Year by Year Estimates of Historical Growth for a Local Gas System

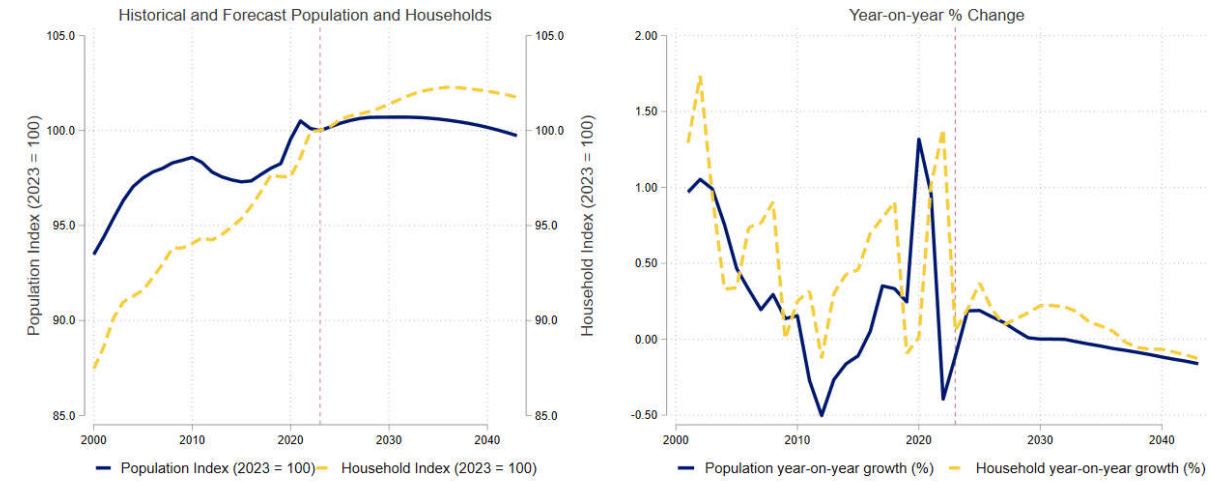


The load growth forecasts were developed using probabilistic methods—Monte Carlo simulations—that produced the range of possible load growth outcomes by year. The model simulates the reality that the near- term forecast has less uncertainty than forecasts 10 years out. A total of 2,000 simulations were implemented for each gas system. Each simulation produced a distinct growth trajectory that took into account the historical trend, variability in growth patterns, and the fact that growth patterns are auto-correlated.

In addition, the overall gas usage and customer growth trends were analyzed using data from 2000-2023. Since 2000, residential customers in Central Hudson have grown by 1.36% per year, and commercial accounts have grown at a rate of 1.51% per year. Residential and non-residential account growth is closely correlated with changes in the number of households with correlations of 99.2% and 99.1% percent, respectively.[24] The number of households is forecasted to grow at a slower pace and eventually decline over a twenty-year horizon, as shown below in Figure 25. At the recommendation of Staff's consultant, rather than base the forecasts on historical trends, the forecast of accounts was adjusted to incorporate the forecasted change in households over a 20-year planning horizon.

[24] The correlation of residential and non-residential accounts changes with population changes are weaker, 84.3% and 83.6%, respectively.

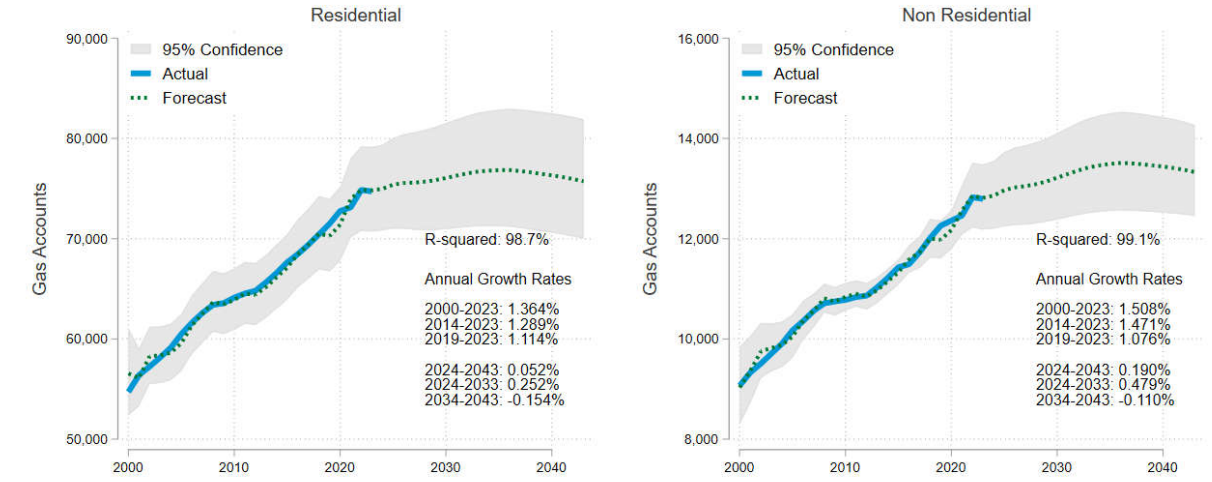
Figure 25: Historic and Projected Changes in Population and Household in Central Hudson Metro Areas



Based on Moody's data for Central Hudson area

Figure 26 shows the forecasted growth in residential and non-residential accounts, absent the recent and proposed interventions to decarbonize the gas system via building electrification. The future forecast does not mimic historical growth.

Figure 26: Historic and Projected Changes in Residential and Non-residential Accounts (Absent Interventions)

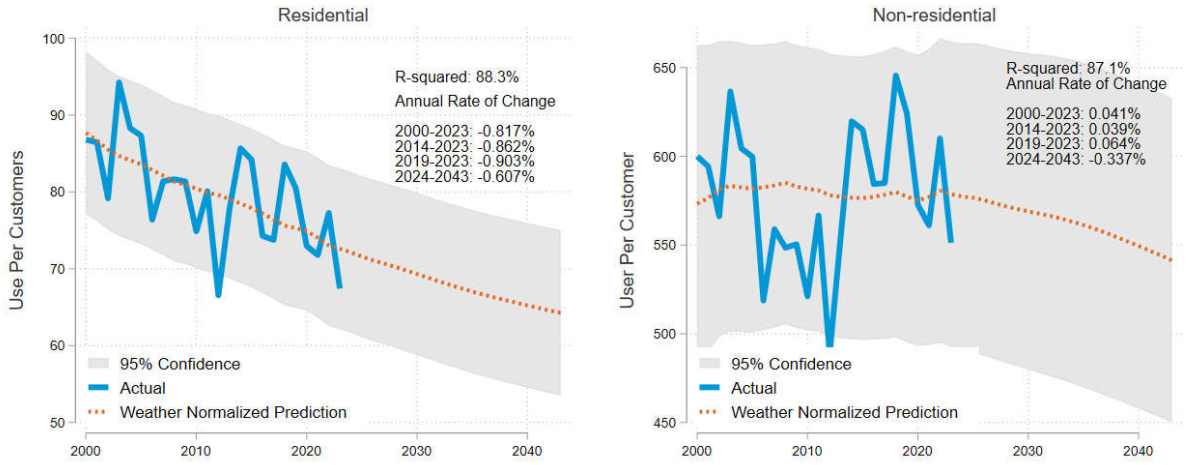


Forecasts incorporate Moody's historical and forecast household data for Central Hudson territory

Over the 2000-2023 period, while the residential customer counts and gas sales grew, the per capita energy use declined substantially as shown in Figure 27. The reduction in per capita usage is due to a combination of changes in weather over time, codes and standards, efficiency programs, and a

declining number of people per household. The forecast incorporates the declining trend in use per customer. Thus, any changes due to the interventions to accelerate building electrification in the gas sector are incremental to the existing trend of declining use per customer.

Figure 27: Forecasted Changes in Use per Customer (Mcf)



Incorporates Moody's historical and forecast household data for Central Hudson territory
Incorporates historical and forecast change in Annual HDD and CDD

C. Demand-Side Programs

i. Energy Efficiency

Description of Program

Central Hudson currently implements a comprehensive portfolio of gas and electric energy efficiency programs, which include a variety of solutions for residential, commercial, and industrial customers, and which are described in the Company's annual 2019-2025 SEEP. The Commission has authorized Central Hudson's current energy efficiency budget and targets,[25] with additional 2022-2024 expanded targets authorized under a recent rate case approval order,[26] resulting in a continued scaling up of the energy efficiency portfolio on an annual basis from prior years, as shown in Figure 28, below.[27]

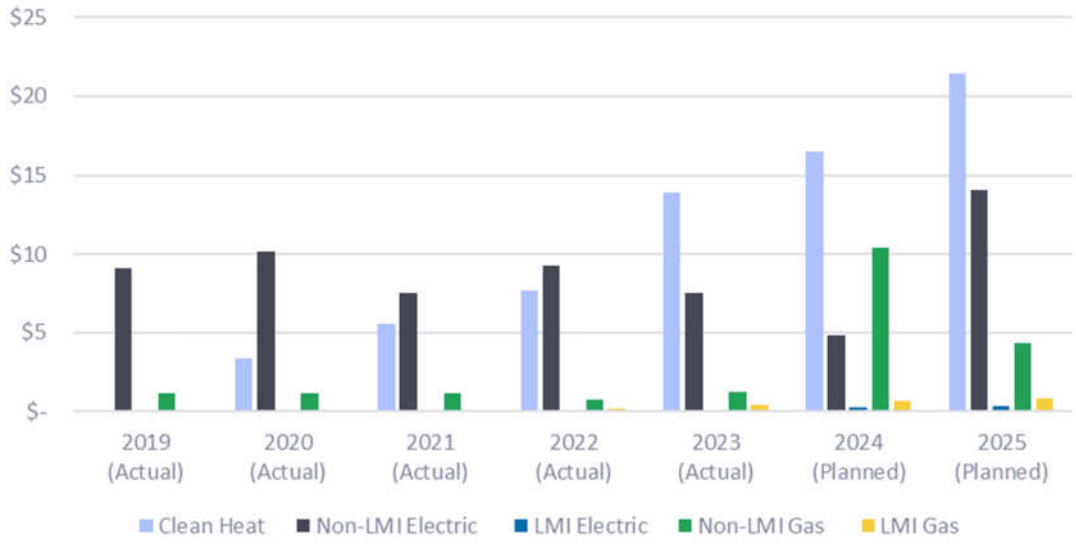
[25] NE: NY Proceeding.

[26] 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).

[27] 2023 SEEP, p. 4.

Figure 28: 2019-2025 Gas and Electric EE Portfolios ($, millions)

Note: Approximately 88% of Central Hudson's Clean Heat budget is allocated to non-gas projects, with the balance (i.e., 12%) allocated to gas projects.



Central Hudson collaborates with the other New York State utilities and NYSERDA to develop coordinated statewide efficiency initiatives targeting LMI customers. Central Hudson has taken an active role in the initiatives presented in the LMI Implementation Plan[28] and seeks to ensure LMI customers have equal access to all programs regardless of funding sources for the full duration of the plan.[29]

Figure 29: Air Source Heat Pump System Installed at a Central Hudson Customer Residence

[28] NE: NY Proceeding, Statewide LMI Portfolio Implementation Plan, November 1, 2023. Full descriptions of the LMI Portfolio are provided in this plan.

[29] 2023 SEEP, p. 4.

The associated greenhouse gas emissions savings from these programs over this period is estimated at 197,246 metric tons of CO_2.[30]

The Company continues to leverage opportunities to implement Energy Efficiency programs in a way that is complementary to other energy transition initiatives, including the New York Renewing the Energy Vision (REV) initiative. For example, additional incentives are being offered within Non-Pipeline Alternatives to facilitate home electrification and the strategic retirement of leak-prone pipes.[31]

While Central Hudson's budgets and targets referenced in its SEEP cover the years 2019-2025, Central Hudson has also filed its Energy Efficiency / Building Electrification Proposal (EE/ BE Proposal)[32] which provides proposed budgets and targets for the period 2026-2030. A central element of the Commission's EE/ BE Proposal Order[33] and Central Hudson's EE/ BE Proposal is the adoption of a framework of categorizing measures as "strategic," "non-strategic," and "neutral," with the Order requirement of at least 85 percent of budget supporting strategic measures, with no budget for non-strategic measures, including no incentives allowed on residential gas-fired equipment, with a possible exception for LMI measures.[34] Central Hudson's EE/ BE Proposal allocates 92 percent of the budget to strategic measures, with the key shift of supporting the rollout of weatherization measures and building electrification continuing funding the Clean Heat programs. This also reflects the shifting away from the traditional lighting measures (recognizing the market transformation to efficiency lighting (*i.e.*, LEDs)) as well as the significant reduction in gas measures (*e.g.*, including away from traditional major natural gas measures such as replacements of older oil, gas, and propane furnaces and boilers with new efficient gas ones.)

Figure 30, below, shows the project budgets and targets for 2026-2030 from Central Hudson's EE/ BE Proposal. It is noted that, consistent with the EE/ BE Proposal Order's shift away from most gas measures, Central Hudson's budget focus is shifted more to electric programs. For the 2026-2030 Portfolio, $121.8 million is allocated to electric programs, including $62.5 million to Clean Heat and $39.4 million to weatherization; an additional $2.6 million in weatherization budget is allocated to gas-only customers.[35] For the period 2026-2030, the funding for LMI EE programs is being shifted to NYSERDA, and so Central Hudson does not have LMI EE budgets beyond 2025.

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30 2023 SEEP, tables 3A-3E and 4A-4E.

31 2023 SEEP, p. 4.

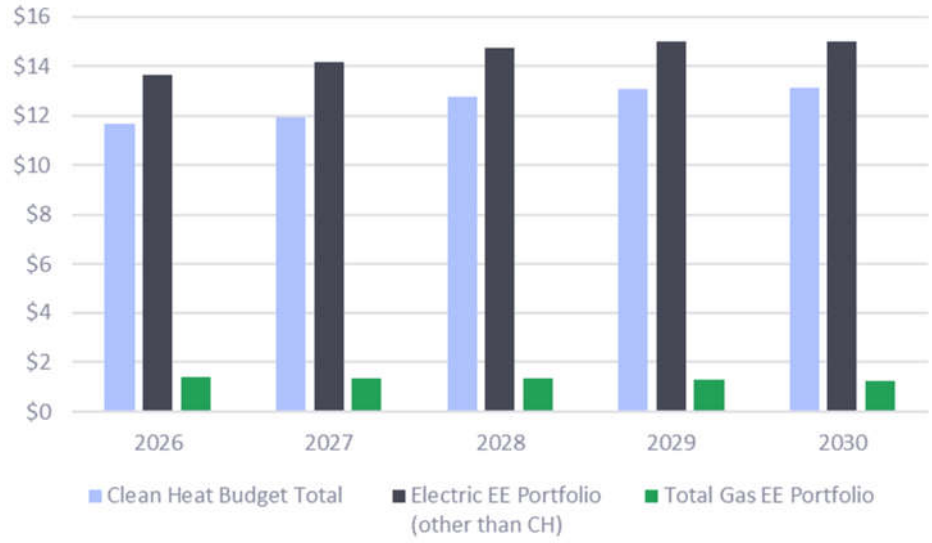
32 NE:NY Proceeding, Central Hudson EE/BE Proposal ("EE/BE Proposal", filed November 1, 2023. These proposed budgets and targets have not yet been ruled on.

33 NE:NY Proceeding, EE/BE Order.

34 Ibid.

35 *See supra*, note 32.

Figure 30: Central Hudson Electric and Gas Portfolio Budgets 2026-2030 ($, millions)[36]



ii. Clean Heat Program

Description of Program

Central Hudson is one of the utility program administrators of the New York State Clean Heat Program (Clean Heat), which was launched on April 1, 2020, and supports the adoption of efficient electric heat pump systems for space heating and water applications throughout New York. Through the Clean Heat Joint Management Committee, Central Hudson coordinates with the other electric utility program administrators and NYSERDA in all aspects of program administration, including the core incentive program to support adoption. The Clean Heat Program was authorized by the 2020 NE: NY Order[37] for the period 2020-2025, with Central Hudson a budget of $43.2M to achieve 255,292 Gross MMBtu of savings beginning April 1, 2020, through December 31, 2025. [38]

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36 *Ibid*.

37 NE:NY Proceeding, Order Authorizing Utility Energy Efficiency and Building Electrification Portfolios Through 2025 ("2020 NE:NY Order") (issued January 16, 2020).

38 In the development of this Final GSLTP, Central Hudson supports the analysis of many decarbonization approaches including those that are not yet available. One of these approaches is a natural gas heat pump. Central Hudson's parent company, Fortis Inc., is also piloting natural gas heat pumps in its other service territories.

Figure 31 below shows the spending and savings achieved through 2023.

Figure 31: Clean Heat Program Spend and Achievement 2020-2023[39]

Category	Spend ($)	Savings (MMBtu)
Cumulative 2020-2023 Spend/ Achievement	$54,433,121	594,599
Cumulative NE:NY 2020-2025 Budget/ Target	$43,221,312	255,292
Share of NE:NY Budget/ Target Realized Through 2023	126%	233%

In February 2023, Central Hudson filed a petition for additional funding to support the Clean Heat program and avoid a market pause; due to high activity and increased adoption rates, Central Hudson surpassed cumulative Clean Heat savings goals and needed additional funding to support continued activity. On June 22, 2023, the Commission authorized additional funding of $25 million for the program along with stipulations for closer collaboration with DPS Staff and stakeholders moving forward.[40]

As described above, Central Hudson has also filed its EE/ BE Proposal[41] which provides a higher-level planning proposal for the period 2026-2030. The budgets and targets from the EE/ BE Proposal have not been authorized to date, but this information is appropriate for planning and modeling in this GSLTP. Central Hudson proposes to allocate over 50 percent of its electric energy efficiency portfolio 2026-2030 budget (~$62.5M) (incentives and administration) to Clean Heat.[42] This is reflective of Central Hudson's Clean Heat Program having been successful, exceeding targets at lower than projected unit cost.[43] The EE/BE Proposal outlines strategies to improve/ increase the effectiveness of the Clean Heat program for 2026-2030.[44]

As noted above, Central Hudson is using a model that includes analysis of each segment of its gas distribution system as well as each circuit on its electric system. Central Hudson has conducted

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39 NE:NY Proceeding, New York State Clean Heat Program 2023 Annual Report (filed April 4, 2024), p. 17.

40 NE:NY Proceeding, Order Approving Funding for Clean Heat Program (issued and effective June 23, 2023). The additional $25.2 million in funding consisted of nearly $4 million of previously collected and unspent funds, reallocation of $13.5 million of previously authorized non-LMI electric energy efficiency budgets, $1.7 million of accrued interest on Clean Energy Fund collections, and spend up to an additional $6 million in Continuity Funding, if needed, to support Central Hudson's Clean Heat program. The "Cumulative NE:NY 2020-2025 Budget/ Target" information shown in **Error! Reference source not found.** reflects the budgets and targets approved in the Order Authorizing Utility Energy Efficiency and Building Electrification Portfolios Through 2025 ("2020 NENY Order") (issued January 16, 2020), Appendix C.

41 NE:NY Proceeding, EE/BE Proposal.

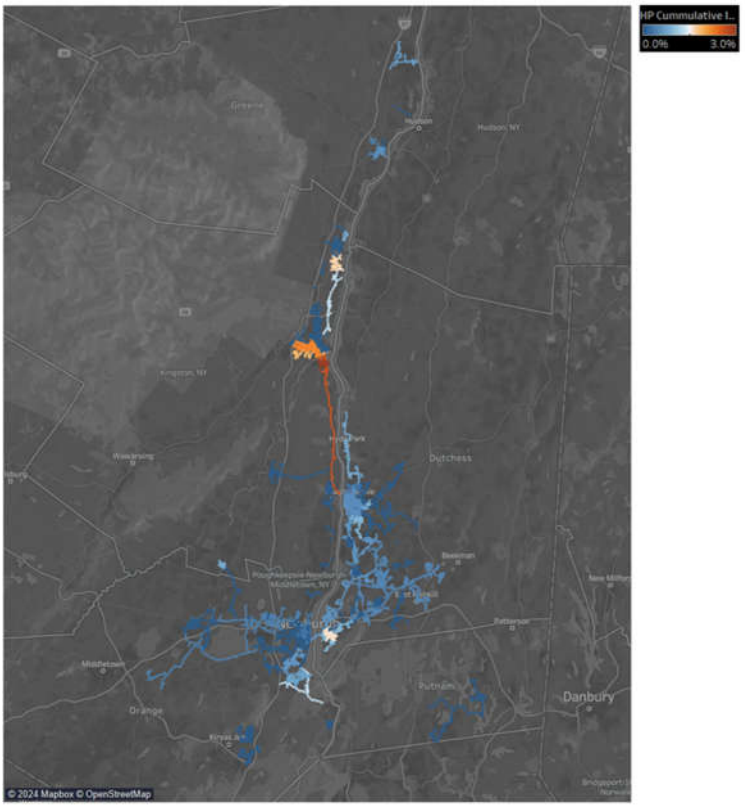
42 *Ibid*, pp. 9, 27

43 *Ibid*, p. 9.

44 *Ibid*, p. 9-10.

analysis of customer adoption of heat pumps in its service territory through the Clean Heat Program. This enables the Company to have a view on adoption of its electric system as shown below.

Figure 32: Geographic Location of Heat Pump Adoption (As of 2023)



System	Name	HP Penetration (% of sites)
PE	Port Ewen	5.6%
PK	Poughkeepsie- Kingston	4.7%
KLP	Kingston LP	3.8%
KM	Kingston Medium Pressure	3.2%
KS Medium	Kingston -Saugerties (9.5#)	2.8%
B	Beacon LP	2.7%
GLP	Glasco LP	2.7%
KS High	Kingston-Saugerties (40#)	2.1%
WP	West Point	2.0%
SP	Sharon Dr- Poughkeepsie	1.6%
BF	Beacon-Fishkill-Glenham	1.5%
HLMS	Blue Point - Highland/Highland Medium Pressure	1.4%
HV	Hyde Park- Violet Ave	1.2%
WK	Wallkill	1.2%
CW	Cornwall Medium Pressure	1.2%
MLP	Malden Low Pressure	1.1%
TVPV	Titusville/Pleasant Valley	1.0%
LNW	Lower New Windsor	0.9%
CK	Coxsackie	0.9%
PN	Poughkeepsie- Newburgh	0.8%
CLP	Catskill LP	0.8%
PLP	Poughkeepsie LP	0.8%
STCRK	Salt Point Turnpike/Creek Rd	0.8%
HH	Hopewell- Hughsonville	0.7%
CH	Cronomer Hill-Coldenham	0.7%
BN	Balmville- Newburgh Holder,	0.5%
AMW	Scotts Corner - Maybrook/Berea - Chandler Ln	0.5%
CMP	Catskill System	0.5%
NLP	Newburgh LP	0.5%
PM	Poughkeepsie Medium	0.4%
CMENP	Newburgh - Cornwall/Cocheton - Nbg Holder/Ne..	0.2%
CFNM	Cronomer Hill - Fullerton Ave/Newburgh Medium	0.1%
W	Coldenham- Wallkill	0.0%
SM	Carmel- Mahopac	0.0%
NFW	Elmendorf St- West King	0.0%
NFE	North Kingston - Foxhall	0.0%
MA	Maybrook	0.0%
HM	Highland Mills	0.0%
HF	Highland Falls	0.0%
BC	Browns Crossing	0.0%

Further analysis and conclusions are identified in the Company's 2023 DSIP Filing, but key findings for the purposes of this GSLTP include that most customers who adopted Heat Pumps through Clean Heat were served by a heat fuel other than gas, by approximately 2:1 margin. While this does not deter Central Hudson's efforts at reaching gas customers, it does provide a notable data point for planning the conversion of current gas customers to beneficial electrification. Importantly, this is not a negative comment on the Clean Heat program and its benefits, since the greenhouse gas emissions benefits and dollar savings are generally higher for customers switching to heat pumps from fuels such as propane and oil, as compared to gas. Thus far heat pumps have not been targeted at highly loaded local gas systems.

iii. Non-Pipe Alternatives

Description of Program

Non-Pipeline Alternatives (NPAs) are projects designed to displace the need for traditional gas infrastructure investment. Since its 2017 Rate Case filing, Central Hudson has proposed and pursued incorporating NPA projects in its system planning processes, consistent with the Commission's Order

Adopting Terms of Joint Proposal and Establishing Electric and Gas Rate Plan.[45] On August 10, 2022, Central Hudson filed its Proposals for Non-Pipe Alternative Screening and Suitability Criteria[46] for establishing its NPA screening and suitability criteria framework. The Company is pursuing two categories of NPA projects, both of which employ non-traditional solutions to avoid traditional infrastructure construction: Transportation Mode Alternatives (TMA) and Load Growth-Based Projects.

Transportation Mode Alternatives

Central Hudson's transportation mode alternatives projects have focused on the strategic abandonment of leak prone pipe through electrification in cases where it is more cost-effective than replacing infrastructure and does not compromise system reliability.

Through electrification of customers' heating and appliances, LPP can be permanently retired in strategic locations. The approach is ideal for areas of low customer saturation with high pipeline replacement costs such as when a long length of pipe needs to be replaced to serve only one or a few customers. Generally, for a TMA project to be successful, all customers served by the designated infrastructure must agree to retire their gas service. Achieving this level of customer adoption can be challenging, particularly as the number of customers involved increases.

The Company has identified over 60 locations across its service territory where implementing a TMA project could enable the permanent and cost-effective retirement of LPP. These project locations, referred to as "cases", include more than 100 customers in total.[47] Updates on the Company's TMA activities have been filed in annual filings since 2019, with additional projects being identified each year. Cases have been designated as high priority when they have heightened time constraints due to concurrent Company or municipal initiatives. Central Hudson pursues TMA cases based on a determined priority, as opposed to their chronological identification. The initiative uses a focused marketing strategy followed by customer education and enrollment. It employs a "white glove" direct install approach, replacing primary natural gas end uses with high-efficiency cold climate air-source heat pumps and electric heat pump water heaters.

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45 Case 17-G-0460, *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Central Hudson Gas & Electric Corporation for Gas Service* ("2017 Rate Proceeding"), Central Hudson Gas & Electric Corporation's Non-Pipeline Alternatives Annual Report ("NPA Annual Report"), (filed December 1, 2023) p. 2.

46 Gas Planning Proceeding, Central Hudson Gas and Electric Proposals for Non-Pipe Alternative Screening and Suitability Criteria ("NPA Screening and Suitability Criteria"), (filed August 10, 2022).

47 Central Hudson Gas & Electric Corporation's *Non-Tariff Implementation Plan & Compliance Filing for Non-Pipe Alternatives: Three Transportation Mode Alternatives* ("2019 Implementation Plan"), filed in June 2019. The first three cases were submitted in 2019 Implementation Plan. In 2020, the Company broadened its scope for potential projects and identified 37 additional cases as potential TMA candidates. Five of these new cases were identified as "high priority" and included in Central Hudson's 2020 Implementation Plan, filed in June 2020. On September 15, 2021, the Company filed its 2021 Implementation Plan Update. Thirteen additional NPA project opportunities were included in this update; seven cases from 2020 which did not proceed with NPA conversions at that time, and six new cases being initially pursued in 2021. On October 24th, 2022, the Company filed its 2022 Implementation Plan Update. Six additional NPA project opportunities were included in the update; five cases from the 37 potential projects identified in 2020, and one new case identified in 2022.

To date, TMA solicitations have offered to fully cover the costs of converting gas appliances to energy-efficient electric alternatives, along with a final project completion bonus to participating customers. All completed TMA projects have been delivered at no cost to customers. Additional information is provided on each of these cases in the Company's most recent NPA Annual Report.[48]

Load Growth-Based Projects

Load Growth Based Projects would be designed to manage locational constraints that are associated with peak demand. As part of the GSLTP, Central Hudson commissioned and completed an avoided gas distribution study to determine if there were imminent constraints on the gas distribution system that would warrant the development of such an NPA at the time. Two locations – the Kingston Saugerties and the Titusville-Pleasant Valley local gas systems -- were identified as potential NPAs, and more detailed analysis was conducted for these locations to define strategies through demand side management and electrification to avoid growth-related infrastructure upgrades. This new analysis is included in Appendix C titled "Non-Pipe Alternatives Assessment". Central Hudson welcomes stakeholder feedback on this new approach as we further define, study and develop these projects into actionable programs and conduct additional analysis of other highly loaded systems.

Assessing Costs to Achieve Abandonment in Geographic Areas

As part of this GSLTP process and in response to stakeholder input, the Company has assessed the viability of quantifying the number or level of incentives (e.g., in energy efficiency, electrification, and NPA programs) needed to achieve abandonment-related goals, such as the retirement of the gas network in certain geographic areas.

Central Hudson analyzed two main sources of data to inform the viability of gas abandonment. The first source is the data for sites that participated in the Clean Heat program and installed whole home heat pumps between 2020 and the end of 2023. The second data source comes from proactive efforts by Central Hudson to strategically abandon leak prone pipe segments, when cost-effective, as part of the leak prone pipe program. The objective was to inform two main questions using empirical data.

- What share of Clean Heat customers abandon the gas system upon installation of heat pumps?
- What share of customers targeted for leak prone pipe program strategic abandonment agreed to fully electrify and disconnect from local gas systems?

As part of the Clean Heat program, Central Hudson offers customers up to $1,000 per 10,000 Btu to install heat pumps and decommission their prior fossil fuel heating source. While a growing share of sites elect to retire their fossil fuel heating system, 97.7% of sites have elected to retain their gas service after heat pump installation. To understand gas abandonment, Central Hudson analyzed the Clean Heat Program data and gas and electric billing usage data for 2020-2023. The population of Clean Heat participants was narrowed to whole home heat pumps for space heating and to sites with gas heating before the installation of the heat pump. The analysis was conducted at the site level to avoid mixing discontinuation of gas service with move outs. All the gas and electric accounts associated with the site

[48] 2017 Rate Proceeding, 2023 Central Hudson Non-Pipes Alternative Annual Report (filed to DMM December 1st, 2023)

were merged in order to identify sites that disconnected gas service. A site was considered to discontinue gas service if electric service continued, and gas service discontinued (and did not reconnect later) for three or more months.

As part of Central Hudson's leak prone pipe program, Central Hudson pursues strategic abandonment efforts in locations where leak prone pipe replacement costs are high, where few customers are served, and where it is more cost-effective to fully electrify homes than it is to replace the pipe. For a project to be successful, all the natural gas customers served by the designated infrastructure must agree to electrify and retire their gas service. Approximately 44% of sites targeted have agreed to fully electrify and disconnect from the gas system. However, because a single customer in a proposed project declining to participate means the project cannot go forward, the project-level success rate is lower (approximately 22%). Moreover, the costs are substantially higher, and the marketing is more extensive than what is modeled in this GSLTP. Per home conversion costs were approximately $46,000, and, at sites where offered, on average, a $4,000 bonus incentive in addition to the full cost of electrification equipment, installation, and panel upgrades was needed. This is more than eight times the current level incentives offered via the Clean Heat program and a much higher incentive level than even the most aggressive scenario modeled in the GSLPT.

Central Hudson cannot force customers to purchase a heat pump and relies solely on incentives and targeted marketing, to convince customers to fully electrify and disconnect from the gas system. Incentive-based strategic gas pipeline abandonment is viable only under very limited conditions where a pipe needs to be replaced to serve a handful of customers and pipe replacement costs are high. Incentive-based strategic gas pipeline abandonment also does not scale easily because all customers must agree to abandonment. The probability of successful pipe abandonment drops dramatically when participation is required from more than five sites. If customer agreement to abandon gas pipes from more than 10 sites is required, strategic gas pipeline abandonment is impractical, with less than a 3 in 1000 probability of success. Moreover, the suite of tactics (including the full cost of equipment, labor, bonus incentives, panel and wiring upgrades, and single point of contact marketing) required to convince customers to fully electrify and disconnect from the gas system is not scalable.

As described in this GSLTP, the Company has developed and continues to advance robust energy efficiency, electrification, and NPA programs. Further, the Company will continue to provide any supplemental, applicable information on these topics to the degree it becomes available. At this time, however, Central Hudson finds that, rather than focus primarily on full abandonment of geographic areas, it is preferable to focus on reducing demand growth in specific geographies to prevent the need to invest capital in system reinforcements. This approach facilitates greater system-wide capital cost savings and avoided investment and promises far greater feasibility and avoids potentially very high costs and associated bill impacts.

iv. Utility Thermal Energy Networks (UTEN)

Description of Program

Thermal energy networks offer numerous potential benefits for customers and communities, including reductions in GHG and other climate emissions through the decarbonization of buildings and communities. Pursuant to requirements in the CLCPA and the Utility Thermal Energy Network and Jobs Act, Central Hudson designed its Thermal Energy Network pilot (Thermal Pilot) to test the feasibility and economics of using thermal network applications to replace gas, which will consequently inform the

Commission's future promulgation of regulations governing thermal energy networks. The Thermal Pilot supports the climate justice and emissions reduction mandates of the CLCPA by providing thermal energy to participating customers in a designated disadvantaged community. In addition, it tests financial and technical approaches to equitable and affordable building electrification that, among other attributes, may mitigate up-front cost barriers to individual customers while investing in clean energy infrastructure. Furthermore, the pilot is expected to create benefits to participating customers and to society at large, including public health benefits in areas with disproportionate environmental or public health burdens, job retention or creation, reliability, and increased affordability of renewable thermal energy options.[49]

The Company conducted a Service-Territory-Wide Geothermal Potential Study which underpins the selection of a site for Central Hudson's proposed UTEN.[50] In this Study, the Company's service territory was evaluated at a high level to identify potential suitable pilot sites, including identifying sites with adequate thermal resources, building diversity, and population densities. Using this information, numerous potential host sites were identified with the potential for hosting a large district geothermal system with surrounding infrastructure that lends itself to future expansions of the district geothermal system. Weighted criteria were developed to objectively select the highest ranked sites to be evaluated in more detail. Central Hudson designed the pilot's screening criteria to encourage the installation of thermal energy networks in its service territory, while focusing on the key criteria related to: Customer, Location, Facility Type, Facility Status, Stakeholders, Space and Geology. [51]

The Thermal Pilot has identified the designated site as 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 great diversification of thermal loading and value, and is located in a DAC. Figure 33 provides a project rendering of The YOU and Figure 34 shows a layout of the site and its proposed customers.

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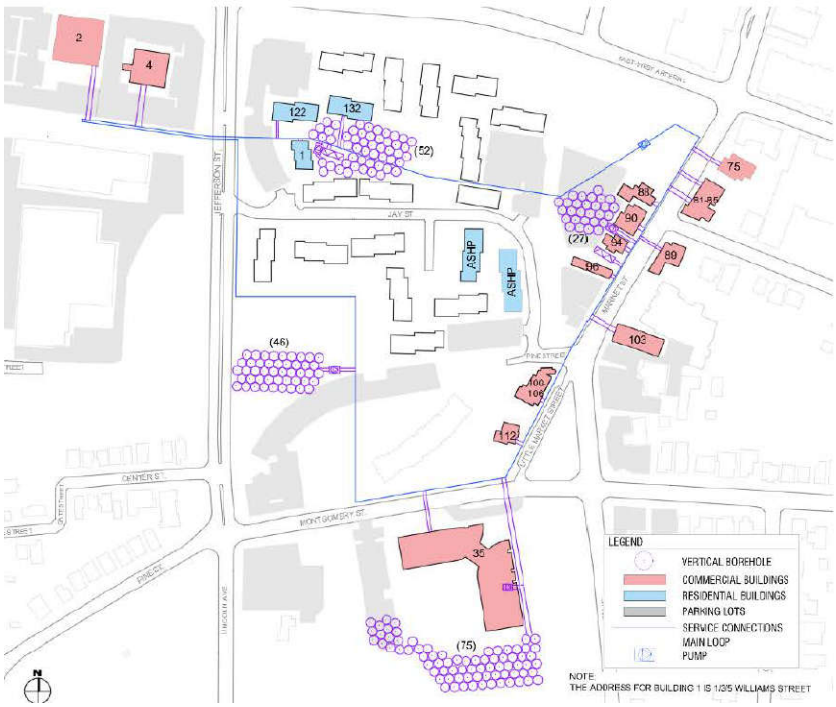
49 Case 22-M-0429, *Proceeding on Motion of the Commission to Implement the Requirements of the Utility Thermal Energy Network and Jobs Act* ("UTEN Proceeding"), Central Hudson Thermal Energy Pilot Proposal, October 2022.

50 *See* Appendix F.

51 *See* Appendix F, pp. 8-9. For the pilot period and future potential projects, Central Hudson will evaluate potential projects based on these criteria and the weighted criteria identified in the study.

Figure 33: Project Rendering of "The YOU" (Courtesy of Dutchess County and MASS Design Group)

Figure 34: Project Youth Opportunity Union Proposed Thermal Energy Network Pilot



This project will be working with both existing customers and planned construction projects, local municipalities, community groups and Central Hudson's local union. The project will test concepts on utilization of community green space, phasing, scalability, and expansion of UTENs, and impacts on varying levels of weatherization. The Thermal Pilot will support new construction that will have both

social and economic benefits far outreaching the immediate area of the project. In addition, the pilot provides the opportunity to serve Low-Income Housing. The proposed pilot will have a Net Cost of $17.6 M after discounting for potential incentives from the Inflation Reduction Act, with expected annual operating and maintenance costs of $343,400.[52]

On October 1, 2024, Central Hudson Gas & Electric received approval from state regulators to move forward to stage 2 Engineering Design for the pilot project. Stage 2 will involve detailed engineering designs, customer protection plans, construction standards, detailed cost estimates, training and qualification programs, O&M Procedures, emergency plans, and cost recovery plans. This will be submitted to the Commission for approval in the Fall of 2025

v. Demand Response Programs and Interruptible Customers

Description of Program

Central Hudson offers interruptible rate options that allow large customers' gas service to be paused for select hours under certain high demand conditions as part of the overall rates structure. The interruptible customers account for 20% of Central Hudson's total sales and are required to curtail in full when called upon. This means that 20% of gas load could be curtailed as needed, which achieves the same purpose and goals as a demand response program. These interruptible customers effectively represent substantial demand response resources for Central Hudson. Central Hudson will explore new demand response options as described in Appendix C.

Central Hudson does not offer any additional demand response programs that are focused on gas usage at this time. The Company explored program options in a potential study released in 2020, including both residential and non-residential direct load control as well as non-residential load curtailment options.[53] The study concluded that gas demand response programs would be cost-effective to implement and would slightly reduce system peaks. In addition, the overall focus of shifting gas usage to electricity may suggest a decreased focus on pursuing new gas demand response efforts in general, noting that gas demand response efforts may be suitable on a more targeted basis, *e.g.*, if there is both a gas and an electric constraint.

Central Hudson administers several demand response programs on the electric side. For Commercial & Industrial (C&I) customers, Central Hudson offers a Commercial System Relief Program (CSRP) and a Targeted Demand Response (TDR) program. The CSRP offers two tiers of participation options for C&I customers to curtail their electric load when called upon by Central Hudson. The TDR program is open to C&I customers located in certain constrained areas and offers a higher incentive for usage reductions. Central Hudson also participates in a Dynamic Load Management (DLM) process in which applicants can bid to provide load relief either through a Term- or Auto-DLM program.

The Company recognizes stakeholder interest in Central Hudson evaluating and implementing a gas demand response program if shown to be cost-effective. Central Hudson is open to developing a gas demand response program, proposes to coordinate with interested parties to identify customers that

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[52] UTEN Proceeding, Central Hudson Thermal Energy Network Final Pilot Project Proposal (June 2024).

[53] Cadmus, Central Hudson Gas and Electric Assessment of Potential Report, August 2020.

would be willing to participate, and work with parties to understand the benefits of and to develop an innovative gas demand response program (or programs).

D. Supply Planning

Central Hudson's gas system is served by four city gate stations that feed one contiguous service territory, providing for both operational flexibility and supply diversification. These four city gates provide interconnection to the Millennium Pipeline at the Tuxedo Gate in the southwest corner of the territory, to the Tennessee 200 leg pipeline at the Cedar Hill Gate in the northwest corner of the territory, to the Iroquois Pipeline at the Pleasant Valley Gate in the east part of the territory, and to the Algonquin Pipeline at the Mahopac Gate (Somers, New York) in the southeast corner of the territory. This configuration provides significant planning and operating flexibility, as well as supply diversity. Central Hudson procures and delivers various supply resources to customers through a combination of owned infrastructure and contracts with third parties. None of the segments of the system are isolated or specifically served by one city gate, which provides for system flexibility and reliability through diversification. If deliverability at one city gate is reduced, for example, Central Hudson can offset the supply loss by procuring and scheduling additional supply through the other three city gates.

i. Supply Portfolio

Central Hudson's supply portfolio consists primarily of interstate pipeline transportation contracts (both gate-delivered and upstream receipt) and storage contracts with interstate pipeline transportation agreements. This supply portfolio is relatively straight-forward and provides for a combination of seasonal base gas, storage gas injection/withdrawal, and winter peaking gas supplies (i.e. gate-delivered gas services), for which the Company issues competitive Requests for Proposals ("RFPs") to procure at the lowest evaluated cost. These supplies are supplemented with occasional daily gas purchases with firm delivery to any one of the company's four city gate stations, considering that day's operational needs and economic alternatives, to satisfy the daily forecasted gas send-out requirements.

Central Hudson notes that any gate-delivered gas services contract could, potentially, be difficult to renew. The Joint Local Distribution Companies ("Joint LDCs")[54] July 2020 filing "Modernized Gas Planning Process: Standards for Reliance on Peaking Services and Moratorium Management"[55] discusses the risks associated with increased reliance on natural gas peaking resources due to recent challenges in siting new natural gas pipelines to serve New York markets. Based on winter 2023-2024 data shown in Figure 35, winter gas Peaking contracts, on an average $/Dth basis, were almost five times more expensive than gate-delivered base gas, and almost 3.75 times more expensive than gate-delivered storage gas. The Company anticipates less future reliance on gate-delivered (a.k.a. peaking) gas services will be economically beneficial for customers as peak gas demand reduces under the NNI scenario.

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[54] The Joint LDCs include: Con Edison Company of New York, Inc. (Con Edison); Central Hudson; New York State Electric & Gas Corporation (NYSEG); The Brooklyn Union Gas Company, Keyspan Gas East Corporation, and Niagara Mohawk Power Corporation, together d/b/a National Grid (National Grid); National Fuel Gas Distribution Corporation (National Fuel); Orange and Rockland Utilities, Inc. (O&R); and Rochester Gas and Electric Corporation (RG&E).

[55] Gas Planning Proceeding, Modernized Gas Planning Process: Standards for Reliance on Peaking Services and Moratorium Management (July 17, 2020).

Figure 35: 2023-2024 Winter Supply Gate Delivered $/Dth Average Costs

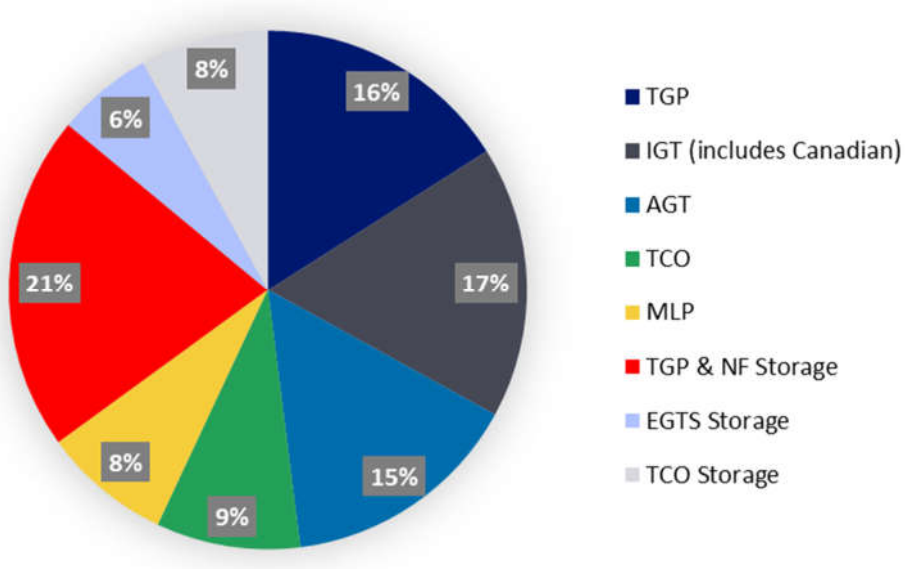
Base Supply	Storage Supply	Peaking Supply
$3.2131	$4.1963	$15.4566

Most gas supply resources are planned for and contracted to meet gas demand behind a particular city gate. Central Hudson's gas transportation and gas storage portfolio is almost entirely made up of short-haul transportation assets from the Marcellus shale region and from Eastern Canada (Dawn Hub). Figure 36 lists the entities with which Central Hudson has firm long-term natural gas pipeline transportation contracts and firm long-term natural gas storage capacity with transportation contracts. Figure 37 illustrates the diversity of the total firm natural gas transportation and storage capacity expressed as a relative percentage of the overall portfolio. The Company's natural gas transportation and storage portfolio has been static in recent years, and Central Hudson does not expect much variation in the near term. This will change, however, when it becomes necessary to implement a de-contracting strategy as explained in further detail later in this section.

Figure 36: Firm Pipeline and Storage Resources

Firm Pipeline Transportation Capacity	Firm Storage Capacity with Transportation Service
• Millennium Pipeline (MLP) • Columbia Gas Transmission (TCO) • Tennessee Gas Pipeline (TGP) • Iroquois Gas Transmission (IGT) • Algonquin Gas Transmission (AGT)	• Eastern Gas Transmission and Storage (EGTS) • Columbia Gas Transmission – Columbia Storage • Tennessee Gas Pipeline – Tennessee Storage and National Fuel (NF) Storage

Figure 37: Firm Transportation and Storage Capacity



The Company's portfolio of natural gas transportation assets provide Central Hudson customers access to a diverse set of liquid natural gas market trading hubs, including Millennium East, Tennessee

Zone 4 300 Leg, TCO (Columbia) Pool, Dawn Hub (Ontario, Canada), TETCO (Texas Eastern) M3, and Tennessee Zone 1 and Zone 0. The Company's access to the array of gas supply markets provides for reliability of supply, operational flexibility, and choices for economic dispatch of supply.

ii. Gas Supply Strategy

The annual gas supply planning process begins with sales and peak demand forecasts prepared each spring. A system load duration curve is constructed for the upcoming winter season based on recent historical send-outs and that curve is adjusted to align with the forecasts. Central Hudson base supply, marketer supplies, storage withdrawal, and peaking supplies are 'stacked' against the load duration curve to ensure adequate supply is available to meet the sales forecast and forecasted design-day peak send-out. Typically, adequate supplies are available to Central Hudson city gates to meet the forecasts. During late Spring prior to each winter season, the Company develops the Winter Supply Plan. The forecasted gas requirement for each winter season month, November through March, is based on the average of the most recent three-, four- and five-year average send outs, adjusted for the forward-looking winter season sales forecast. The estimated send out for each month is then broken down by supply: Central Hudson base supply, marketer supply, storage withdrawal, and peaking supplies. This process sets the total gas supply by month.

Once the supply volumes by type are determined, competitive RFPs are used to procure the necessary natural gas base supplies for the season at the lowest evaluated transportation basis price for customers.

Daily, Central Hudson uses a short-term forecasting model to estimate day-ahead gas supply requirements. The model uses a proprietary mathematical analysis that combines historical weather data and natural gas send-out data with current weather forecasts to provide a rolling multi-day gas demand forecast. The forecast is comprised of a base usage (non-weather sensitive) component and a heating usage (weather sensitive) component. Heating usage is calculated as the product of the forecast of effective degree days (EDD) obtained from an independent weather service and the natural gas usage per EDD. The daily system natural gas supply requirements, including an operating reserve margin, are determined and scheduled based on this daily forecast.

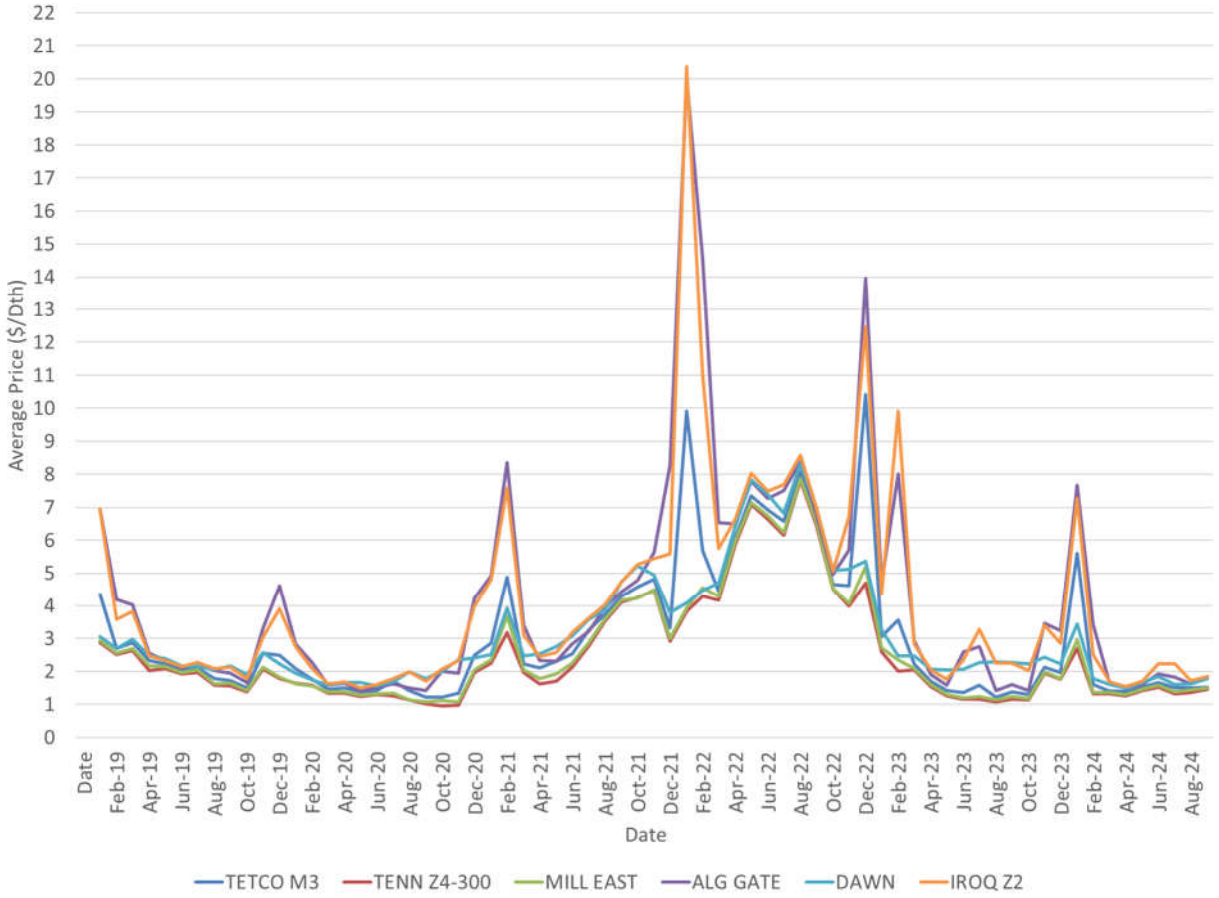
The Company utilizes all its base and storage contracts during the November through March winter season to serve firm customer requirements. That said, the Company employs an economic dispatch approach to scheduling supplies when possible. Unlike the bulk electric system that relies on a Regional Transmission Organization to ensure wholesale electric supply adequacy while satisfying reliability criteria, the Company itself is responsible for maintaining natural gas system supply adequacy and reliability. Natural gas system supply adequacy and reliability are achieved, in part, by scheduling appropriate levels of natural gas supply for daily, monthly, and seasonal forecasted sales and demand across multiple city gates. The Company perpetually monitors daily actual vs forecasted natural gas requirements and makes periodic intraday adjustments to the available natural gas supplies using contracts that provide operational flexibility. While natural gas system supply adequacy and reliability are the primary consideration, the Company will adjust natural gas supplies on an economic basis when possible. Figure 38 provides a summary of the 2023-2024 winter season natural gas supply prices by city gate:

Figure 38: 2023-2024 Winter Supply Gate Delivered $/Dth Costs

	Base Supply 1	Base Supply 2	Base Supply 3	Storage Alt 1	Storage Alt 2	Peaking
Gate 'A'	$ 2.3764			$ 3.9220	$ 4.5578	$ 12.4411
Gate 'B'				$ 3.3737	$ 4.1768	
Gate 'C'	$ 2.7955	$ 4.1990	$ 4.6620	$ 4.2298	$ 5.0813	
Gate 'D'	$ 3.2159					$ 25.5398

The average natural gas supply costs by supply type delivered to each city gate for winter 2023-2024 is representative of the longer-term relative cost from each liquid market point to which the company has access and uses for natural gas supplies. Figure 39 provides a snapshot of market point pricing for the past five years:

Figure 39: Market Location Price Analysis



For example, during the April through October 'shoulder and summer' seasons, the Company will schedule natural gas supplies on its most economic delivery gate station to minimize customer commodity supply costs. Another example, during the November through March winter season, the Company can use natural gas storage supplies or can make daily natural gas purchases based on the least cost pricing alternative.

For the purposes of the GSLTP, the Company developed a Load Duration Curve for years 5 and 10 under the NNI Scenario (Figure 40 and Figure 41):

Figure 40: Central Hudson Natural Gas Supply Capacity & Load Duration Curve (Winter 2029-2030 NNI Scenario Estimate)

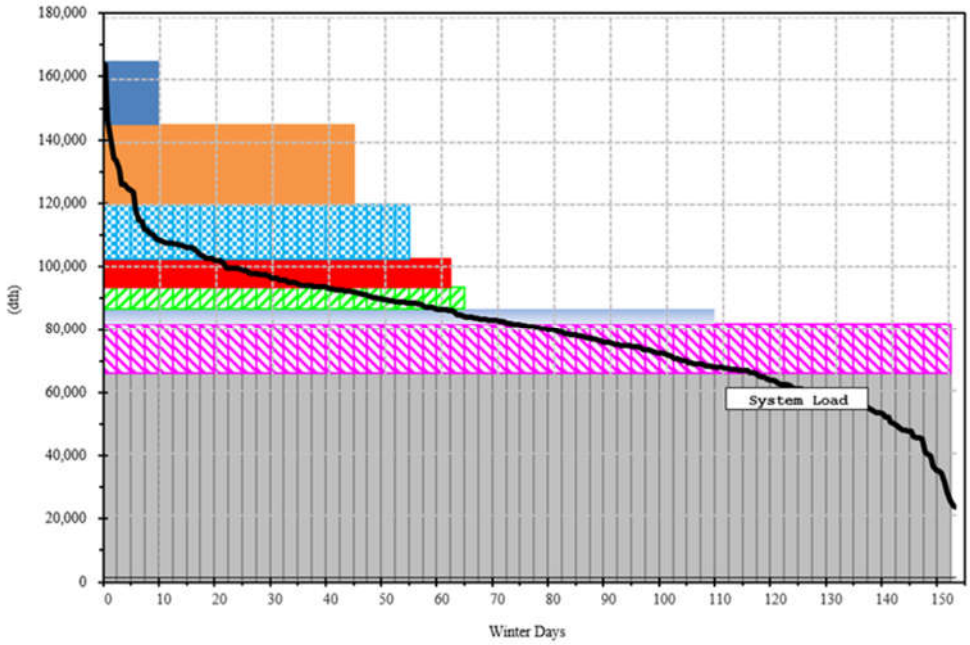
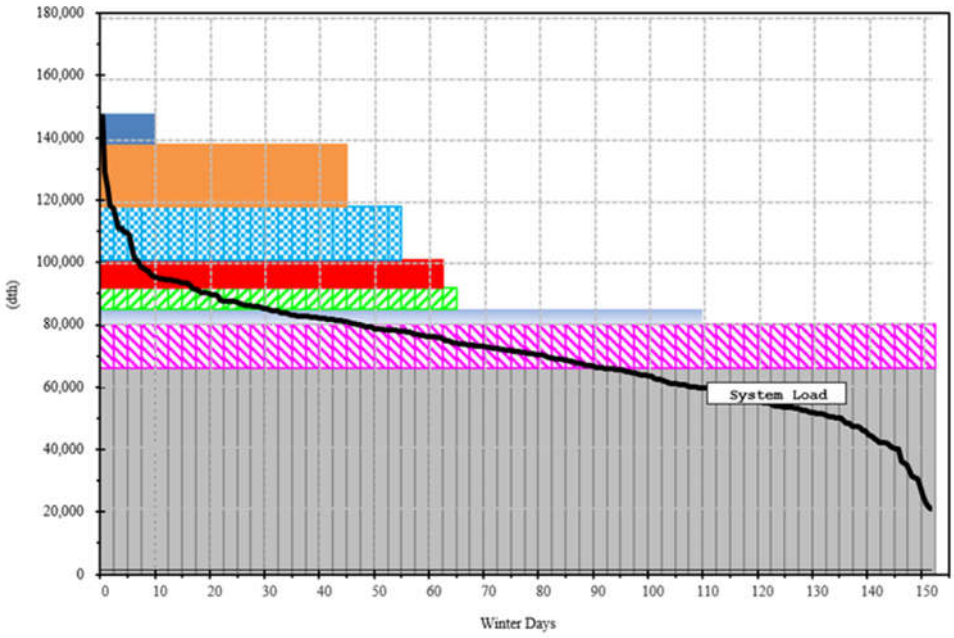


Figure 41: Central Hudson Natural Gas Supply Capacity & Load Duration Curve (Winter 2034-2035 NNI Scenario Estimate)



The NNI Scenario Year 5 and Year 10 hypothetical Load Duration Curves with superimposed supply capacities demonstrate that while the supply stack continues to meet customer requirements,

there is less utilization of each supply component in these estimated future year forecasts. Another observation is that the volume magnitude and duration of winter peaking contracts are less than present day needs, which will reduce customer cost burden. These Natural Gas Capacity & Load Duration Curves will provide the basis for implementing a future de-contracting strategy.

iii. De-contracting Strategy

After firm natural gas sales and peak demand decrease, Central Hudson will begin reducing its natural gas supply portfolio to match the changing needs of customers. While the Company is still in the planning stages of developing the methodology for unwinding or "retiring" portfolio assets, the process will look similar to, and be the inverse of, the process used to determine recommendations to increase natural gas supply portfolio firm transportation or storage services. This will include a combination of long-term natural gas sales and demand forecasts that demonstrate sustained lower levels of customers' natural gas consumption, combined with opportunities to reduce customers' cost burden, while retaining natural gas supply reliability, diversity, and affordability. The Company does not presently see any opportunities to eliminate firm natural gas transportation or storage assets for at least the next five years.

E. Other Planning Methodologies

i. GHG Accounting

Central Hudson currently reports GHG emissions under the US Environmental Protection Agency's Mandatory GHG Reporting Program, which requires various industries to report GHG emissions annually. For the natural gas industry, these regulations are found at 40 CFR Part 98, Subpart W. Under this program, gas distribution emissions sources are limited to mains, services, metering and regulating (M&R) stations, and certain types of combustion units; and there is a 25,000 MT CO2-e/year reporting threshold.

If approved by the Commission, Central Hudson will follow the approach to GHG accounting that is described in the Joint Utilities' December 1, 2022, Proposal for an Annual Greenhouse Gas Emissions Inventory Report[56] and the Joint Utilities' May 31, 2023, Supplement to Proposal for an Annual Greenhouse Gas Emissions Inventory Report.[57] The GHG Inventory Proposal and Supplemental GHG Inventory Proposal present a statewide framework each New York investor-owned gas utility plans to use to report on its GHG emissions. GHG emissions are estimated for the entire supply and delivery chain from gas production through gas consumption for all customers to provide a comprehensive understanding of the emissions associated with supply and demand.

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[56] 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").

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

Prior emission factors were based on the Central Hudson benefit-cost analysis framework approved by the Commission. The BCA framework relied on the EPA emission hub emissions factors for natural gas and CO2 emission factors.[58]

The emissions factors were updated to align with the approach to GHG accounting that is described in the Joint Utilities' December 1, 2022, Proposal for an Annual Greenhouse Gas Emissions Inventory Report and the Joint Utilities' May 31, 2023, Supplement to Proposal for an Annual Greenhouse Gas Emissions Inventory Report. The GHG Inventory Proposal and Supplemental GHG Inventory Proposal present a statewide framework each New York investor-owned gas utility plans to use to report on its GHG emissions. Specifically, the oil, propane, and gas emissions factors align with the NYSERDA report.[59] The electric emissions factors vary over time and are based on NYSERDA's projected emission factors for New York Grid Electricity.[60] Per the guidance in the documents noted above, Central Hudson used the annual average long-run emissions for downstate. The model relies on CO2 equivalent emissions, which include carbon, and the carbon equivalent emissions from methane (CH4) and nitrous oxide (NO2).

ii. Low-Carbon Fuels

Low-Carbon Fuels (LCFs) typically refers to RNG and clean hydrogen, although synthetic natural gas may be included in certain contexts. These LCFs offer the opportunity to significantly contribute to decarbonizing gas consumption, particularly for difficult-to-electrify customers. These fuels can enable material progress toward achieving New York's clean energy goals.

In preparation for integrating RNG into its system, Central Hudson contracted with a third-party expert to conduct a study of RNG potential within the counties that overlap its territory from various feedstocks utilizing anaerobic digesters. The study also estimated the GHG emissions reduction potential from RNG development. Based on the RNG production potential identified in this study from a 5-10 year horizon, it was estimated that RNG could offset 218,152 metric tons CO2e per year if fully developed and directed towards Central Hudson customers, taking into consideration the emission from feedstock transportation.[61]

As discussed in Section V, blending hydrogen into the gas stream is included in the GSLTP scenarios. Central Hudson has completed a Hydrogen Blending Study of a subset of its pipeline distribution systems to estimate the amount of hydrogen Central Hudson can blend without any pipeline modifications or reduction in loading. The analysis found that 72% of the systems that were studied can run hydrogen today with blends up to 20% hydrogen without any need for modification from a flow and pressure perspective on typical winter day. The systems that cannot currently support hydrogen have already been identified by previous traditional system studies that have identified reinforcements. The analysis found that gas velocity was the major limiting factor; however, the upgrades necessary to

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58 *See* Case 15-E-0302, *Proceeding on Motion of the Commission to Establish a Clean Energy Standard*, Order Adopting a Clean Energy Standard (August 1, 2016), p. 163.

59 https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Publications/Energy-Analysis/22-23-Fossil-and-Biogenic-Fuel-Greenhouse-Gas-Emission-Factors.pdf

60 https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Publications/Energy-Analysis/22-18-Projected-Emission-Factors-for-New-York-Grid-Electricity--Annex.xlsm

61 Guidehouse, Renewable Natural Gas Analysis, Final Report, Prepared for Central Hudson Gas & Electric, January 9, 2024. *See* Appendix E.

improve the velocity of a system are more economical than to improve the system pressure.[62] In addition, there may be specific opportunities to use hydrogen above the 20% level at targeted locations for certain C&I customers whose operations can accommodate higher levels of hydrogen.

In its previous rate case, Central Hudson received approval to conduct a Clean Hydrogen Feasibility Study. The objectives of the study are to identify portions of its distribution system where hydrogen blending activities could be successful and identify project sites that can utilize hydrogen for both gas heating and industrial process load. The goals of the Clean Hydrogen Feasibility Study include to: 1) study the feasibility of various industrial sites and determine the capability to introduce hydrogen production and blending equipment; 2) identify hydrogen project costs and benefits, and additional potential use cases; 3) identify the safety requirements for blending and transportation of hydrogen; 4) provide recommendations for the startup, operations, maintenance and monitoring for both pipeline facilities and customer equipment of a hydrogen blended network; 5) develop recommendations for gas quality monitoring; 6) develop the scope and size of a clean hydrogen production facility; 7) estimate GHG emission reduction benefits and any potential negative changes in the emission characteristics such as Nitrogen Oxide levels; 8) understand the challenges associated with installing and maintaining a hydrogen production system and blending equipment; 9) understand the siting constraints, technical and interconnection challenges, and overall scalability; 10) review operational and cost profiles of industrial electrification for industrial process of facilities identified in the study; 11) review of operational and cost profiles of thermal energy storage technologies for industrial process facilities that are the focus of the study. Central Hudson received recommendations from stakeholders in this GSLTP proceeding on this study, which the Company will take into consideration as it implements this study.[63]

Finally, Central Hudson received approval for utilization of RSG. RSG (which is distinct from RNG) is natural gas obtained from suppliers that proactively manage their methane emissions through an independent third-party measurement and certification to attest that the gas was produced under specified present day best practices for methane mitigation as well as present day best practices for other vital environmental categories, such as water use, land use or community engagement. The Company has determined through a recent pilot project that the procurement and distribution of RSG has a meaningful impact on reducing GHG emissions compared to traditionally sourced natural gas. Since the pilot project close-out, the Company continues to include the option for RSG in its' competitive supply RFPs and has purchased volumes of RSG at competitive prices. Further, the Company has received PSC approval in its 2023 rate case to separately consider and track the cost of certification when evaluating natural gas supply offers. This will allow the competitive RFP process to continue while supporting the methane reduction techniques being implemented by Producers. This will also allow for greater utilization of RSG in serving system gas loads with the intention of further reducing supply-related fugitive methane emissions.

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62 *See* Appendix D.

63 Topics include: potential operational challenges of hydrogen blending; opportunities to target hydrogen strategically for difficult-to-electrify end uses within Central Hudson's service territory such as medium and heavy-duty transportation, industrial processes, or electricity reliability; sensitivity analysis regarding hydrogen costs. *See* Central Hudon Reply Comments (filed October 23, 2024), pp. 10-11.

V. Decarbonization Scenarios

A. Model Overview

Central Hudson has taken a bottom-up approach to modeling the decarbonization scenarios and associated impacts on distribution planning, customer demand, and pressure drops. At a high level, the analysis included 4 principal steps:

1. **Analyze the Central Hudson territory-wide historical sales and customer growth patterns.** This information is used to understand the trends, absent interventions, for the Central Hudson system. It is designed to reflect what the expected gas consumption would be absent interventions to electrify heating and actively reduce carbon emissions.
2. **Evaluate each local gas system with 15-minute gas pressure data.** The analysis focuses on pressure data, which is critical for gas distribution planning to maintain safe and reliable operations. The objectives of local system assessment are to:
    - ✓ Quantify the relationships between weather and pressure drops.
    - ✓ Quantify the relationship between gas demand and pressure drops.
    - ✓ Identify highly loaded regions within the Central Hudson service territory.
    - ✓ Estimate location-specific growth rates for each local gas system.
    - ✓ Produce probabilistic 20-year forecasts of pressure drops and demand (flow) assuming no additional interventions occur. The baseline forecasts reflect pressure drops and

demand levels absent policies to electrify heating and absent new codes and standards. They are used to quantify the infrastructure investments and carbon emissions that would occur *absent* the interventions included as part of the GSLTP.

- ✓ Estimate the likelihood of need for growth-related distribution investments at each location.
- ✓ Estimate costs associated with reinforcing localized regions, absent interventions. These estimates reflect costs absent policies to decarbonize, electrify heating, and weatherize buildings.
- ✓ Calculate the location-specific avoided distribution costs associated with a decrease (or increase) of gas flow for each local gas system.
- ✓ Assess the overlap between highly loaded gas systems and corresponding electric grid components– circuit feeders, substations, and utility transmission areas– to understand the available capacity for electrification of heating.

3. **Estimate historical costs associated with new gas connections.** The objective is to understand the savings associated with avoiding additional connections to the gas system by residential and commercial customers.
4. **Model the energy, demand, and emissions reductions associated with each intervention and compare them to outcomes absent intervention.** This component of the study applies a dynamic, bottom-up tool. When user inputs are modified, granular results are updated. This allows Central Hudson to modify assumptions when Staff or stakeholders have questions. It conveys greater understanding of the implications of inputs and assumptions. Please see Appendix B for more information about the assumptions for each of the scenarios discussed below.

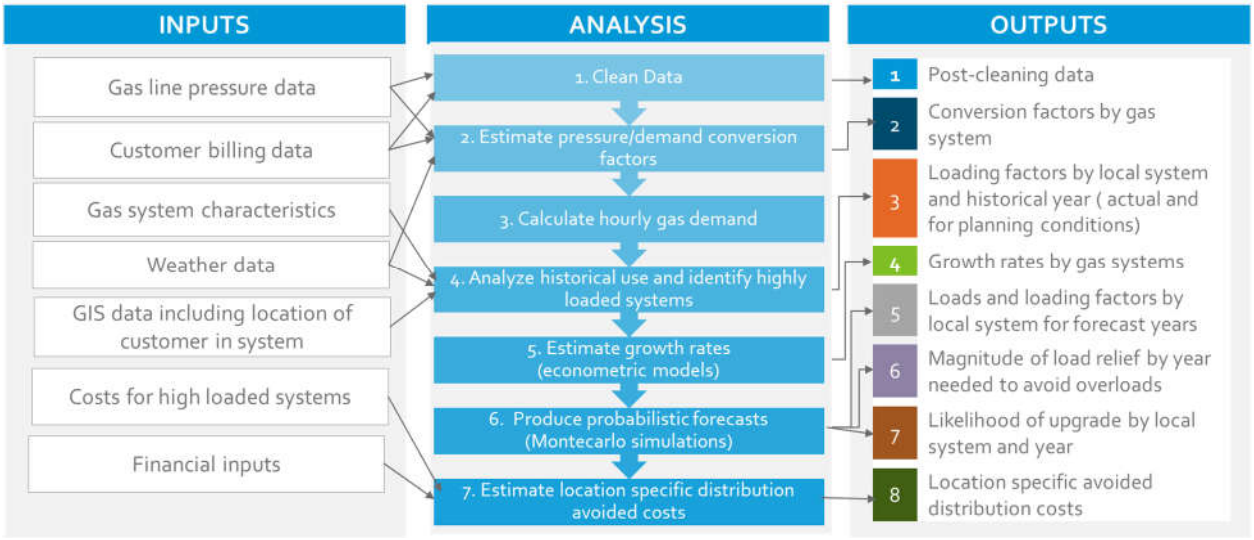
The model Central Hudson has used includes modules for beneficial electrification (heat pumps), energy efficiency (weatherization), hydrogen, and RNG. It also assesses impacts on rates and includes impacts on rates and customer bill impacts. The electrification and weatherization module includes a granular achievable potential study that produces results for the combination of 42 local gas systems, 18 customer segments, and 52 measures for each of the 20 years. It includes the ability to modify variables such as budgets, set incentives, modify technology cost curves, assess the impact of incentives of heat pump and energy efficiency adoption rates, produce adoption curves with and without incentives, implement cost-effectiveness screening, and produce supply curves. It also assesses impacts on rates and customer bill impacts.

One of the most important inputs is whether or not budgets are capped. The model can accommodate a pre-specified budget (with inputs in a different tab), elect an unlimited budget, or set a threshold for portfolio cost-effectiveness, in which case the model selects the beneficial electrification and energy efficiency measures until the portfolio cost-effectiveness threshold is met. Currently, the model is capped. It elects measures from most to least cost-effective as long the portfolio is cost-effective. This leads to more cost-effective outcomes but less gas savings. In developing the scenarios for this GSLTP, the Company currently models parameters to keep costs at reasonable levels.

Central Hudson has incorporated data analysis from the electric Distribution System Implementation Plan (DSIP) where and when possible and will continue to refine the integration of gas and electric planning studies. A key feature of the Central Hudson model is the ability to quantify the

impact of policy changes on pressure drops and the likelihood of the need for distribution reinforcements. Figure 42 provides an overview of the local gas system analysis.

Figure 42: Overview of Local Gas System Analysis



Central Hudson's approach to gas system modeling and the scenarios it has evaluated in this GSLTP are informed by several key features of its service territory and distribution system. These include the composition of customers and sources of demand, and the geographic regions in the gas system that experience the highest demand in relation to capacity (*i.e.*, "loading").

As discussed in Section III, above, a large proportion of the total annual demand for gas in the Company's service territory is concentrated among a very small proportion of customers. (See Figure 10, which shows that large transportation and interruptible customers account for approximately 40% of Central Hudson's sales. The Company has fewer than 40 such customers.) This suggests that achieving material reductions in gas sales and associated carbon emissions will require measures that either specifically address the transition of industrial load or that provide compelling incentives for a significant population of customers to pursue alternatives (*e.g.*, electrification).

Additional details on planning specifications that apply to each scenario can be found in Appendix B.

B. Scenario Overview

Central Hudson has developed four scenarios: a Current Clean Agenda Scenario that reflects the current legal and policy framework and three additional scenarios. A description of each of the four scenarios is presented below. The Company has worked with Stakeholders on adjusting and updating each scenario's assumptions as the GSLTP process progressed. For instance, the level of incentives drives the rate of electrification in all of the scenarios. If those incentives are increased, electrification will increase. In some instances, forecasted performance for the modeled scenarios are compared to a "Historic Trend" trend, which is an estimate of performance for a given metric based on historical data and historical initiatives and funding levels (*i.e.*, no incremental interventions). The historic trend

forecasts do not incorporate higher funding levels for 2024-2026 or yet-to-be-enacted policies such upcoming building codes for heat pumps.

i. Current Clean Agenda (*i.e.*, current policy/statutory framework)

The Current Clean Agenda Scenario reflects the legal and policy framework that applies today at current funding levels. It presents the expected trajectory for the gas system (in terms of customers, footprint, volumes, *etc.*) that can be projected under current policies that apply to the gas system, including investments the Commission has approved. This is the Company's current base case which includes substantial decarbonization actions.[64] Under these assumptions, customer growth will continue as described in further detail below. The Current Clean Agenda Scenario assumes that gas business or market transformations that occur naturally during the next two decades reflect the current set of laws that direct Central Hudson's investments and operations, and the existing funding mechanisms for energy efficiency programs (*i.e.*, heat pump incentives). It reflects a higher level of investment in clean heat and weatherization than in the past and incorporates not-yet-enacted policies such as code requirements for heat pumps for new buildings. RNG and hydrogen will be integrated into the supply portfolio to the extent they are cost-competitive with conventional natural gas resources. The Current Clean Agenda Scenario assumes continuation of Central Hudson's Clean Heat and energy efficiency programs while recognizing ongoing shifts in energy efficiency policy in the state, including an increased emphasis on weatherization programs.

ii. CLCPA Approach Scenario

The CLCPA Approach Scenario generally incorporates programs and policies that Central Hudson expects will be needed to meet the economy wide GHG reductions envisioned in the CLCPA, though this does not seek to achieve a specific level of emissions reductions for the gas utility sector. The CLCPA Approach Scenario entails doubling (2x) heat pump incentives to convert current customers to the electric system. It relies on technological advancements (*e.g.*, improvements in the economics of ground source heat pumps, a decline in heat pump system costs, *etc.*) and a system-wide transition approach rather than one targeting specific regions within the Company's service territory. It also assumes efforts progress in incorporating hydrogen (5% by 2043) and renewable gas (5%) into the supply mix. It also caps new connections starting in 2026.

Each of the scenarios the Company has evaluated requires deep collaboration among gas and electric system planning organizations within Central Hudson. The electric system has sufficient capacity to accommodate projected winter peaking loads over the next five to ten years but would experience overloads thereafter. As a result, the CLCPA Approach Scenario will require a large investment in the electric transmission and distribution system to support incremental electric load and provide assurances of safe, reliable, and resilient service, including upsizing poletop and pad mount transformers and reinforcing circuit feeders, substations, and the utility transmission system (69-115kV).

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[64] The CCA Scenario is a "business-as-usual" scenario. Central Hudson has given the scenario a different name in this GSLTP because it does not believe the common industry usage of business-as-usual accurately reflects what is included in its the forecast. The CCA Scenario includes decarbonization at current funding levels while the other three scenarios rely on additional funding.

iii. No New Infrastructure (i.e., GSLTP Pathway)

The No New Infrastructure (NNI) Scenario (which the Company selects as its GSLTP Pathway) represents the profile of the gas system under policies that prevent growth-related investment in the gas system. Note, however, that the NNI Scenario does not entail the elimination of capital spending altogether: under any scenario Central Hudson will continue to make the investments necessary to ensure that safe and reliable gas distribution service remains available to customers that continue to rely on the system. This includes infrastructure investment needed to address safety and reliability in highly loaded segments of our system.

Efforts to limit capital investment in gas infrastructure will be supported by an assertive effort to identify highly loaded areas and develop NPAs where possible, consistent with State policies (pertaining to, *e.g.*, NPA suitability, benefit cost analyses for alternatives to traditional infrastructure, *etc.*). It includes an up to five-fold increase in incentives for heat pumps and weatherization in local gas systems that are highly loaded and caps new connections starting in 2026. In addition, energy efficiency and building electrification program design will emphasize decarbonization through electrification. Electrification-oriented incentives will focus on targeted areas of the system where load presents challenges and would otherwise require infrastructure investments to meet safety and reliability requirements.

iv. Pipe Use Transformation

The Pipe Use Transformation (PUT) Scenario features a focused transition of Central Hudson's gas supply resources to the extent feasible, safe, and practicable. Conventional natural gas resources will be displaced with alternative, low-carbon fuels (LCFs) that will produce a net reduction in GHG emissions to a greater focus than other scenarios. Central Hudson will continue to pursue the integration of RNG, including in situations in which RNG interconnections prevent the need for investments in distribution infrastructure. Green hydrogen will be blended with conventional supply resources in a manner consistent with safety and reliability guidelines (i.e., at an expected level up to 20% of the gas stream by volume). In addition, the scenario assumes increased use of RNG (20% by 2043) from feedstock and livestock.[65]

The PUT Scenario includes the same concerted and targeted effort to identify highly loaded gas systems and target resources to avoid infrastructure upgrades as in the NNI Scenario. Clean electricity and LCFs will be used to contribute to the State's economy-wide GHG emissions goals. The PUT Scenario also envisions the use of existing pipeline infrastructure to help decarbonize industrial facilities that currently rely on more carbon intensive fossil fuels such as oil and propane. This scenario provides the most emissions savings as it builds on the assumptions from the NNI Scenario.

C. Central Hudson's Selection of the NNI as the GSLTP Pathway

Central Hudson plans to pursue the NNI Scenario as its GSLTP Pathway. This scenario has evolved over the course of this GSLTP cycle of the GSLTP development process (*i.e.*, from the Initial to the Revised GSLTP, and now to this Final GSLTP), based on stakeholder input concerning the refinement of modeling features. The promotion of the NNI Scenario reflects engagement and alignment with the Company's broader planning efforts across both its electric and gas operations.

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[65] Note that the CLCPA Approach Scenario and the NNI Scenario also include some levels of RNG and hydrogen but substantially less than the PUT Scenario.

The NNI Scenario builds on New York State's current policies and uses enhanced incentives in targeted areas to achieve cost benefits. Implicit in selecting the NNI Scenario as the GSLTP Pathway is Central Hudson's approach to accelerate efforts beyond what can be achieved under current programs and existing policies.

Some aspects of the NNI Scenario will be pursued outside of this GSLTP proceeding and, potentially, following the end of this planning cycle. That is, several decarbonization actions and policies will be proposed, processed, approved, and funded in other proceedings that support and reflect the objectives of the GSLTP Pathway.

i. Key features of the GSLTP Pathway

Key features of the GSLTP Pathway include:

1. **Limiting Capital Investment in Gas Infrastructure** supported by efforts to identify highly loaded areas and develop Non-Pipeline Alternatives (NPAs) where possible, consistent with State policies.[66]
2. **Increased Incentives for Heat Pumps and Weatherization**: 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.
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.

ii. Development and Assessment of the Scenarios Evaluated in the GSLTP

Central Hudson's assessment of the alternative GSLTP scenarios was instrumental in selecting the GSLTP Pathway.

- **CCA**: While cost-effective, the trajectory of emissions reductions under existing policies, as illustrated in the CCA, would not adequately support achievement of CLCPA targets.
- **CLCPA**: This approach does not involve targeted incentive deployment, indicating that it would not be an optimal plan. In addition, it could lead to an inequitable distribution of benefits based on customer access to existing programs.
- **PUT Scenario**: Greater reductions in greenhouse gas (GHG) emissions are possible under the PUT Scenario, but these reductions come at a significant cost. This is, in part, due to a concerted focus on LCFs that do not have proven economics at this time.

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[66] Central Hudson notes that its commitment to limiting capital investment where possible will not diminish the Company's intent to satisfy all statutory obligations to provide safe and reliable service to customers throughout its service territory. This includes the possible need to reinforce the system in limited circumstances to ensure the Company can meet its public service mandates.

Central Hudson notes that an upcoming hydrogen study the Company is pursuing will provide additional insights into the feasibility of deploying these fuels at scale. Central Hudson will consider 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.

Figure 43: Benefits and Strategies of Central Hudson's GSLTP Pathway

Key Benefits of the GSLTP Pathway	Strategies for Supporting the GSLTP Pathway
1. **Supports the goals of the CLCPA.** 2. **Maintaining Safety and Reliability**: Ensures the safety and reliability of the gas system. 3. **Synergies with the PUT Scenario**: Achieves GHG emissions reductions and customer cost savings in a more incremental way. 4. **Smart Decision-Making**: Defers capital investments by making smart decisions at the right time and locations. 5. **Avoiding Infrastructure Reinforcements**: Lowers rate pressure and increases affordability. 6. **Prioritizing Electrification Investments**: Works in tandem with the Company's electric planning. 7. **Significant GHG Emissions Reductions**: Achieves substantial reductions in GHG emissions.	1. **NPA Program**: A first-of-its-kind pilot to align and test concepts from the NNI Scenario. 2. **Targeted NPA Solutions**: For gas transmission services and isolated leak-prone services.[67] 3. **Conservative Approach to RNG and Hydrogen**: Continued through an upcoming study. 4. **Near-Term Actions**: Lowering methane emissions from the gas system. 5. **Modeling Program**: Supporting funding requests and tying budget forecasts to GHG emission reductions utilizing the GSLTP statistical model.

iii. Proceedings with GSLTP Pathway Opportunities

Many aspects of the GSLTP Pathway are being proposed and/or implemented through Central Hudson programs and Commission proceedings outside the scope of this proceeding. Key examples of programs that will be critical to achievement of the GSLTP Pathway's potential benefits include Central Hudson's Clean Heat Program, Energy Efficiency Program, NPA Program, and pending and future rate cases. See Figure 44, below, for a selection of venues in which Central Hudson plans to pursue the GSLTP Pathway.

Figure 44: Opportunities to pursue the GSLTP Pathway, external to the Gas Planning Proceeding

- Clean Heat Program
- Energy Efficiency Program
- NPA Program – Transportation Mode
- NPA Program - Pilot
- NPA Program – Transmission Services
- NPA Program – Leak Prone Isolated Services
- Hydrogen
- RNG – Targeted Use and New Cost
- RSG
- UTENs

[67] See Appendix C and Section IV.C.iii.

D. Modeling Assumptions/Inputs

The subsections that follow illustrate the key assumptions that inform expected future Central Hudson gas system performance in key areas (*i.e.*, outputs), which are described below in subsection E of this Section V. More detailed descriptions of the planning scenario specifications can be found in Appendix B.

i. Heat Pump and Energy Efficiency Incentives

There are multiple sources of incentives in the form of rebates and tax credits. Based on Clean Heat program data, the average air source heat pump and ground source heat pump projects cost approximately $18,000 and $48,000, prior to incentives. The Central Hudson rebates are based on the heating capacity, as measured by 10 kBtuh. For context, 10 kBtu is enough capacity for roughly 400 square feet of living space. Central Hudson currently offers incentives exclusively for whole-home load projects that comply with the NYS Clean Heat program criteria, which include the use of a Manual J calculation and the installation of cold-climate heat pumps. In addition, roughly 40% of participants opt for the higher incentives available for decommissioning the existing fossil heating fuel source. Overall, in the most recent two years, Central Hudson rebates have covered roughly 15% of the total project costs. The funds currently authorized to support Central Hudson's Heat Pump Program[68] are projected to exhaust by mid-2025, although it is anticipated that an order from the Commission's on the Company's 2026-2030 EE/BE Proposal will authorize additional funds for use through 2030.

The federal tax credits are available as a tax refund and are capped at $2,000 per heat pump. They are in effect through 2032 and, thus, were modeled through 2032. The Inflation Reduction Act (IRA) also included funds for electrification of low and medium income households. While the incentives are generous, the funds are limited and are expected to be exhausted within a few years of the 20-year planning horizon. A total of $317.4M was awarded to New York. If allocated proportionally based on the number of households, roughly $2.8M in additional funding would be anticipated for LMI households with gas service in Central Hudson's territory. Depending on the average size of rebates, the additional funds should help electrify between 300 and 600 households in Central Hudson's gas service territory.

Figure 45: Summary of Current Incentives

Source	Air Source Heat Pump	Ground Source Heat pump	Heat Pump Water Heater
Central Hudson (Current)	• $1,000 per 10kBtuh of heating capacity if the fossil heating fuel source is removed • $700 per 10kBtuh of heating capacity if	• $2,000 per 10kBtuh of heating capacity • Up to $500 of total incentive may be allocated to the contractor	• $1,000 rebate per water heater

[68] Central Hudson's combined authorized total budget of $68.4M from the NE:NY Proceeding, Order Approving Funding for Clean Heat Program (issued and effective June 23, 2023) and Order Authorizing Utility Energy Efficiency and Building Electrification Portfolios Through 2025 ("2020 NENY Order") (issued January 16, 2020), Appendix C.

Source	Air Source Heat Pump	Ground Source Heat pump	Heat Pump Water Heater
	advance controls are installed • $500 per 10kBtu of heating capacity if the fossil fuel heating source is not removed. • Up to $500 of total incentive may be allocated to the contractor for decommissioning projects; Up to $300 available to contractor for non-decommissioning projects		
Federal Tax Credits	• Up to 30% of total costs for residential, but with caps for individual components • $2,000 cap for heat pumps • $1,200 cap for home envelope improvements • Utility rebates are subtracted from total cost calculations • Valid through 2032		
Federal Rebates for low and medium income (Administered by States)	• Customers with 80% or less of the Area Median Income are eligible for the full amount. • Customers with income between 80%-150% of the Area median income are eligible for half the amount. • Area median income defined by HUD: https://www.huduser.gov/portal/datasets/il/il24/Section8-FY24.xlsx • IRA allocated $8.8 billion of funding nationwide, of which $317.4M was awarded to New York. • Heat pump for Space Heating or cooling - $8,000 cap • Heat pump water heater - $1,750 cap • Electric Cooking or Heat pump clothes dryer - $840 cap • Panel upgrades - $4,000 cap • Electric wiring - $2,500 cap • Insulation, Air Sealing, Ventilation - $1,200 caps		
State	• $300 New York State tax credit	• 25% of installation expenses (up to $5,000) for residential only	N/A

(a) 10 kBtuh of heating capacity is sufficient for approximately 400 sq ft.
(b) As of mid-2024, approximately 40% of Central Hudson participants in the Clean Heat Program opt to decommission their fossil heating fuel source.

The base incentive levels are modeled to decline gradually as the heat pump market share matures. Except for the CCA Scenario, each of the scenarios assumes funding for incentives three times

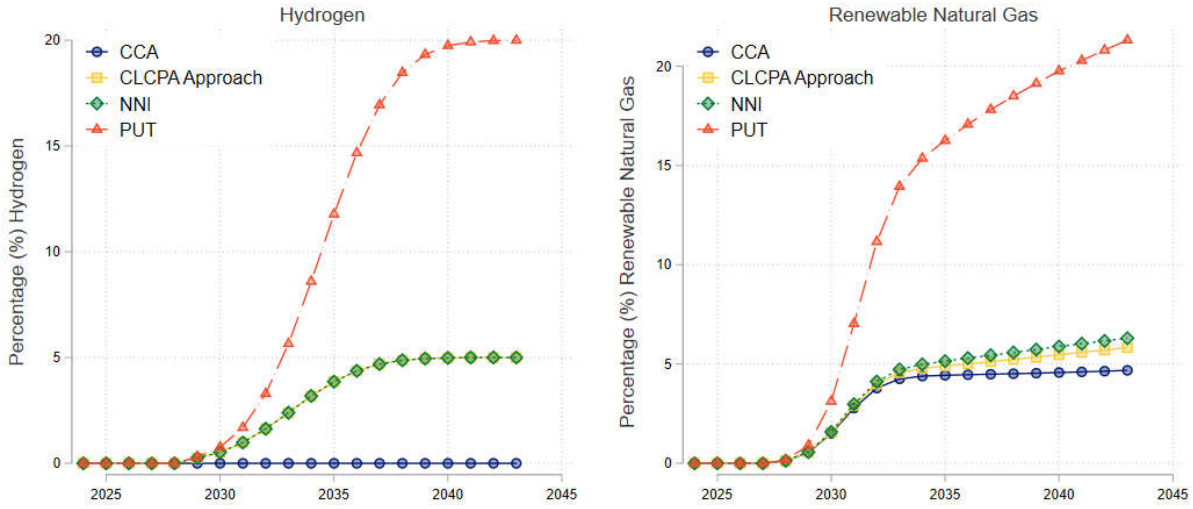
(3x) higher than the currently available incentives. Thus, incentives are modeled to cover roughly 45% of the total costs in the early years. In addition, the NNI and PUT scenarios assume that even higher incentives, up to 5x current levels, are funded for highly loaded areas where load decreases can help reduce the risk of infrastructure upgrades.

ii. Composition of Gas Commodity

Assumptions concerning the introduction and accelerated use of low-carbon fuels (*i.e.*, hydrogen and RNG) are presented in Figure 46, below. The PUT Scenario assumes that hydrogen is initially introduced in 2028, with steady increases to a peak level of 20% of the gas stream by 2040. It is conventionally believed that utilities can only safely blend hydrogen up to this 20% threshold using available pipeline technologies. Even if targeted pipeline retrofits were to be made, Central Hudson assumes that current consumer end-use appliances will not be able to handle hydrogen content above 20% (by volume) in the gas stream.[69] However, pursuant to the Central Hudson hydrogen study discussed above, the percentage of hydrogen that could be blended into the system may be higher than 20% in some instances like if a blending station is near a specific customer. There may be specific opportunities to use hydrogen above the 20% level at targeted locations for certain customers whose operations can accommodate higher levels of hydrogen.

The CLCPA Approach and the NNI Scenarios also reflect a similar, albeit more muted, assumption pertaining to Hydrogen. Both scenarios assume that hydrogen will reach a peak level of 5% of the gas stream by 2040.

Figure 46: Hydrogen in the Gas Stream (2024-2043)



Central Hudson assumes that RNG is deployed in the Current Clean Agenda, NNI, and CLCPA Approach Scenarios at levels at which RNG remains cost-competitive with conventional natural gas resources. RNG is introduced to the system beginning in 2028 and ramps to a sustained maximum level

[69] Some manufacturers are designing consumer end-use products that can accommodate higher levels of hydrogen beyond 20%.

of 25% of the assessed Central Hudson RNG potential level[70] by 2034. The PUT Scenario assumes a greater emphasis on LCFs in general, including RNG. The PUT Scenario assumes RNG is introduced in 2028 and reaches a maximum of 75% of the assessed Central Hudson RNG potential level by 2036.

iii. Customer Counts

Current modeling includes assumptions regarding customer attrition following retrofits to electric space heating technologies. While there is limited empirical data to rely on in making these estimates, as described in Section IV.C.iii, above, the Company reviewed two main sources of data to develop assumptions: (1) data for sites that participated in the Clean Heat program and installed whole home heat pumps between 2020 and the end of 2023; (2) data from pro-active efforts by Central Hudson to strategically abandon leak prone pipe segments when cost-effective. According to this data, 97.7% of gas customers who adopt full load cold climate heat pump systems retain their gas service, and 2.3% discontinue gas service (i.e., while retaining electric service).

The account forecast absent interventions is detailed in Section IV.B, above. Customer account growth is lower in the reference forecast for all of the GSLTP scenarios, reflecting the changes in codes and standards and the efforts to convert customers from oil to electric rather than gas for fuel heating. The NNI, CLCPA Approach, and PUT Scenarios restrict the deployment of growth-related capital, meaning that customer accounts are prevented from increasing in highly loaded regions of the Central Hudson system.

Industrial account change occurs much more slowly. Central Hudson assumes for this GSLTP analysis that 263 industrial customers will remain on the system in all years, for all scenarios.

iv. Other Independent Variables Used in Modeling

Central Hudson's scenario evaluation methodology is extremely flexible, enabling customization of many market and system configuration features. Other input specifications that drive model outcomes are addressed in greater detail in Appendix B.

E. Comparison of Modeling Results by Scenario

i. Net Sales

The trajectory of sales under each of the GSLTP planning scenarios is illustrated in Figure 47, below. Note that net sales under the Current Clean Agenda, NNI, and CLCPA Approach Scenarios are expected to remain relatively stable in the near/immediate term before declining as efficiency and electrification programs reach maturity. Figure 48 summarizes the drivers of the change in net sales. Residential sales plummet dramatically in all of the scenarios, whereas saving from non-residential sites are smaller, despite accounting for over 60% of current sales. The biggest contributor to reduction in gas sales is heat pump programs followed by codes and standards (also targeting heat pumps). The impact of codes and standards is diminished due to the lower forecasted growth of households and accounts in the future.

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[70] *See supra*, note 61.

Figure 47: Net Sales (MCF, thousands) for GSLTP Scenarios (2024-2043)

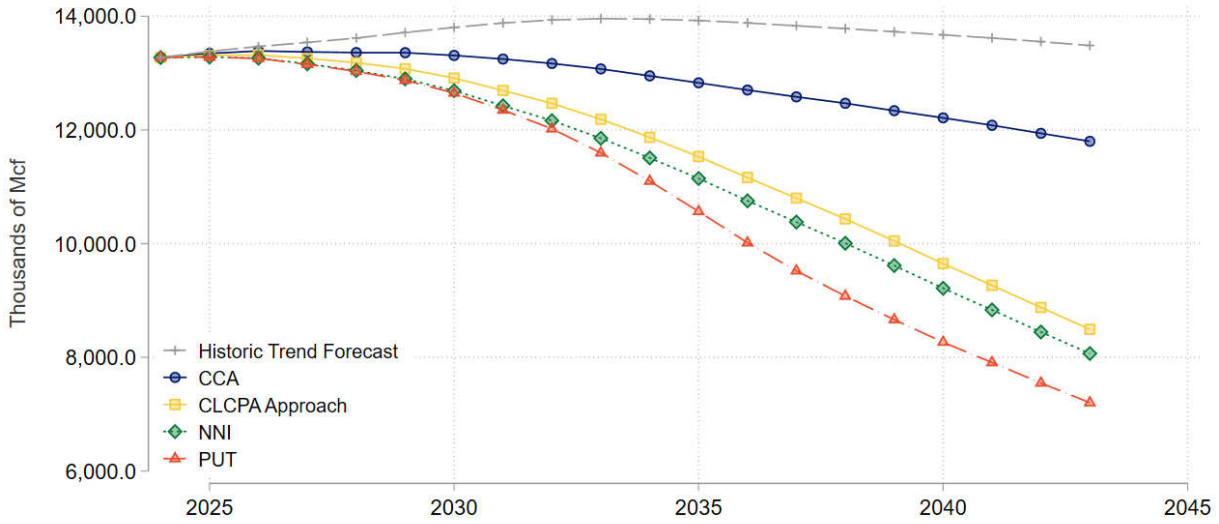
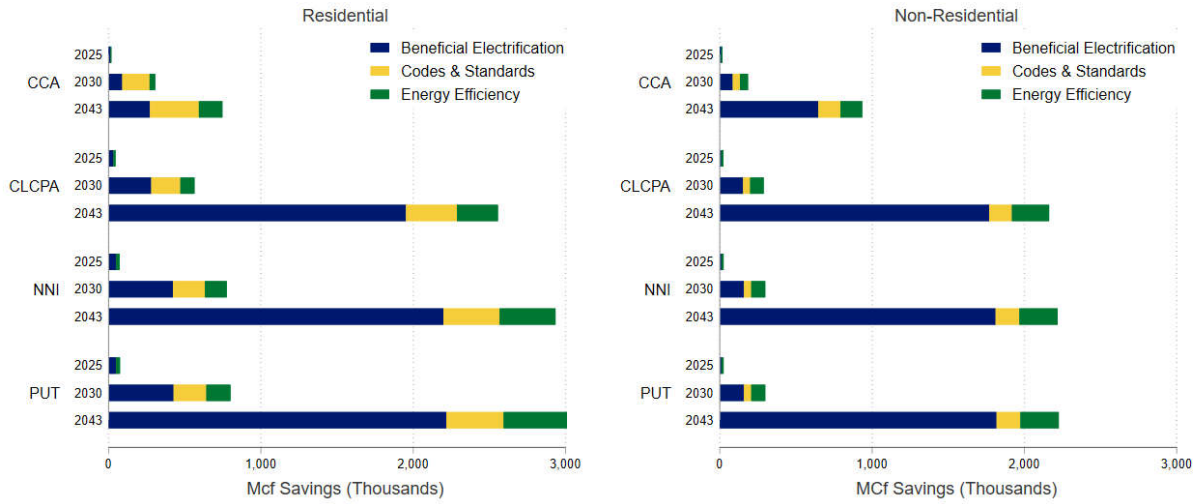
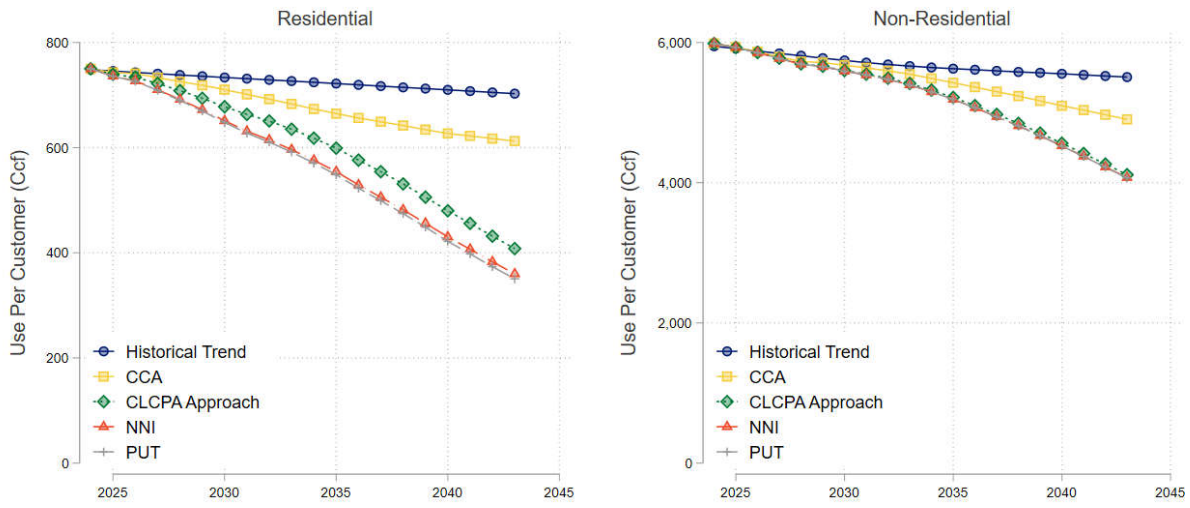


Figure 48: Drivers of Change in Net Sales (CCF) for GSLTP Scenarios (2024-2043)[71]



[71] "Codes & Standards" refer to building codes and appliance standards that require minimum standards for new equipment. For example, starting in 2026, all new residential construction requires the installation of heat pumps.

Figure 49: Use per Customer (CCF) for GSLTP Scenarios (2024-2043)



ii. Peak Demand

Peak demand is projected to continue to decrease in all scenarios, as illustrated in Figure 50 and Figure 51, below.

Figure 50: Peak Hour Demand (Mcf/hr) for All Scenarios (2024-2043)

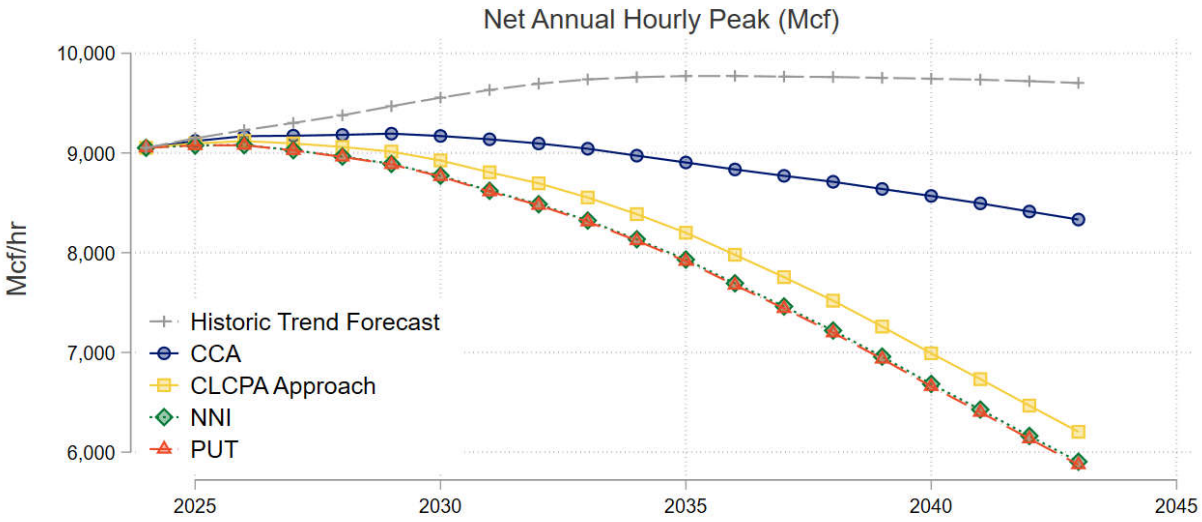
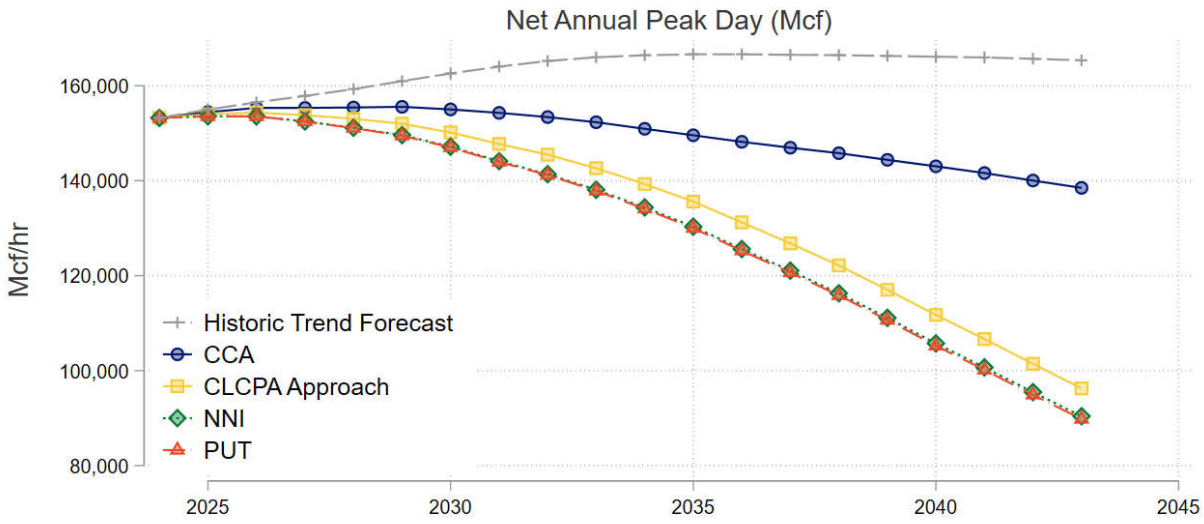


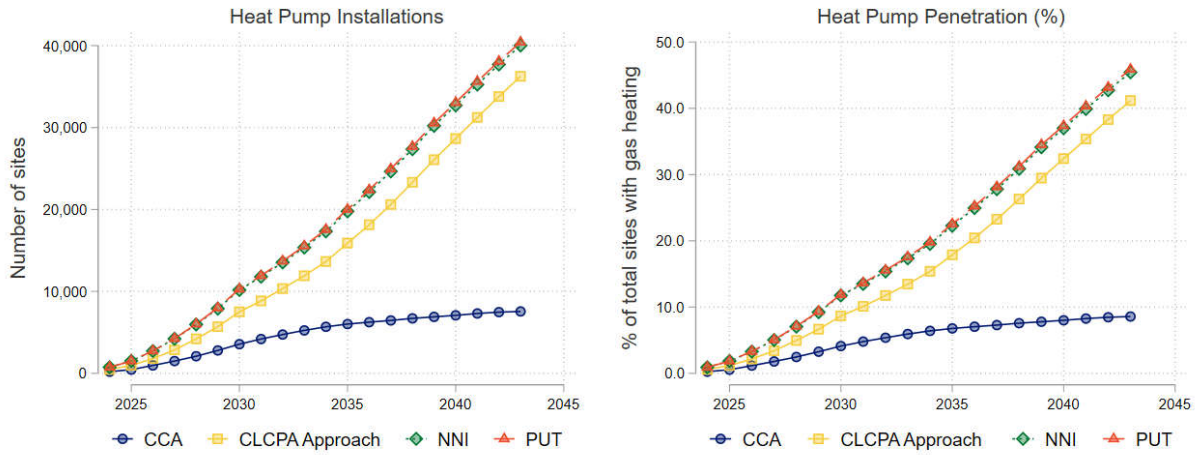
Figure 51: Peak Day Usage (MCF/Day) for All Scenarios (2024-2043)



iii. Heat Pump Penetration Level

Central Hudson modeled heat pump penetration levels for each planning scenario as illustrated in Figure 52, below. The figure shows the penetration levels for space heating heat pumps among existing and expected gas accounts, absent the GSLTP scenario interventions. Heat pump penetration is expected to reach up to 50% of residential sites by the end of the 20-year period under the most aggressive planning scenarios.

Figure 52: Heat Pump Installations and Penetration Levels (2024-2043)



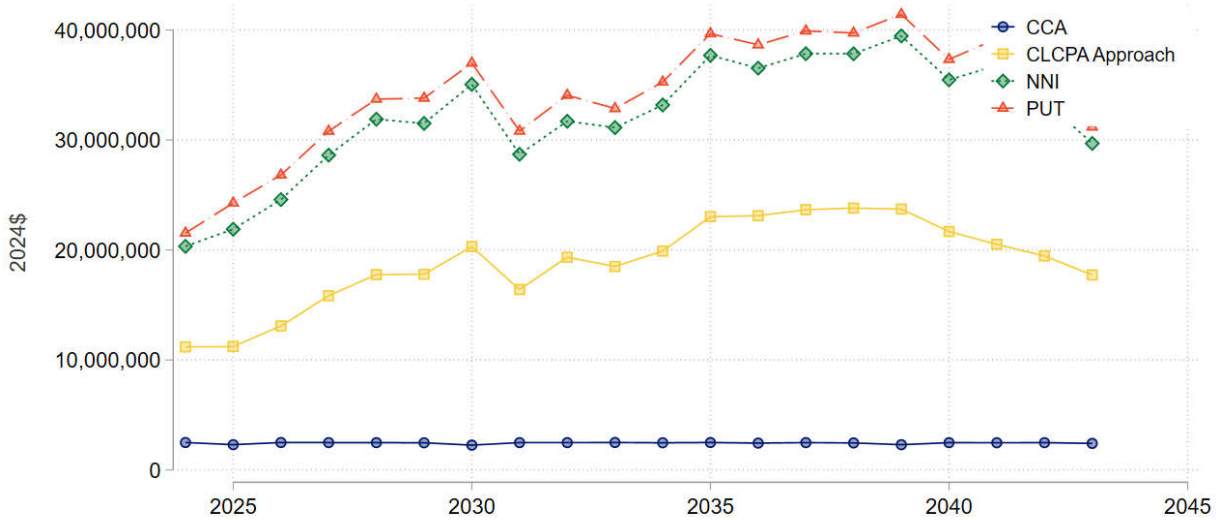
Some Multi-family is commercially owned and can have multiple dwellings.
Thus, the estimate may undercount dwellings

iv. Heat Pump and Energy Efficiency Funding Requirements

Annual heat pump and energy efficiency incentive funding, illustrated in Figure 53, is modeled to increase through 2032 to stimulate installation of building electrification systems. Funding is then

assumed to moderate before settling into a plateau as heat pump penetration approaches its peak levels. As Figure 53 indicates, incentive funding is highest for the PUT Scenario. The scenarios feature targeted incentives in regions of the gas system that experience the highest loading (i.e., to mitigate or eliminate the need for growth-oriented investment). The NNI Scenario has the most significant targeting of incentives to remain consistent with meeting the Gas Planning Order's requirement that the Company evaluate a scenario with no growth-related infrastructure investment.

Figure 53: Annual Heat Pump and Energy Efficiency Incentive Funding Levels (2024-2043)



v. GHG Emissions

Central Hudson continues to achieve CO2-equivalent emissions reductions, building on the momentum the Company has established through its existing energy efficiency and Clean Heat programs. The CLCPA Approach, NNI, and PUT Scenarios' reductions separate from the CCA reductions in approximately 2028, when low-carbon fuels (specifically hydrogen) begin to displace conventional natural gas in the supply mix. The PUT Scenario's acceleration is most pronounced, consistent with its progressively higher proportion of hydrogen and renewable natural gas in the fuel mix. Total emissions are presented in Figure 54. Annual and cumulative emissions reductions are depicted in Figure 55 and Figure 56.

Figure 54: Annual CO_2e Emissions as Percentage of 1990 Levels

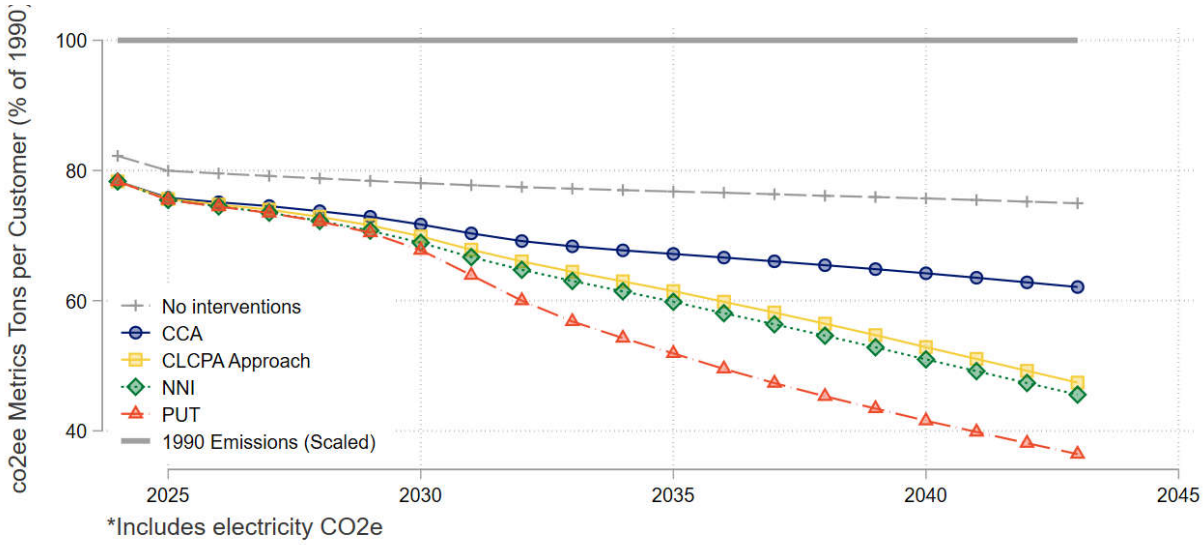


Figure 55: Calendar Year CO_2e Emissions Reductions from a 2024 Baseline

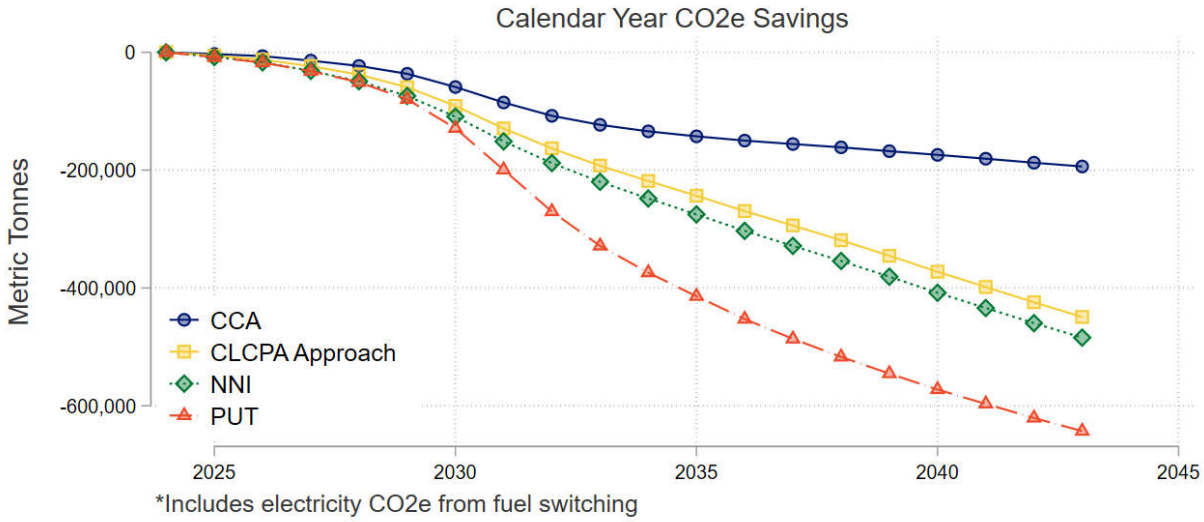
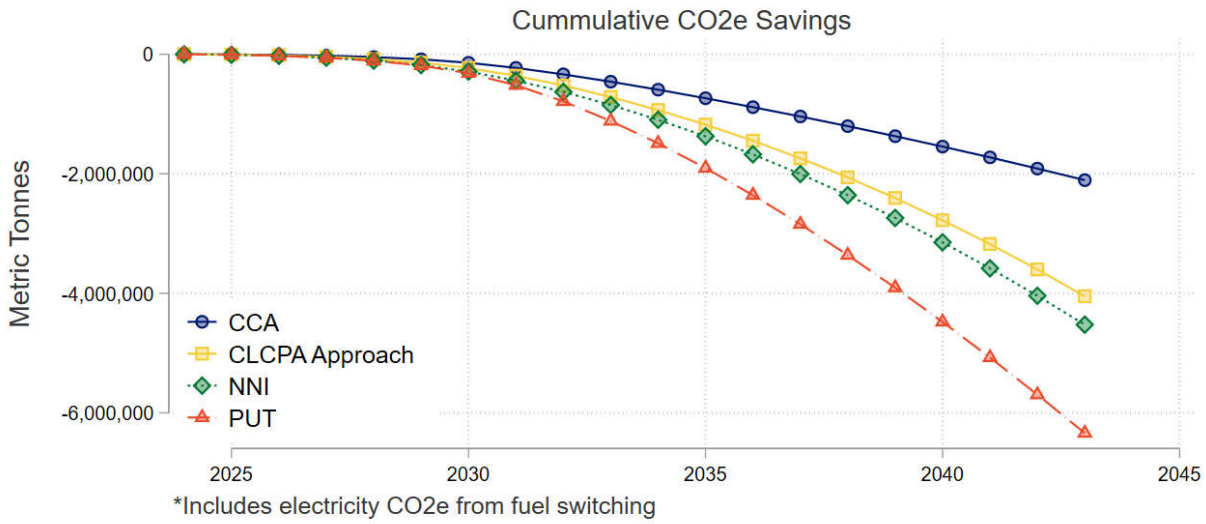


Figure 56: Cumulative CO_2 e Emissions Reductions (2024 Baseline)



vi. Impact on Local Gas Systems

The higher penetration of heat pump technology and weatherization is expected to limit or reduce demand for local gas systems, which, in turn, reduces the magnitude of pressure drops and the need for growth related gas system reinforcement. In practice, the exact trajectory of growth is uncertain, especially over 20 years. Thus, Central Hudson adopted a probabilistic approach to measure the likelihood of the need for local gas system upgrades on a year-by-year basis for each scenario. In addition, both the NNI and the PUT Scenarios incorporate higher incentive levels at locations that are highly loaded.

For each local gas system, the analysis estimates how scenario assumptions impact the likelihood of distribution reinforcement upgrades over time (Figure 57). An advantage of this approach is that it enables Central Hudson to quantify avoided capital costs based on the change in probability, while factoring in the inherent uncertainty in a 20-year forecast.

Figure 57: Example of Change in Upgrade Probability for a Single Location

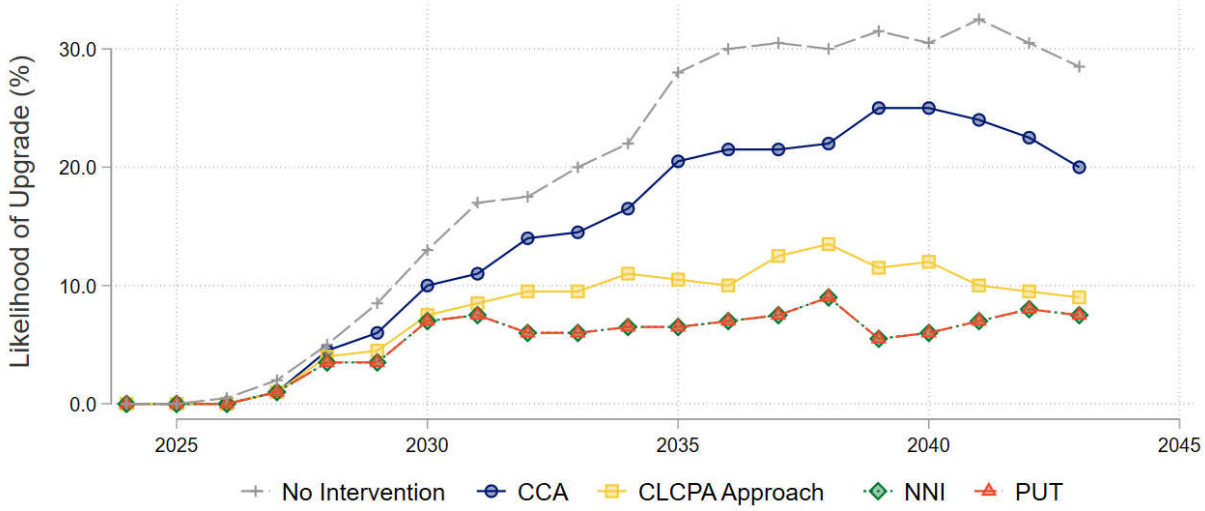
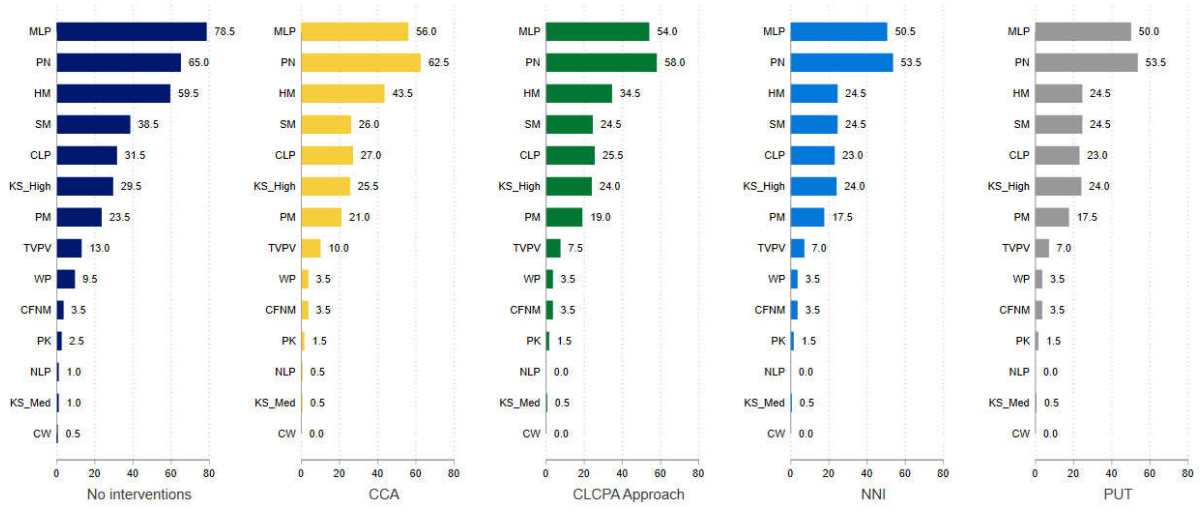


Figure 58 provides a ten-year outlook (*i.e.*, through 2033) on the likelihood of the need for upgrades for specific portions of the Central Hudson system under the policies and funding levels that apply to each planning scenario.

Figure 58: Probability of Need for Distribution Infrastructure Upgrades to Maintain Safe and Reliable Service (2024-2033)



vii. Impacts on Capital Costs

The investments in electrification and a cleaner heating fuel mix have a measurable impact on the gas capital costs. Figure 59 shows the expected year by year capital costs for each scenario and

Figure 60 shows the reduction in capital costs compared to the reference, or historical trend scenarios. Approximately one third of the reduced capital costs are from reduced new customer connection costs and two thirds are from reduced costs associated with growth-related distribution cost reinforcements. In addition, there is a small increase in capital costs associated with hydrogen blending stations. The capital costs lead to lower delivery revenue requirements, which in turn affects delivery rates and customer bills. However, 20-year capital plans are not routine and are highly uncertain. The below projections will need to be refined and updated as implications of electrifying heating become clearer.

Figure 59: Projected Gas Capital Costs by Scenario ($2024 M)

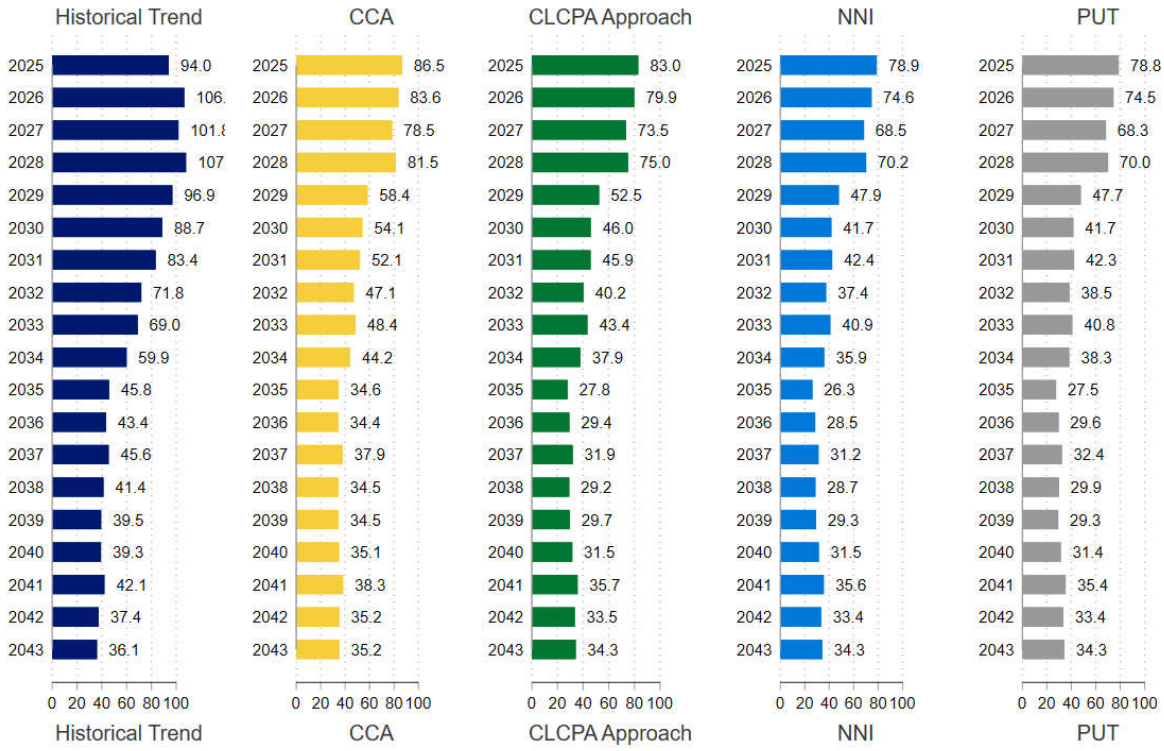
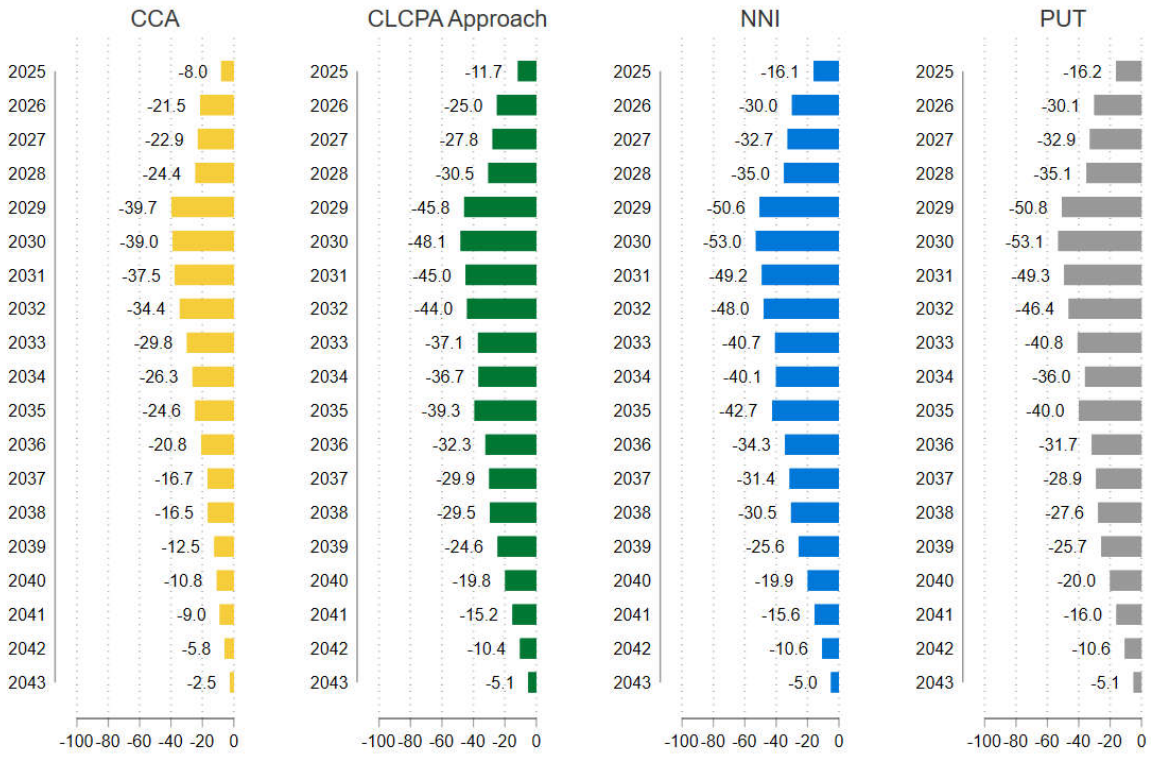


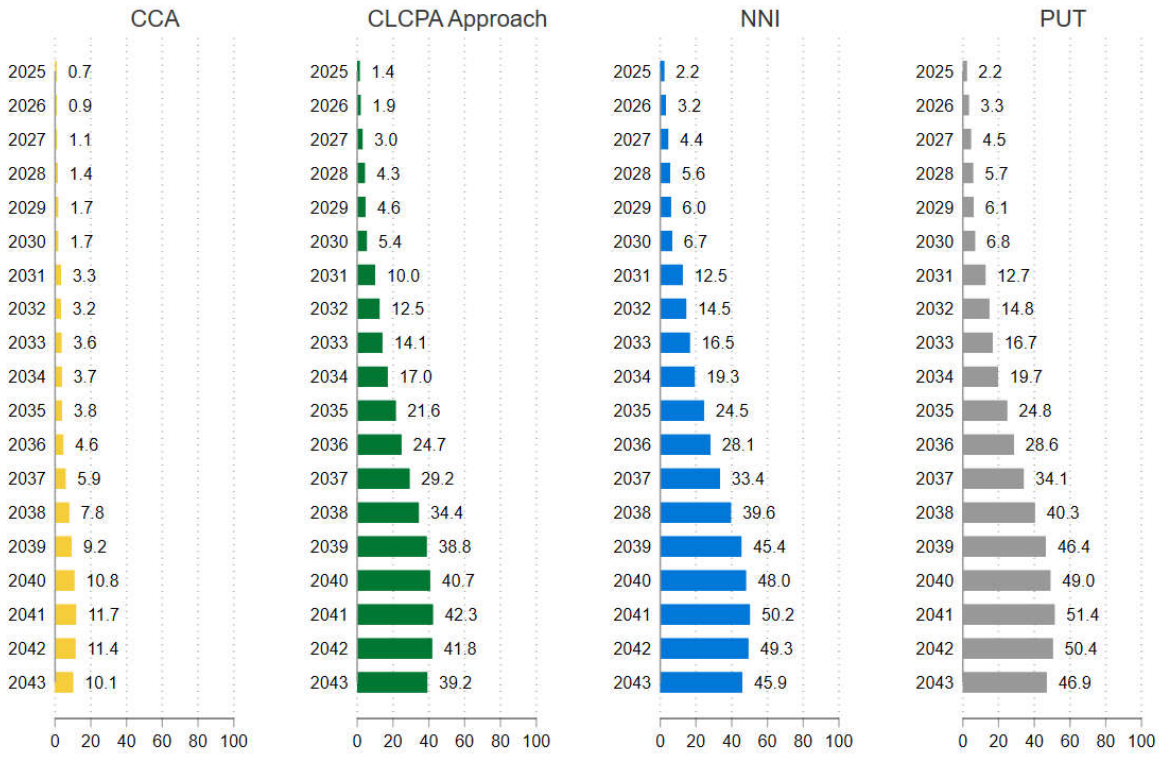
Figure 60: Change in Gas Capital Costs by Scenario ($2024 M)



While the transition from gas to electric heating can reduce some capital costs, it also leads to increases in electric capital costs. Over the next five to ten years, Central Hudson's electric grid likely has room to accommodate a good of amount of winter peaking heating loads. However, as penetration of electric heating grows, it will require resizing of poletop and padmount transformers, and upgrades to feeder circuits, substations, and transmission lines. While heat pumps are relatively efficient they are significant loads and most customers will experience peak demand on the same days and the same hours, when extreme cold temperatures occur. Starting in the 2030's, an increasing share of generation capacity cost was allocated to winter months in the modeling. The additional electric capital costs will lead to increase revenue requirements, which eventually impact the delivery rates and customer bills.

Figure 61 shows the expected electric capital cost for gas customers only. It does not reflect the capital costs associated with electrification for Central Hudson's entire electric grid. The analysis is an initial, early attempt at quantifying electric grid capital costs and does not fully factor other loads that are changing on the electric grid such electric vehicles and DERs. Central Hudson, at this time, does not have a tool to fully coordinate gas and electric planning. The overlay between gas and electric planning will be refined further in future GSLTPs.

Figure 61: Change in Electric Capital Costs for Gas Customers by Scenario ($2024 M)



viii. Total Bill Impacts (Gas & Electric) and Wallet Share

Building electrification technologies and heat pumps, specifically, use less energy to heat homes or water (or other end uses) and also rely on a cleaner fuel source as the electric grid becomes cleaner. Thus, the combined electric and gas use for the current gas customers is forecast to decrease under the various scenarios, as measured by total MMBtu. The decrease in total energy use does not lead to a lower total bill for the average customer, however. The combined gas and electric bill is expected to remain at similar levels despite the decrease in energy use due to higher cost of electricity.

As is illustrated in Figure 62, below, the gas rates are projected to increase with electrification, nearly doubling for residential customers over the 20-year planning period. Thus, while the combined electric and gas consumption of the average customer decreases, their total bill does not decline.

Figure 62: Typical Gas Customer Combined Electric and Gas Usage and Bill Impacts (2024-2043)

		Typical Gas Customer Combined Gas and Electric Annual Usage (MMBtu)			Typical Customer Annual Total Bill ($2024) Gas + Electric			Wallet Share		
Rate Class	**Scenario**	**2024**	**2030**	**2043**	**2024**	**2030**	**2043**	**2024**	**2030**	**2043**
Residential	Reference	103	101	98	$3,104	$3,154	$3,157	3.48%	3.54%	3.54%
	CCA	103	100	90	$3,111	$3,130	$3,112	3.49%	3.51%	3.49%
	CLCPA Approach	103	97	78	$3,111	$3,116	$3,384	3.49%	3.49%	3.79%
	NNI	103	95	74	$3,112	$3,088	$3,401	3.49%	3.46%	3.81%
	PUT	103	95	73	$3,112	$3,089	$3,409	3.49%	3.46%	3.82%
Non-residential	Reference	781	760	735	$13,261	$13,350	$13,350	N/A	N/A	N/A
	CCA	786	758	687	$13,346	$13,292	$13,168	N/A	N/A	N/A
	CLCPA Approach	786	752	646	$13,346	$13,332	$14,625	N/A	N/A	N/A
	NNI	786	751	643	$13,346	$13,361	$14,740	N/A	N/A	N/A
	PU,T	786	751	643	$13,346	$13,403	$14,859	N/A	N/A	N/A

(1) Estimated residential income per household is $89,192 ($2024)
(2) Each gas premise was matched to median income for their census block group to estimate income
(3) Wallet share is the share of income per household, for the typical customer, dedicated to combined gas and electricity costs.

The ”typical gas customer” in Figure 62 includes both homes that electrify heating and major uses and homes that do not electrify. In practice, the usage and bill impacts will vary between customers who do and do not electrify. The table below illustrates the differences between bills for the same home if it does and does not electrify.

The example below in Figure 63 is for a typical gas customer that switches space heating and water heating from gas to electric. Specifically, the example assumes the installation of an air-source heat pump and a heat pump water heater. A few observations are noteworthy. If the site electrifies heating and water heating, the gas use decreases by over 90% and electricity use more than doubles. However, the combined energy of gas and electricity, as measured by MMBtu, is roughly 53% of a site that does not electrify. Over time, the combined electric and gas bill declines slightly, less than 7%, across all scenarios over the 20-year horizon. By contrast, if the site does not electrify, their gas bill increases between 45% and 60% under the high electrification scenarios, leading to a combined electric and gas bill that is 20% and 30% higher by the end of the 20-year planning horizon.

Figure 63: Example of Usage and Bill Impacts with and without Gas Electrification (2024-2043)

Scenario	Electrification	Year	Annual Gas Use (Ccf)	Annual Electric Use (kWh)	Combined Gas and Electric Usage (MMBtu)	Annual Gas Bill ($2024)	Annual Electric Bill ($2024)	Combined Gas and Electric Bill ($2024)
CCA	No Electrification	2024	837.5	7,351.6	112.0	1,703	1,583	3,286
		2030	815.2	7,309.5	109.6	1,660	1,603	3,264
		2043	784.1	7,324.3	106.4	1,811	1,589	3,399
	Electrification	2024	63.5	15,238.0	58.6	129	3,281	3,410
		2030	62.9	15,050.8	57.9	128	3,302	3,430
		2043	64.5	14,657.9	56.7	149	3,179	3,328
CLCPA Approach	No Electrification	2024	837.5	7,351.6	112.0	1,703	1,583	3,286
		2030	815.2	7,309.5	109.6	1,688	1,580	3,268
		2043	784.1	7,324.3	106.4	2,476	1,482	3,958
	Electrification	2024	63.5	15,238.0	58.6	129	3,281	3,410
		2030	62.9	15,050.8	57.9	130	3,254	3,384
		2043	64.5	14,657.9	56.7	204	2,966	3,170
NNI	No Electrification	2024	837.5	7,351.6	112.0	1,703	1,583	3,286
		2030	815.2	7,309.5	109.6	1,693	1,564	3,256
		2043	784.1	7,324.3	106.4	2,675	1,485	4,161
	Electrification	2024	63.5	15,238.0	58.6	129	3,281	3,410
		2030	62.9	15,050.8	57.9	131	3,220	3,350
		2043	64.5	14,657.9	56.7	220	2,973	3,193
PUT	No Electrification	2024	837.5	7,351.6	112.0	1,703	1,583	3,286
		2030	815.2	7,309.5	109.6	1,701	1,563	3,264
		2043	784.1	7,324.3	106.4	2,751	1,486	4,237
	Electrification	2024	63.5	15,238.0	58.6	129	3,281	3,410
		2030	62.9	15,050.8	57.9	131	3,218	3,349
		2043	64.5	14,657.9	56.7	226	2,974	3,200

(1) Typical customer with gas space heating and water heating.

(2) Assumes the site electrifies by installing a whole home cold climate air source heat pump (ASHP) and a heat pump water heater (HPWH)

To better illustrate the impact of gas electrification, Central Hudson's consultant created a proprietary tool, available to stakeholders via a formal data request in the current proceeding. The tool enables users to select a scenario, building type, gas electrification appliance, and forecast year. It then provides details about the relative efficiency of the electric versus gas option, pulls in the relevant rates, gas usage of the end use, and usage with electrification, and compares the bills with the gas appliance and with the electric alternative.

In the example shown in Figure 64, an air-source heat pump uses 37.3% of the energy that a gas furnace uses. However, when put in the same terms ($/MMBtu usage), gas is cheaper than electricity at roughly one-third the cost. The net bill impact is a function of both the relative efficiency of the heat

pump and of difference in rates across fuels. The net impact is an operational bill increase of $181 (10.5%) for the year and scenario selected in this example.

Figure 64: Gas Electrification Bill Impacts Comparison Tool

Gas Electrification Bill Impacts

Demand Side Analytics

The following calculator estimates the bill impact of electrifying gas appliances, based on average household energy consumption.

1. Choose the scenario, building type, appliance, and year from the dropdown menus below:

Scenario	NNI	
Building Type	Single-Family Detached	
Appliance or end use	Heat Pump - Air Source	
Year	2030	
Electric COP	2.20	
Gas COP	0.82	
CCF to kWh conversion	29.1	
Gas rate	$2.076	$2024/CCF
Gas rate (converted)	$0.071	$2024/kWh
Electric rate	$0.214	$2024/kWh
Electric energy as % of gas energy	37.3%	
End use	Space Heating	

2. Observe the bill impact due to electrification:

Gas CCF per Year	Electric Appliance CCF per Year	Electric (kWh) with Electrification	INITITAL BILL (GAS)	NEW BILL (ELECTRIC)	BILL IMPACT
739	275	8,016	$1,534.01	$1,714.89	$180.88

The tool also includes several automated sensitivity analyses. Figure 65 shows an example of one of the views. It shows the bill impacts by year for an air source heat pump for the selected scenario and building type. A few patterns become evident. First, the gas usage is expected to decline over time absent electrification due to the trend of warmer winters (less HDD) in New York. In addition, the gas bill increases despite the decreasing gas use due the higher gas rates over time. The net impact is improving operational bill savings over time for heat pumps.

Figure 65: Gas Electrification Bill Impacts Comparison Tool – Automated Sensitivity Analysis Example *(Example: Air Source Heat Pump ($2024); Scenario: NNI; Building Type: Single-Family Detached)*

Year	Gas CCF per Year	Electric Appliance CCF per Year	Electric (kWh) with Electrification	INITIAL BILL (GAS)	NEW BILL (ELECTRIC)	BILL IMPACT
2024	758	283	8,222	$1,541	$1,770	$229
2025	756	282	8,197	$1,533	$1,771	$238
2026	752	280	8,162	$1,522	$1,767	$244
2027	750	280	8,140	$1,519	$1,760	$241
2028	746	278	8,091	$1,517	$1,745	$228
2029	742	277	8,054	$1,516	$1,731	$215
2030	739	275	8,016	$1,534	$1,715	$181
2031	738	275	8,009	$1,576	$1,705	$129
2032	733	273	7,947	$1,602	$1,690	$87
2033	733	273	7,955	$1,646	$1,686	$40
2034	728	271	7,899	$1,676	$1,666	-$11
2035	725	270	7,864	$1,723	$1,650	-$73
2036	720	268	7,809	$1,772	$1,627	-$145
2037	718	268	7,794	$1,823	$1,615	-$208
2038	714	266	7,748	$1,886	$1,599	-$287
2039	710	265	7,702	$1,961	$1,582	-$378
2040	708	264	7,687	$2,058	$1,573	-$485
2041	703	262	7,631	$2,148	$1,558	-$589
2042	700	261	7,596	$2,258	$1,547	-$711
2043	699	260	7,580	$2,384	$1,537	-$847

ix. Gas Rates & Gas Bill Impacts

There is a close relationship between average gas rates (*i.e.*, $/CCF), delivery revenue requirements, total usage, and customer bill impacts (*i.e.*, total dollar impacts). The delivery pipeline infrastructure is needed to ensure gas can flow to where it is needed, when it is needed on the coldest days. While decreases in demand lower some capital costs, decreases in demand do not lead to proportionate decreases in the infrastructure needed to transport energy. Thus, as net volumes decline, delivery rates increase. The customer bills are thus a mix of lower consumption and higher rates per unit of gas.

Figure 66 summarizes the expected changes in monthly gas bills for residential and non-residential customers under the scenarios evaluated in this GSLTP. They reflect the expected gas capital cost savings and reduced demand levels. Figure 67 shows the change usage per customer, and excludes any accounts that discontinued gas service and customer who did not sign up for gas service to the GSLTP policies. It does not reflect the change demand due to avoided new connections. The change in the rates ($/Ccf) are shown in Figure 68. The decline in average residential customer bills is primarily a function of lower per customer consumption due to installation of heat pumps. Despite the lower bills per customer, the costs per unit of gas delivery is increasing.

The projected gas accounts includes customers that do and do not electrify. Central Hudson assumed that new construction sites with heat pumps would not connect to gas system and that most customers with oil and propone heating would convert to electric heating rather than gas. A key question has been whether or not customers would discontinue or abandon gas service upon installation of heat pumps. Central Hudson commissioned an analysis of the empirical data to inform the modeling assumption, which detailed in Appendix A, Section 5. Based on the empirical data thus far, 97.7% of customers who retrofit their heating system to cold-climate, whole home heat pumps retain their gas service. Central Hudson doubles the incentives for customers who install a heat pump and decommission their prior fossil fuel heating source. However, the vast majority of sites elect to retain their gas service.

Figure 66: Percent Impact on Gas Bill for Non-Residential and Residential Customers (2024-2043)

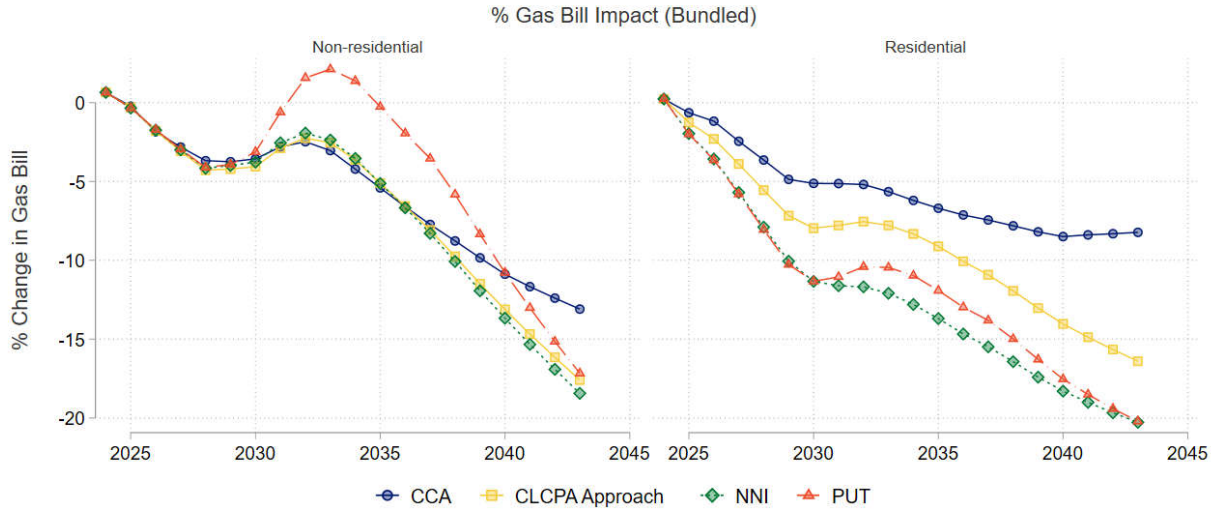


Figure 67: Percent Change in Gas Use for Average Account (2024-2043)[72]

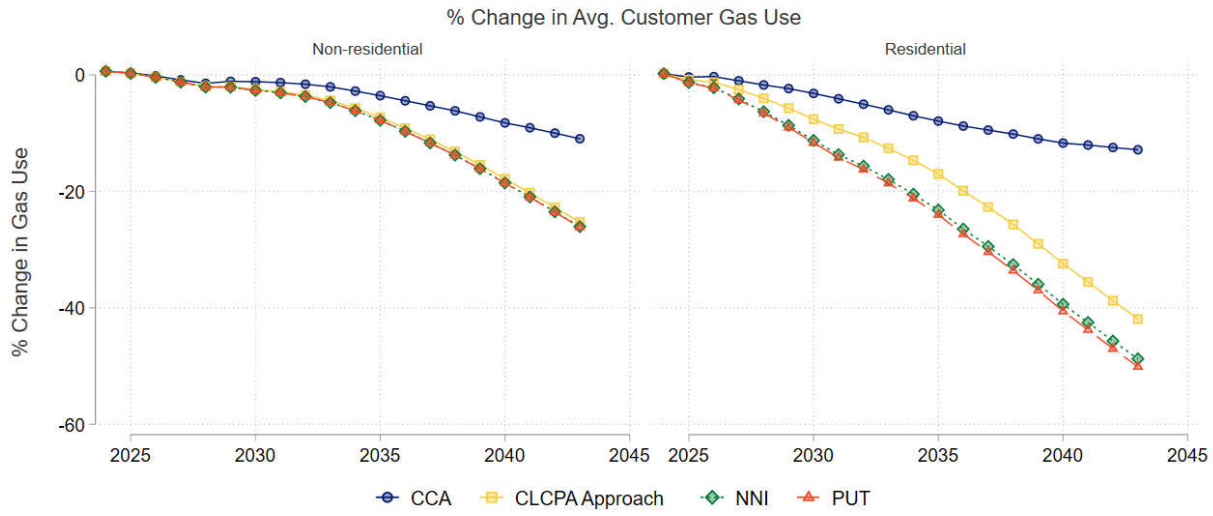
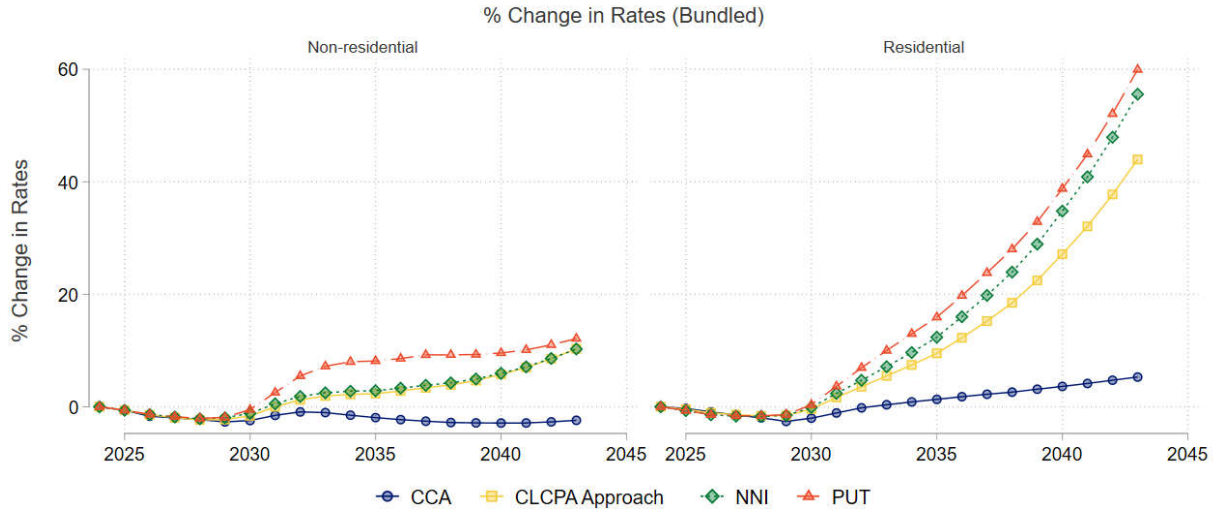


Figure 68: Percent Impact on Bundled Gas Rates for Non-Residential and Residential Customers (2024-2043)



The comparison of a typical customer annual bill by customer segment is presented in Figure 69. The figure compares estimated typical bills in 2030 and 2043 to typical bills in 2024. As noted earlier, while usage decreases substantially, the reduction in annual bill is not conmeasurate due to the need to maintain the delivery infrastructure despite fewer sales.

[72] Energy savings due to disconnections and avoided gas connections are not included in the plot.

Figure 69: Customer Annual Gas Bill Impacts by Scenario ($ 2024)

		Typical Customer Annual Usage (Ccf)			Typical Customer Annual Gas Bill ($2024)		
Rateclass	**Scenario**	**2024**	**2030**	**2043**	**2024**	**2030**	**2043**
Residential	Reference	748	734	703	$1,521	$1,525	$1,541
	CCA	750	710	612	$1,525	$1,447	$1,414
	CLCPA Approach	750	678	408	$1,525	$1,403	$1,289
	NNI	750	651	360	$1,525	$1,352	$1,229
	PUT	750	648	351	$1,525	$1,352	$1,230
Non-residential	Reference	5,947	5,744	5,507	$6,373	$6,361	$6,491
	CCA	5,986	5,678	4,904	$6,414	$6,134	$5,641
	CLCPA Approach	5,986	5,600	4,114	$6,414	$6,102	$5,350
	NNI	5,986	5,593	4,073	$6,414	$6,121	$5,295
	PUT	5,986	5,593	4,068	$6,414	$6,162	$5,377

x. Electric Rates & Electric Bill Impacts

The impact of gas electrification on electric rates and bills is more nuanced than the impact on gas rates. The higher electric usage lead to immediate higher electric bills but the impact on electric rates is delayed. As the buildings electrify, the total electric sales increases. As long as the existing infrastrucure can support the additional loads, it leads to lower electric delivery rates. Over the next five to ten years, the Central Hudson electric system has sufficient capacity to accommate the added winter loads. However, as heat pump penetration grows larger in the second decade of the GSLTP time horizon, it will be necessary to resize poletop transformers, upgrade feeder circuits, and upgrade substations. As a result, more electric capital investments will be needed in later years to accommodate the additional loads, and revenue requirements will increase. Further, although revenue requirements increase, electric delivery rates ($/kWh) remain relatively stable because the delivery revenue requirement are spread over a large amount of enegy use.

Figure 70 summarizes the expected changes in monthly electric bills for residential and non-residential customers under the scenarios evaluated in this GSLTP. They reflect both the increased use of electricity for heating and the changes to rates. Figure 71 shows the change in usage per customer. The change in the rates ($/kWh) is shown in Figure 72. The impact on electric rates is much less pronounced than for gas rates, particularly in early years.

Figure 70: Percent Impact on Electric Bill for Non-Residential and Residential Customers (2024-2043)

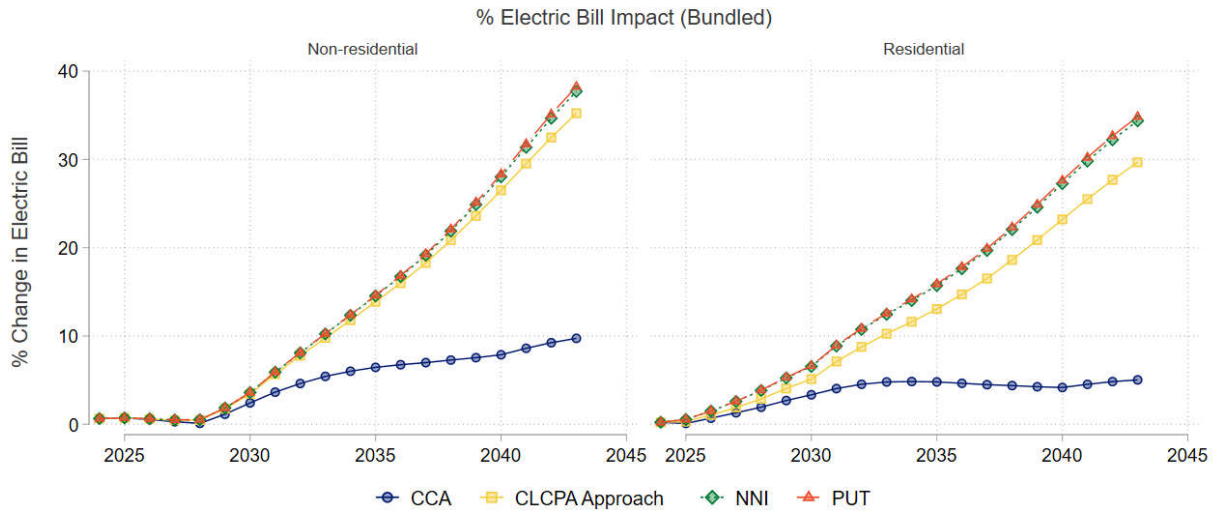
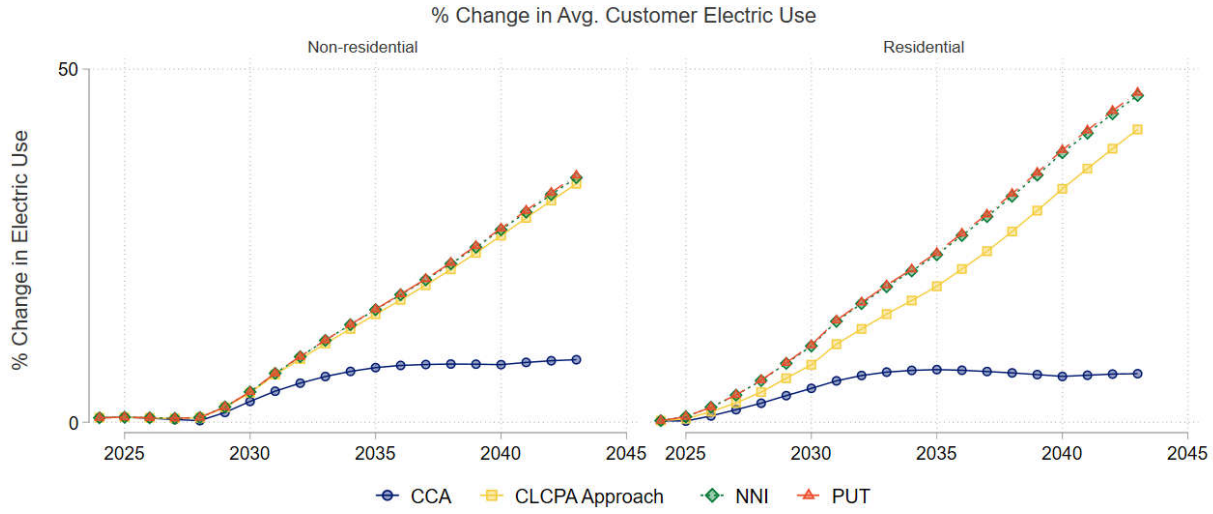


Figure 71: Percent Change in Electric Use for Average Account (2024-2043)[73]



[73] Energy savings due to disconnections and avoided gas connections are not included in the plot.

Figure 72: Percent Impact on Bundled Electric Rates for Non-Residential and Residential Customers (2024-2043)

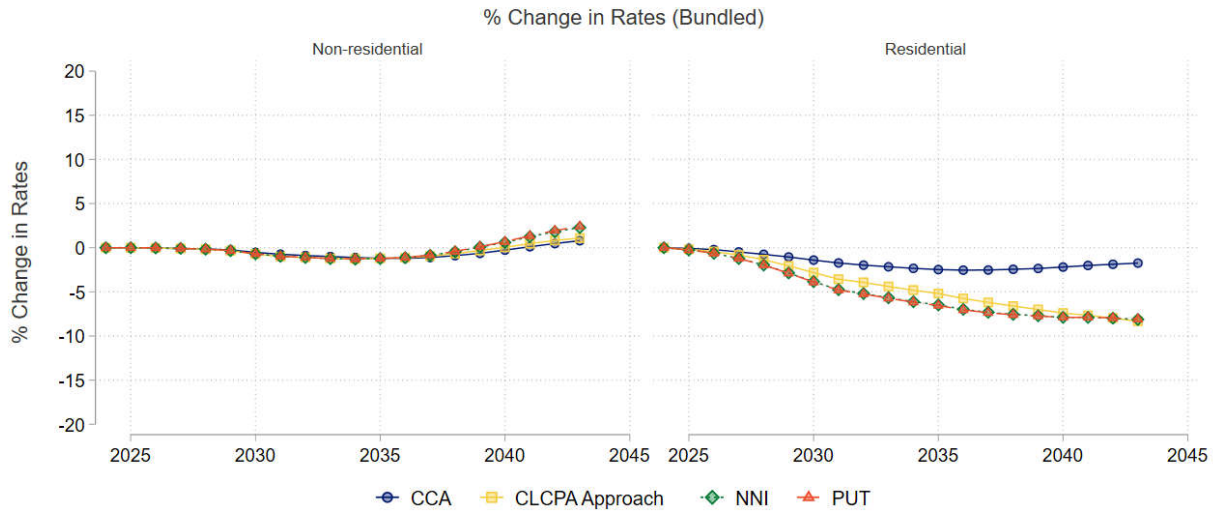


Figure 73 shows the expected electric usage and bill impacts for Central Hudson gas customers. The customer bills increase in proportion to the increased energy use, and delivery rates remain stable. Electric usage will grow as customers electrify heating. The increase in capital costs and revenue requirements is commensurate with the additional energy use.

Figure 73: Gas Customer Annual Electric Bill Impacts by Scenario ($ 2024)

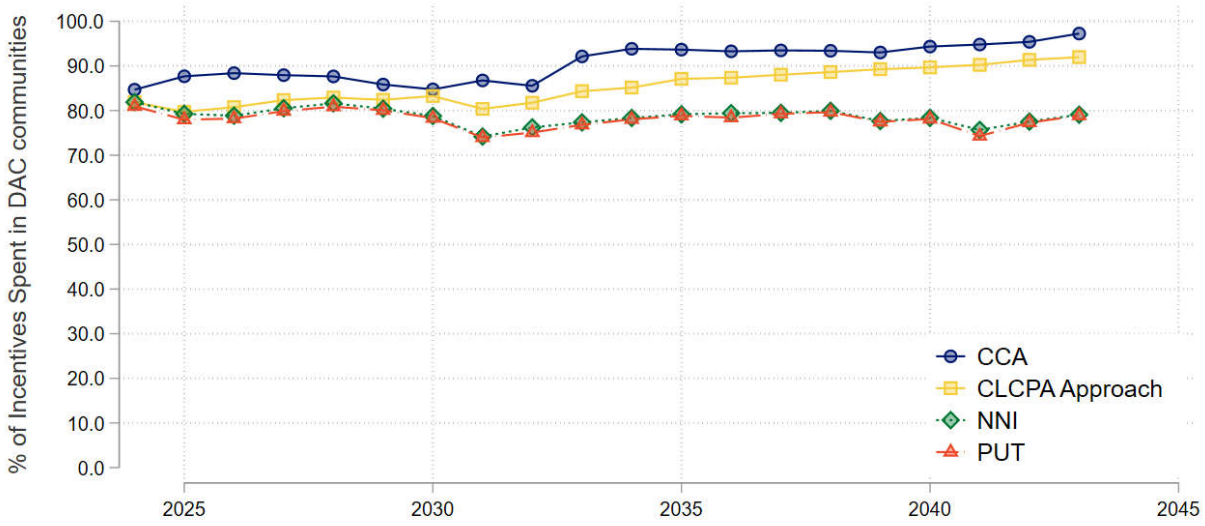
		Typical Customer Annual Usage (kWh)			Typical Customer Annual Electric Bill ($2024)		
Rateclass	**Scenario**	**2024**	**2030**	**2043**	**2024**	**2030**	**2043**
Residential	Reference	7,352	7,323	7,321	$1,583	$1,629	$1,616
	CCA	7,368	7,675	7,825	$1,586	$1,684	$1,697
	CLCPA Approach	7,368	7,921	10,357	$1,587	$1,713	$2,096
	NNI	7,369	8,114	10,709	$1,587	$1,736	$2,172
	PUT	7,369	8,124	10,740	$1,587	$1,737	$2,179
Non-residential	Reference	47,987	47,903	47,932	$6,888	$6,989	$6,859
	CCA	48,298	49,324	52,182	$6,932	$7,158	$7,526
	CLCPA Approach	48,298	49,902	64,125	$6,932	$7,229	$9,276
	NNI	48,298	49,966	64,536	$6,932	$7,240	$9,445
	PUT	48,298	49,966	64,695	$6,932	$7,241	$9,482

xi. Impact on DACs

All of the scenarios envision larger incentives for customers in disadvantaged communities, though this represents a shift to current practice. Across all scenarios, the heat pump incentives for customers in DACs are 1.5x to 1.67x larger than for customers outside DACs. However, the general

strategy modeled was to start with higher incentives when adoption rates are lower and progressively phase them out as the market transforms.

Figure 74: Heat Pump Incentives in DACs



xii. Benefit Cost Analysis

BCA outputs and results using the Societal Cost Test (as well as the Utility Cost Test and Ratepayer Impact Test) are contained in Figure 75. One of the Central Hudson GSLTP scenarios has a BCA above 1.0 for the 20-year evaluation period under the SCT. Raising the cost of carbon would increase the BCA ratios under all four scenarios, as would introducing a method of internalizing non-quantifiable benefits of decarbonization (*e.g.*, health measures, improved air quality, economic development, *etc.*).[74] Currently, carbon comprises between 23 and 37 percent of the benefits under the SCT, depending on the scenario. More information on the BCA analysis (including calculation alternatives to the Societal Cost Test) can be found in Appendix B.[75]

[74] *See supra*, note 11. *See* Appendix E of Central Hudson's 2023 DSIP.

[75] Central Hudson GSLTP Proceeding, Final Gas System Long-Term Plan, Appendix B.

Figure 75: Benefit Cost Analysis Summary – Comparison of Scenarios ($ Millions, 2024)[76]

Test	Metric	CCA	CLCPA Approach	NNI	PUT
Societal Cost Test	**Benefits**	$460.1	$776.8	$852.0	$941.0
	Costs	$372.4	$1,052.6	$1,183.0	$1,363.3
	Net Benefits	$87.7	-$275.8	-$331.0	-$422.3
	Benefit Cost Ratio	1.24	0.74	0.72	0.69
Utility Cost Test	**Benefits**	$364.2	$558.0	$618.2	$623.0
	Costs	$301.6	$908.4	$1203.1	$1410.8
	Net Benefits	$62.5	-$350.3	-$584.9	-$787.8
	Benefit Cost Ratio	1.21	0.61	0.51	0.44
Ratepayer Impact Test	**Benefits**	$364.2	$558.0	$618.2	$623.0
	Costs	$396.6	$1045.6	$1363.4	$1579.0
	Net Benefits	-$32.4	-$487.6	-$745.2	-$956.0
	Benefit Cost Ratio	0.92	0.53	0.45	0.39

[76] Benefits and costs presented in this Figure 75 are discounted to 2024 using an 8.36% discount rate.

Figure 76: Benefit Cost Analysis Detail – Comparison of Scenarios ($ Millions 2024)

Resource Type	Category	Metric	CCA	CLCPA Approach	NNI	PUT
Beneficial Electrification	Electric Impacts	Avoided Electric Supply Costs	-$12.1	-$72.1	-$77.1	-$78.1
		Electric Distribution Capacity	$8.1	$39.1	$47.1	$47.1
		Electric Feeder Capacity	$39.1	$84.1	$115.1	$118.1
		Electric Generation Capacity	$23.1	$197.1	$204.1	$206.1
		Electric Transmission Capacity	$4.1	$20.1	$23.1	$24.1
		Poletop and Padmount Transformer Resizing	$26.1	$56.1	$76.1	$79.1
		Utility Revenue Loss Electricity	-$67.1	-$408.1	-$444.1	-$448.1
	Environmental	Avoided CO2 Value	$37.1	$140.1	$150.1	$150.1
	Gas Impacts	Avoided Gas Distribution Capacity	$125.1	$211.1	$244.1	$245.1
		Avoided Natural Gas Supply Costs	$46.1	$187.1	$199.1	$201.1
		Avoided New Connection Costs	$69.1	$70.1	$71.1	$71.1
		Utility Revenue Loss Natural Gas	$89.1	$443.1	$483.1	$487.1
	Other	Admin Fixed	$13.1	$12.1	$13.1	$12.1
		Admin Volumetric	$2.1	$12.1	$21.1	$21.1
		Incentive Payments	$34.1	$239.1	$415.1	$420.1
		Incremental Equipment and Installation Costs	$40.1	$303.1	$337.1	$341.1
		Participant Bill Savings	$21.1	-$49.1	-$54.1	-$56.1
Codes & Standards	Electric Impacts	Avoided Electric Supply Costs	-$4.1	-$5.1	-$5.1	-$5.1
		Electric Distribution Capacity	$3.1	$4.1	$5.1	$5.1
		Electric Generation Capacity	$2.1	$2.1	$3.1	$3.1
		Electric Transmission Capacity	$2.1	$2.1	$3.1	$3.1
		Utility Revenue Loss Electricity	-$23.1	-$25.1	-$29.1	-$30.1
	Environmental	Avoided CO2 Value	$18.1	$18.1	$19.1	$20.1
	Gas Impacts	Avoided Gas Distribution Capacity	$85.1	$86.1	$87.1	$87.1
		Avoided Natural Gas Supply Costs	$20.1	$21.1	$23.1	$23.1
		Utility Revenue Loss Natural Gas	$60.1	$62.1	$68.1	$69.1
	Other	Incremental Equipment and Installation Costs	$67.1	$72.1	$80.1	$81.1
		Participant Bill Savings	$80.1	$83.1	$90.1	$92.1
Energy Efficiency	Electric Impacts	Avoided Electric Supply Costs	$1.1	$2.1	$2.1	$2.1
		Electric Distribution Capacity	-$2.1	-$4.1	-$5.1	-$5.1
		Electric Generation Capacity	-$5.1	-$9.1	-$10.1	-$10.1
		Electric Transmission Capacity	-$1.1	-$2.1	-$3.1	-$3.1
		Utility Revenue Loss Electricity	$5.1	$10.1	$13.1	$13.1
	Environmental	Avoided CO2 Value	$12.1	$21.1	$26.1	$28.1
	Gas Impacts	Avoided Gas Distribution Capacity	$23.1	$36.1	$47.1	$48.1
		Avoided Natural Gas Supply Costs	$12.1	$22.1	$26.1	$29.1
		Utility Revenue Loss Natural Gas	$30.1	$53.1	$69.1	$77.1
	Other	Admin Fixed	$3.1	$3.1	$3.1	$4.1
		Admin Volumetric	$.1	$3.1	$5.1	$7.1
		Incentive Payments	$6.1	$65.1	$104.1	$132.1
		Incremental Equipment and Installation Costs	$3.1	$73.1	$82.1	$82.1
		Participant Bill Savings	$42.1	$75.1	$95.1	$106.1
Hydrogen	Environmental	Avoided CO2 Value	$.1	$9.1	$9.1	$34.1
	Other Energy Costs	Hydrogen Blending Stations	$.1	$4.1	$4.1	$12.1
		Hydrogen Fuel Costs	$.1	$35.1	$34.1	$82.1
Renewable Natural Gas	Environmental	Avoided CO2 Value	$30.1	$30.1	$30.1	$86.1
	Other Energy Costs	RNG Fuel	$146.1	$146.1	$146.1	$255.1

VI. Near-Term Actions for Future Decarbonization

Central Hudson has developed this GSLTP and associated analytic and modeling capability as described herein to align with directives from the Gas Planning Order and to provide the Commission, Staff, and stakeholders with detailed information and analysis regarding the Company's gas planning. The Company appreciates the input and feedback received and has sought to respond to and integrate such feedback, including on an iterative basis, as appropriate. The Company appreciates that the GSLTP proceeding process takes time, largely due to extensive stakeholder interaction and iterative planning stages. The Company emphasizes that while this regulatory proceeding has unfolded, Central Hudson has continued to advance numerous efforts that further the overall objectives of the proceeding on a parallel path.

As is reflected in this GSLTP, Central Hudson is charting a new direction in gas (and electric) planning. The scenarios presented over a 20-year horizon provide detailed information regarding options for how the Company can maintain reliability and safety, while "bending" the demand curve down and mitigating system investment/ costs through the deployment of many tools and solutions.

While such planning necessarily includes a long-term horizon, it also includes the continuation and initiation of numerous near-term actions and strategies. Reflective of this GSLTP as a whole, these near-term actions are described below.

A. Leveraging GSLTP Modeling Analysis for NPAs and Other Program Initiatives

The innovative modeling and analytic tools foundational to GSLTP are central to such ongoing and near-term Company efforts. The Company is leveraging these capabilities beyond just the Gas Planning Proceeding scope to enable innovation and transform its own planning process. This is illustrated, throughout the GSLTP, in the granular analysis of gas system segment loading, electric system circuit loading, and penetration of DSM measures and heat pumps. This granular, system- and location-specific analysis enables the Company to assess, test, and implement initiatives and programs such as targeted heat pump deployment efforts, increased incentives, NPA solutions, and storm hardening investments. The analysis provides rich information for the Company to identify and assess opportunities for NPAs or other programs and pilots, which the Company will continue to advance, including in coordination with stakeholders. Such efforts have inherent challenges and constraints, including inducing customers to participate in NPAS, but the increased analytical tools provide increased visibility about how and where to target efforts (*e.g.*, to target sections of high growth and loading). This modeling capability also provides a potential roadmap to change the paradigm of how NPAs are designed and implemented. In particular, the modeling may allow for system benefits to be achieved through a higher technology (*e.g.*, heat pump) adoption and program participation rate, that do not require the 100% customer participation/ conversion for NPAs. Such 100% participation rates, which are characteristic to traditional NPA programs, are often prohibitively difficult to achieve, particularly on a larger scale.

B. Emissions Reductions Research and Development ("R&D")

i. Cosponsor of R&D with NYSEARCH

Central Hudon's ongoing and near-team efforts include a focus on R&D. For example, Central Hudson is part NYSEARCH as a cosponsor with other utilities across New York, the United States and Canada on R&D projects to enhance leak detection and to assess measures to reduce GHG emissions from the gas sector. This includes sponsoring projects that will help the industry potentially move towards the adoption of renewable gases including RNG and hydrogen. The NYSEARCH renewable fuel studies focus on the use of different fuels and how they can be leveraged within the pipeline network.

Sponsored projects include:

- Development of Small Unmanned Aerial Systems (sUAS) to perform inspections of both submerged pipelines and arial inspections of the natural gas network.

Figure 77: Aquatic Drones Perform Inspections of Submerged Pipelines

Figure 78: Aerial Drones Perform Inspections of Pipelines on Land

- Development of an autonomous robotic system for above ground leak detection.
- A study to reduce methane emissions at threaded connections.
- An odor detection study to measure the effect of hydrogen blends on odorizing natural gas.
- A study on renewable natural gas and its impact on natural gas grids and consumer appliances.
- A hydrogen living lab demonstration project: Aims to validate the feasibility of blending and injecting hydrogen starting at 20 percent by volume or more into the existing natural gas infrastructure by simulating system operations. The project will evaluate safety, maintenance, and emergency response changes on gas distribution infrastructure.

- A study on the Impact of blended hydrogen on threaded connections: The objective is to determine if blended hydrogen in natural gas causes any change in the presence or absence of leaks in threaded connections and if blended hydrogen can change the flow rate of a leak in a threaded connection.
- A study of natural gas dispersion with blended hydrogen in residential structures: This will support a better understanding of the physics of hydrogen dispersion regarding buoyancy and will observe any gas separation post leakage.

ii. Sponsor of Low Carbon Resource Initiative ("LCRI")

Central Hudson is a sponsor of the LCRI, which was established by the Electric Power Research Institute and the Gas Technology Institute (a leading independent non-profit research, development, and training organization addressing global energy and environmental challenges) to evaluate pathways for deployment of alternative energy projects in support of decarbonization across the energy economy. The multi-year initiative will cover development of demonstration projects in the technical areas of renewable fuels, hydrocarbon-based solutions, electrolytic processes, storage and delivery, power generation, renewable generation, nuclear, transportation and buildings, integrated energy analysis, and safety and environmental aspects.

C. Ongoing and Near-Terms Efforts Described in this GSLTP

This GSLTP describes efforts the Company has advanced and will continue to advance throughout the Gas Planning Proceeding. Many of these elements are key elements of the GSLTP Pathway and/or core activities Central Hudson already pursues. These include the following:

- **System Investment for Safety, Reliability, Environmental Benefits**: Central Hudson will continue investing in its system to maintain reliability, safety, and environmental benefits. This planning includes but is not limited to removal of leak prone pipe through its LPP Program. In conjunction with the LPP Replacement Program, Central Hudson has received approval for a Leak Prone Services program to replace services that are considered LPP but are not included within the LPP main program because they are not served by a leak-prone main. The Company's Large Diameter Gas Welded Pipe Replacement Program targets large diameter gas welded steel pipe, which is categorized as higher risk. The Company's Creek Crossing Risk Remediation Project would proactively target creek crossings that pose a high risk and install a bypass by either boring or rerouting the pipeline strategically. Additional investment programs address the Company's gas transmission system. (See Section III.D and III.G)
- **Hydrogen and RNG**: The Company has numerous ongoing efforts regarding RNG and Hydrogen, including assessment of viability, benefits, costs, and strategies and steps. (See Section IV.E.ii)
- **Clean Heat Program**: The Company will continue its administration of the Clean Heat program, including but not limited to expand technology options, increase the effectiveness of marketing and outreach, and enhance installation contractor network capacity and excellence. (See Section IV.C.ii)
- **Energy Efficiency Programs**: The Company will continue administration of its energy efficiency programs, including for market rate and LMI customers, as applicable. (See Section IV.C.i)
- **EE/BE 2026-2030 Proposal**: The Company is advancing its proposed planning for the EE/BE interim review process as the EE/BE portfolio continues to focus on electrification and electrification readiness primarily through weatherization. (See Section IV.C.i.-ii.)
- **Non-Pipe Alternatives** – The Company will continue to advance its two categories of NPA projects, which employ non-traditional solutions to avoid traditional infrastructure construction. TMAs will

continue to advance strategic abandonment of leak prone pipe through electrification where it is more cost effective than replacement and system reliability is not negatively impacted. Load growth-based projects will continue to be advanced to manage locational constraints that are associated with peak demand, including through tools such as kicker incentives. The Company will continue to advance such efforts through increased analytical tools, innovative solutions, stakeholder engagement, and annual reporting. (See Section IV.C.iii and Appendix C)

- **Thermal Energy Networks** – As part of its thermal energy network activities, the Company will continue the implementation of its thermal energy network pilot program to test the feasibility and economics of using thermal network applications to replace gas, and inform future actions, as well as provide social and economic benefits. (See Section IV.C.iv)
- **Demand Response** – The Company will continue to explore options for traditional demand response to reduce gas system peak load, including its initiative to reduce demand on highly loaded feeders. The Company offers several electric demand response programs, which will become increasingly important as fossil end uses are electrified. (See Section IV.C.v.)
- **GHG Accounting** – The Company will continue to actively participate in state and federal GHG accounting efforts to estimate GHG emissions for the entire supply and delivery chain from gas production through gas consumption for all customers to provide a comprehensive understanding of the emissions associated with supply and demand (See Section IV.E.i)
- **DACs** – The Company will continue to advance analysis and programs to support the investment in and benefits of DACs in the energy transition. (See Section III.C)

VII. Conclusions and Report Implications

Central Hudson is pleased to provide this Final GSLTP to advance the goals identified in the Gas Planning Order, including to evaluate opportunities to improve gas system planning and operational practices and to enable LDCs to meet evolving policy goals and customer expectations transparently and equitably. The Company has undertaken rigorous modeling and analysis with the goal of educating and involving stakeholders regarding demand and supply and forecasts, demand side investments and programs – including electrification and Non-Pipe Alternatives, while maintaining reliability, and affordability. This Final GSLTP provides four scenarios for policies, investments and activities to achieve goals beyond historical trends, including: Current Clean Energy Agenda, CLCPA Approach, No New Infrastructure (GSLTP Pathway), and Pipe Use Transformation. These scenario analyses include estimates of GHG emissions, bill and rate impacts, and benefit cost analyses. This Final GSLTP provides a basis to assess the potential impacts of the Company's long-term plans and alternatives, both benefits and burdens, on disadvantaged communities. Based on a thorough review of these scenarios, associated funding requirements, clean energy achievements, and customer impacts, Central Hudson has selected the NNI Scenario as its GSLTP Pathway. The Company plans to pursue policies and implementation strategies in support of the NNI Scenario going forward.

Central Hudson's unique modeling approach and the scenario development advanced for this GSLTP provide the tools needed to work with stakeholders to move closer toward CLCPA goals while understanding the full costs of these programs to customers. In developing the scenarios for this GSLTP, the Company has modeled parameters to keep costs at reasonable levels. The Company is already

moving forward with numerous decarbonization actions as noted in Sections IV and VI and is further developing its LCF capabilities. The purpose of the GSLTP is to quantify and assess the implications of different tactics, but currently all possible actions discussed in this Final GSLTP are important for the Company to meet CLCPA goals.

The following are key takeaways for the scenario assessments Central Hudson has completed for this GSLTP cycle:

- All four scenarios result in significant GHG savings. The PUT Scenario achieves the greatest level of GHG savings due to a blending of lower GHG fuels added to increased targeted electrification. The CCA Scenario, which assumes approved program funding, planned upgrades to codes, and other "current" assumptions, provides more limited impacts in decarbonizing Central Hudson's system.
- On a per customer basis, the Company projects significantly lower GHG emissions relative to 1990 for all scenarios.
- The scenarios show a range of cost effectiveness based on the BCA.
- Gas usage will decline and delivery gas rates will increase across scenarios, and electric usage will increase over time.
- Most of the savings across scenarios are from residential customers, i.e., not commercial customers.
- The modeling assumes a relatively small decrease in customer count based on empirical analysis of Central Hudson Clean Heat and NPA programs. The customer attrition assumptions have implications on bill impacts, as the overall gas revenue requirement continues to be allocated across a relatively similar number of customers over the bulk of the period of the analysis.
- The NNI Scenario shows the benefits of having the most targeted approach to deployment of programs such as increased heat pump incentives and NPA development. This comes with higher costs but does avoid new infrastructure. Customer adoption will be key to the success of the NNI Scenario and with all the scenarios.
- LCFs are key to decarbonizing the system to a rate that could meet CLCPA goals.
- Safety and reliability will remain paramount through the implementation of any scenario.

Central Hudson will continue to evaluate these impacts in the future. The Company looks forward to additional dialogue and collaboration with DPS Staff and other stakeholders as this gas planning process continues to unfold.