STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

In the Matter of a Review of the Long-Term Gas

System Plan of National Fuel Gas Distribution

Corporation

Case 22-G-0610

Initial Comments of

Natural Resources Defense Council,
with technical assistance and analysis from Synapse Energy Economics

Dated: March 13, 2023

Pursuant to the Notice of Technical Conference Regarding Long-Term Plan Review and Requesting Comments issued on December 22, 2022, in Case 22-G-0610, Natural Resources Defense Council (NRDC) respectively submits these Initial Comments, which were developed with technical assistance and analysis from Synapse Energy Economics (Synapse), on the Initial Long-Term Plan (Plan) filed by National Fuel Gas Distribution Corporation (NFG or the Company) on December 22, 2022, in this case. NRDC welcomes the opportunity to comment on NFG's Initial Long-Term Plan and to engage in the gas system planning process going forward as NFG adapts its planning and operational practices to comply with the requirements of the Climate Leadership and Community Protection Act (CLCPA) in a manner which maintains reliability and minimizes the impacts of compliance on affordability.

NFG's Initial Long-Term Plan deserves strict scrutiny for two reasons. First, it is the first filing by any New York utility required by the new long-term planning process, which is a first-of-its-kind process that holds promise for making vast improvements over gas system planning, operational practices, transparency, consideration of alternatives, and alignment with the State's landmark clean energy and climate policy. As such, the Initial Long-Term Plan is the first step in NFG's planning process that should strive to improve through each iteration. The Plan also takes on heightened importance because it will serve as a template for the other utilities to follow. Fostering engagement and incorporating stakeholder input will drive better outcomes, increased support, and improved trust as NFG right-sizes its gas system to be consistent with the CLCPA's emission reduction and climate justice targets.

Second, NFG has positioned itself as a leading voice opposing New York's clean energy vision. NFG's representative on the Climate Action Council (CAC) voted against the Final CAC Scoping Plan released in December 2022 (Final Scoping Plan), due to the extent to which it recognizes electrification as the optimal pathway for achieving CLCPA targets, and that the gas system must undergo a well-planned and strategic downsizing.[1] NFG is also a contributing member and on the steering committee of New Yorkers for Affordable Energy,[2] which has been orchestrating a campaign to promote fossil gas service and weaken New York's climate and building decarbonization policies.[3] NFG recently confirmed it conducted a robocall campaign in mid-February to enlist its customers to lobby state lawmakers against building electrification.[4] NFG's aggressive efforts to undermine New York's clean energy transition indicates a bias that is reflected throughout the Initial Plan.

NFG's Long-Term Plan must evolve significantly between the initial and final iterations. The Initial Long-Term Plan is inconsistent with New York policy and Public Service Commission (Commission) guidance. The Plan does not adhere to the CLCPA's emissions reduction targets, the Final Scoping Plan, or the

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[1] Donna L. DeCarolis Statement, Climate Action Council Meeting, (Dec. 19, 2022), https://climate.ny.gov/-/media/project/climate/files/Donna-DeCarolis.pdf.

[2] https://www.ny4affordableenergy.com/ourcoalition/.

[3] Robert Galbraith, Yusra Bitar, Derek Seidman, *Fueling Obstruction: The Fossil Fuel Networks Undermining Climate Action in New York State*, Public Accountability Initiative (AKA "LittleSis), (Nov. 2, 2022) https://public-accountability.org/wp-content/uploads/2022/11/LittleSisFuelingObstruction_11.02.pdf.

[4] Colin Kinniburgh, Fossil Fuel Companies Enlist Customers to Fight New York's Climate Law, New York Focus (Mar. 7, 2023) https://www.nysfocus.com/2023/03/07/fossil-fuel-gas-robocall-climate-new-york/.

Commission's *Order Adopting Gas System Planning Process* (Gas Planning Order).[5] NFG's Plan also relies on a host of unreasonable assumptions that mask the risks and costs of fossil gas while overestimating the cost of alternatives, to the extent alternatives are even considered. As discussed below, NFG's Plan does not fully consider options available for downsizing its gas system, including "no infrastructure" solutions for any of the 20 percent of its gas main that it plans to replace by 2035.

Using two rate forecasting models—a Gas Rate Model and a Strategic Downsizing Rate Model—Synapse demonstrates the long-term revenue requirement and emission reduction implications for NFG's failure to consider opportunities for retiring segments of its system in favor of alternatives to gas infrastructure. In short, the Plan would put NFG on a path that falls short of achieving CLCPA targets and that delays the adoption of available options in favor of costly fuel options that will lead to increased rates and risk of unmanageable customer defection and stranded costs later on.

Indeed, increasing costs to maintain a gas system that has declining use creates the conditions to incite a vicious cycle that spurs uncontrolled customer exit from the gas system, further escalating costs for remaining customers, and producing gross inequities among customers and between generations. The customers bearing the brunt of the inequity would likely be those that are disproportionately vulnerable or disadvantaged. The costs of choosing the wrong path are high, wasting both money and time that New Yorkers can ill afford.

In contrast, the benefits from transforming in-building heating and hot water systems that currently rely on combustion of fossil fuels to clean, super-efficient systems using renewable electricity are tremendous. And making New York's buildings more efficient will make them more comfortable and affordable to operate. Electrified buildings can also be active participants in a two-way optimized clean electric system, providing responsive load and reducing the costs of building out our clean, resilient grid powering our buildings and transportation.

NFG's Initial Long-Term Plan is wholly deficient and will require significant revisions and additional analysis before it is capable of informing prudent investment decisions. NFG, Department of Public Service Staff, the DPS's independent consultant (Charles River Associates), stakeholders, and the Commission should prioritize the quality of the Final Long-Term Plan and compliance with the CLCPA over strict adherence to the Planning Process Schedule,[6] if additional time is necessary to ensure that the Final Plan is capable of guiding decisions until the next planning cycle.

Importantly, NFG's Revised Long-Term Plan must include a scenario analysis that is fully aligned with the Final Scoping Plan, and that identifies the Company's options for strategic downsizing of the gas system.

[5] New York Public Service Commission. *Order Adopting Gas System Planning Process* (Gas Planning Order). Case Nos. 20-G-0131 and 12-G-0297. Issued May 12, 2022.

[6] Charles River Associates, *Initial Findings Report: National Fuel Gas Distribution Corporation Initial Long-Term Plan Assessment*, Case 22-G-0610, at 6 (Feb. 17, 2023).

This is necessary, even if current statutory barriers would make implementation a challenge,[7] in order to: (1) create transparency and ensure that the utility does not foreclose its best available options for downsizing the system (for example, by replacing leak-prone pipe that was not actively leaking and could have been abandoned in favor of an NPA), (2) ensure that electric utilities, stakeholders, and the broader public have insight into locations where pipe is most likely to be abandoned in favor of electrification, and (3) identify the extent to which statutory barriers are making the transition of the gas system more difficult, expensive, or inequitable.

[7] The Scoping Plan identifies that the Commission initiated utility-specific gas system planning processes and a statewide GHG emission reduction pathway study to develop long-term plans for the transition of the gas system; but that the Commission also has limited authority to implement a downsizing of this system because certain provisions of Public Service Law conflict with this goal and the achievement of the Climate Act's targets. Specifically, the 100-foot rule in Public Service Law section 31(4) requires existing gas ratepayers to subsidize building new gas infrastructure to hook up new customers, and the utility obligation to provide gas service in Public Service Law sections 30 and 31 establishes a customer's entitlement to gas service and thereby enables a single customer to block community-scale projects that would facilitate cost-saving downsizing of the gas system. *See* New York State Climate Action Council. 2022. New York State Climate Action Council Scoping Plan, Chapter 18: Gas System Transition (NYS Scoping Plan). climate.ny.gov/ScopingPlan.

CONTENTS

1. BACKGROUND

Adopted in 2019, the CLCPA calls for all sectors of the state's economy to collectively achieve 40 percent greenhouse gas (GHG) emissions reductions from 1990 levels by 2030 and to achieve 85 percent emissions reductions and net zero emissions by 2050. The Climate Act also includes important provisions for climate justice that prioritize equity in fighting climate change to ensure that disadvantaged communities are not left behind in New York's clean energy transition.

In 2020, the Commission opened the gas planning proceeding to "establish planning and operational practices that best support customer needs and emissions objectives while minimizing infrastructure investments and ensuring the continuation of reliable, safe, and adequate service to existing customers."[8]

On May 12, 2022, the Commission released the Gas Planning Order in Case 20-G-0131.[9] This order requires the gas utilities to file long-term gas system plans every three years and file annual reports in interim years. Analyses underlying each long-term plan must consider energy efficiency and Non-Pipeline Alternatives (NPA),[10] and the utility must include an NPA-only "no infrastructure" scenario unless it presents sufficient evidence that an NPA-only scenario is not feasible. The order calls for alternatives to be compared based on benefit-cost analysis, bill impact analysis, and emissions impacts.

The order also requires the gas utilities to file depreciation studies that include the following scenarios:

- Full depreciation of all new gas plants installed beginning 2022 by 2050,
- Full depreciation of all gas plants by 2050, and
- 50 percent of customers leave the gas system by 2040 and only 10 percent remain by 2050.[11]

Relatedly, the Commission issued a separate order directing the gas utilities to propose a Greenhouse Gas (GHG) Emissions Reduction Pathways Study to analyze the scale, timing, costs, risks, uncertainties, and bill impacts associated with significant reduction in GHG emissions. The order requires joint utility

[8] New York Public Service Commission. Case 20-G-0131 - Proceeding on Motion of the Commission in Regard to Gas Planning Procedures, Order Instituting Proceeding. Issued Mar. 19, 2020, p. 4.

[9] New York Public Service Commission. Order Adopting Gas System Planning Process (Gas Planning Order). Case Nos. 20-G-0131 and 12-G-0297. Issued May 12, 2022.

[10] NPAs, previously called Non-Pipeline Solutions, "include temporary supply, energy efficiency, electrification, and clean demand response" to "reduce or eliminate the need for gas infrastructure and investments." (State of New York Public Service Commission. Order Instituting Proceeding, March 19, 2020. Case 20-G-0131, p. 7.).

[11] Gas Planning Order, p. 61.

analyses of decarbonization pathways through 2030 and 2050, and individual utility plans to achieve their share of emissions reductions through 2050.[12]

Pursuant to the CLCPA, the CAC was charged with developing a Scoping Plan setting forth a blueprint for achieving CLCPA targets. For the Draft Scoping Plan, which was issued in December 2021, the New York State Energy Research and Development Authority (NYSERDA) and New York State Department of Environmental Conservation commissioned modeling of the statewide and economy-wide benefits, costs, and GHG emissions reductions of scenarios to achieve the CLCPA emission limits (Integration Analysis).[13] Initial modeling runs included a business-as-usual reference case and a scenario based on the CAC Advisory Panel's initial recommendations (Scenario 1) but found that neither would be sufficient to meet CLCPA requirements.[14] The Integration Analysis found that three scenarios met CLCPA emission-reduction requirements: Strategic Use of Low-Carbon Fuels (Scenario 2); Accelerated Transition Away from Combustion (Scenario 3); and Beyond 85% Reduction (Scenario 4). The Integration Analysis concluded that there are multiple pathways to achieve the CLCPA's legislated emissions limits and that certain strategies are common across all scenarios, including widespread building electrification, decarbonized electricity, and aggressive energy efficiency.[15] Updated analysis and additional sensitivity analyses and research efforts were presented to the CAC over the summer and fall of 2022 to inform the Final Scoping Plan.

Importantly, the Final Scoping Plan calls for a well-planned, strategic downsizing of the gas system.[16] According to that document: "All the information before the Climate Action Council indicates that achievement of the emission limits will entail a substantial reduction of fossil natural gas use and strategic downsizing and decarbonization of the gas system."[17] As informed by the Integration Analysis, the Scoping Plan identified that the vast majority of current fossil natural gas customers (residential, commercial, and industrial) will transition to electricity by 2050 and identified fossil gas use reductions statewide by at least 33% by 2030 and by 57% by 2035.[18]

The Final Scoping Plan thus recommends that "New York State will need to implement an ongoing effort to plan for and manage the strategic downsizing and decarbonization of the gas system as the transition to greater electrification proceeds. That ongoing effort should include identification of strategic

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[12] New York Public Service Commission. Order on Implementation of the Climate Leadership and Community Protection Act. Case No. 22-M-0149. Issued May 12, 2022.

[13] New York State Climate Action Council. 2021. *New York State Climate Action Council Draft Scoping Plan* (Draft Scoping Plan). https://climate.ny.gov/resources/draft-scoping-plan/.

[14] Id., p. 69.

[15] Energy and Environmental Economics and Abt Associates. 2021. *New York State Climate Action Council Draft Scoping Plan: Integration Analysis Technical Supplement,* p. 6 and 84. Prepared for the New York State Energy Research and Development Authority and New York State Department of Environmental Conservation. Available at https://climate.ny.gov/-/media/project/climate/files/Draft-Scoping-Plan-Appendix-G-Integration-Analysis-Technical-Supplement.pdf.

[16] New York State Climate Action Council. 2022. *New York State Climate Action Council Scoping Plan* (NYS Scoping Plan). climate.ny.gov/ScopingPlan.

[17] Id., p 350.

[18] Id.

opportunities to retire existing pipelines as demand declines and exploration of the safest, most reliable, resilient, and least expensive approaches for an orderly transition."[19] The Final Scoping Plan also recommends that this transition of the gas system "take place as quickly as possible and to the maximum extent possible and include the production, transmission, and distribution components of the system, while limiting negative impacts on the workforce."[20]

2. OVERVIEW OF NFG'S INITIAL LONG-TERM PLAN

NFG's December 22, 2022 filing pursuant to the Gas Planning Order consists of three parts: the Executive Summary, Initial Long-Term Plan (main report), and appendices.

NFG indicates that the analytical process to support defining the Long-Term Plan began with the creation of three scenarios: a reference case; a supply-constrained economy case; and an aggressive scenario. The reference case reflects business-as-usual assumptions, excluding any impacts from the CLCPA. The supply-constrained economy case assumes conservative renewable natural gas (RNG) and hydrogen blending and widespread deployment of hybrid electrification (heat pumps with gas furnace). The aggressive scenario assumes full electrification of heating loads and aggressive RNG and hydrogen blending.[21]

NFG assessed these scenarios based on a 20-year period, from 2023 to 2042. The analysis considered certain tradeoffs between GHG emissions reductions and the costs to achieve them, while considering safety, reliability, resilience, and affordability.[22]

Based on its view of "a reasonable balance" of emissions reductions and cost, NFG identified specific decarbonization actions to pursue in its preferred plan (Preferred Plan).[23] The following are the key strategies:[24]

- Enhancement of Energy Efficiency measures: Implementation of weatherization and behavioral programs, resulting in 2042 emissions reductions of 452,000 MT CO_2e at a cost of $577 million.
- Promotion of Hybrid Heating Systems: Program to have residential customers install non-cold climate heat pumps for heating in moderate temperatures, retaining gas furnaces for cold

[19] Id., p 51.

[20] Id.

[21] National Fuel Gas. 2022. *Initial Long-Term Plan* (NFG Initial Long-Term Plan), p. 24-25 and 29. https://www.nationalfuel.com/wp-content/uploads/documents/NFGDC-Initial-Long-Term-Plan-22-G-0610-12.22.22.pdf.

[22] NFG Initial Long-Term Plan, p. 44.

[23] NFG calls its preferred plan "National Fuel's Long Term Plan." We use the term "Preferred Plan" for the scenario and "Long-Term Plan" for the document.

[24] National Fuel Gas. 2022. *Initial Long-Term Plan: Executive Summary* (NFG Long Term Plan Executive Summary), p. 10-13 https://www.nationalfuel.com/wp-content/uploads/documents/NFGDC-Initial-Long-Term-Plan-Executive-Summary-22-G-0610-12.22.22.pdf.

weather, referred to as "hybrid heating systems" (cold-climate heat pumps for residential customers—which are widely available, cost competitive, and required by State and Federal rebate programs—are not included in the Preferred Plan).

- Leveraging Existing Infrastructure to deliver low-carbon fuels: Including blending hydrogen into the gas stream to a target of 5 percent in 2039. RNG levels are based on an optimistic growth scenario, utilizing RNG form landfills, animal manure, food waste, and wastewater facilities in western New York.

According to NFG, its Preferred Plan is projected to result in 5,755,000 MT CO2e GHG emissions, a reduction of 3,357,000 MT CO2e, equivalent to a 37 percent reduction by 2042 from the reference case, and 51 percent from 1990 levels.[25] NFG projects that its preferred plan will cost $3.025 billion dollars, including costs of equipment at the customer premises, incremental gas supply costs for RNG and hydrogen, and incremental energy bills for participating customers.[26] Implementing this will increase the typical residential monthly natural gas bill of customers that have not converted electricity to $206 in 2042, compared to $91 in 2024.[27]

3. Concerns with NFG's Initial Long-Term Plan

3.1. What are the proper approach and elements of a strong plan?

At the outset, it is important to consider the characteristics of a good long-term plan for addressing energy and climate policy objectives. These include:

- Respect for, and consistency with, state policy.
    - Planning for a future that is inconsistent with state policy and stated goals will lead to one or both of these unacceptable outcomes: policy objectives are not met, or the utility will find itself outside the bounds of its plans and creating unnecessary risk for its investors and customers.
    - Comprehensive economic assessment requires consideration of the distribution of benefits and costs across customers. In New York, this means consideration of impacts on low- and moderate-income customers and disadvantaged communities, who are specifically identified in state policy.[28]
- Respect for customer-facing economics presented in each scenario considered, and explicit identification of policies or programs to change those economics where necessary to achieve policy or planning outcomes.

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[25] NFG Long-Term Plan Executive Summary, p. 7.

[26] Id., p. 8-9.

[27] NFG Initial Long-Term Plan, p. 53.

[28] See, Woolf, T., A. Napoleon, A. Hopkins PhD, and K. Takahashi. 2021. Long-Term Planning to Support the Transition of New York's Gas Utility Industry. Available at: https://www.synapse-energy.com/sites/default/files/Synapse_Long-Term%20Planning%20to%20Support%20the%20Transition%20of%20New%20York%27s%20Gas%20Utility%20Industry.pdf.

    - Customers have agency to make choices regarding their buildings, and they will act (in general) in a manner consistent with their economic interest. This means that scenarios dependent on electrification depend on attractive customer economics for heat pumps, and it also means that scenarios dependent on customers retaining gas service depend on gas rates and equipment costs that make that an attractive option.
    - System-level cost analysis does not tell the whole story, especially if that analysis depends on a situation where customer economics is inconsistent with the assumed behavior.
- Transparent accounting for GHG emissions from the full lifecycle of energy production, transmission, distribution, and use, including leaks and losses.
    - Consistency with CLCPA emissions accounting and targets is essential to making sure the plan legitimately addresses the issues that will arise when meeting those emission reduction levels.
- A keen sense of the timescale of market transformation and stock turnover, as well as the timescale of utility infrastructure lifetimes and depreciation rates, in the context of the limited years remaining to achieve net zero.
    - There is path dependency in how net zero can be achieved. Delays can result in promising pathways becoming unattainable within the timeframe necessary to achieve the state's climate mandates, or more expensive due to stock turnover timeframes or required changes in depreciation rates.
- Careful consideration of the risk of failure along different pathways, as well as the path dependence which limits the ability to change course in the event of failure.
    - Counting on technologies or fuels that are not available, are more expensive than expected, or pose other concerns, and thereby delaying the adoption of available options, is inconsistent with prudent utility planning.
    - Plans should consider brittleness of outcomes in the event that the timing, cost, availability, or performance of technologies or fuels do not align with the plan's expectations, and should be flexible enough to adapt to unforeseen events.
- Connecting utility business and financial models with utilities' potential roles to enable and accelerate the pursuit of net zero.
    - Plans should include explicit analysis of utility financial parameters such as rate base, depreciation rates, operations and maintenance costs, and capital investment, alongside customer rates and bills.
    - Plans should identify assets at risk of becoming stranded, alongside the circumstances in which they would become stranded, and discuss options to mitigate this risk.
- Avoiding unplanned catastrophic reduction in gas use and the associated stranded costs.
    - Customer defection from the gas system to the electric system (including thermal energy networks) is expected, is being supported by the state and federal governments, and can be reasonably forecast. Plans should account for customer defections and identify and quantify the risk of accelerating any unplanned customer departure,

through analysis of customer economics and sensitivity analysis regarding unexpected but plausible scenarios.[29]

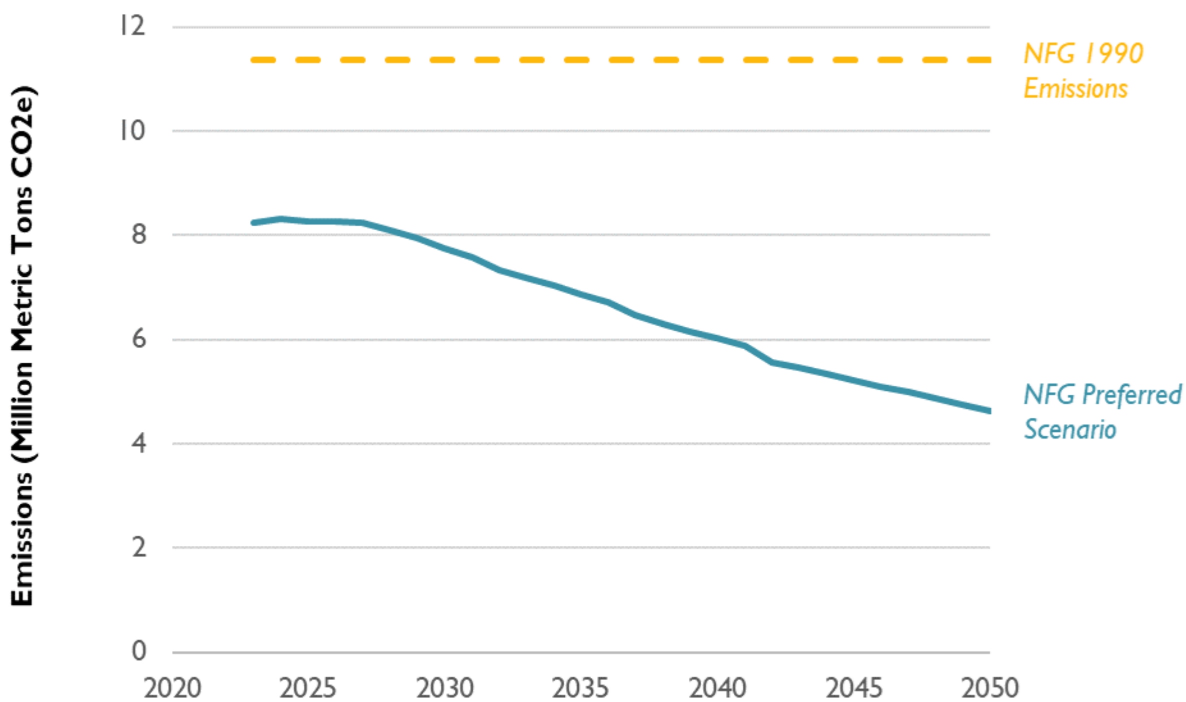
3.2. NFG's Plan is inconsistent with State policy and Commission guidance

NFG's Plan is not consistent with CLCPA

As described above, the CLCPA requires a 40 percent reduction in economy-wide GHG emissions by 2030 and no less than 85 percent reduction in economy-wide GHG emissions by 2050 from 1990 levels.

NFG's Preferred Plan is not aligned with the CLCPA's emissions reduction targets for two reasons. First, it does not reduce emissions by 40 percent by 2030, achieving only 34 percent. In 2042, NFG's Preferred Plan only reduces emissions from a 1990 baseline by 51 percent. Second, assuming customer counts and gas sales continue based on 2023 to 2042 trends in NFG's service territory, NFG will only reduce emissions by 59 percent relative to a 1990 baseline in 2050.

Figure 1. NFG Preferred Plan Emissions



[29] Excerpted from Hopkins, A.S., S. Kwok, A. Napoleon, C. Roberto, K. Takahashi. 2021. *Scoping a Future of Gas Study: In support of Massachusetts DPU Case No. 20-80*. Prepared for Conservation Law Foundation. Available at: https://www.synapse-energy.com/scoping-future-natural-gas-study-massachusetts-dpu-case-no-20-80.

NFG's Plan is not aligned with the Final Scoping Plan

The Final Scoping Plan identifies the actions required across different sectors to achieve the state's climate goals. These actions achieve a reduction in economy-wide GHG emissions of 40 percent by 2030 and 85 percent by 2050 from 1990 levels.[30] As described above, the final Scoping Plan was based on an Integration Analysis of the benefits, costs, and GHG emissions reductions of scenarios to achieve the CLCPA emission limits. This analysis found electrification to be the source of the majority of emissions reductions for achieving CLCPA compliance:

> "the largest reductions [in emissions] are achieved through building and transportation electrification. Because of the extremely clean power sector in New York, even in the Reference Case, electrification of fossil fuel consuming devices has a large GHG reduction benefit, both due to increased efficiency of electric devices and due to a fuel switch from fossil combustion to relatively clean electric generation. *Even in Scenario 2 [Strategic Use of Low-Carbon Fuels], the reductions achieved by low carbon fuels are relatively small*, due to the treatment of low-carbon fuels in the Climate Act gross emissions accounting framework."[31] [emphasis added.]

In order to achieve CLCPA requirements, the Integration Analysis modeled space heating equipment stock as predominantly electric heat pumps with no fuel backup. In Scenario 2 (Strategic Use of Low-Carbon Fuels), 70 percent of heat pumps are Air Source Heat Pumps with no fuel backup, and 20 percent are ground source heat pumps. In Scenarios 3 (Accelerated Transition Away from Combustion) and 4 (Beyond 85% Reduction), 77 percent of heat pumps are air source with no fuel backup, and the remaining 23 percent are ground source heat pumps.[32] Also, this analysis did not include any scenarios with more than 10 percent of buildings having fuel backup.[33] Furthermore, the Integration Analysis did not consider extensive use of alternative gases in buildings: none of the three CLCPA-compliant scenarios include more than 7 percent of residential building space heating equipment stock that runs on alternative gases.[34]

In short: the 2021 Draft Scoping Plan did not contemplate using lower-carbon fuels in sectors that have low-cost commercially available options, such as electrification of space and water heating end uses in residential buildings. In the Draft Scoping Plan, none of the scenarios included more than a limited role for biofuels, and these fuels were reserved for difficult-to-electrify applications, including medium- and

[30] NYS Scoping Plan, p. 1.

[31] New York State Climate Action Council. 2021. *Draft Scoping Plan, Appendix G: Integration Analysis Technical Supplement*, p. 27.

[32] New York State Climate Action Council. 2021. *Draft Scoping Plan, Appendix G: Integration Analysis Technical Supplement, Annex 2*, Scenario Detail tab. IA-Tech-Supplement-Annex-2-Key-Drivers-Outputs.xls.

[33] Scenarios 3 (Accelerated Transition Away from Combustion) and 4 (Beyond 85% Reduction) see no fuel backup of heat pumps in buildings. Even the Integration Analysis's Scenario 2, Strategic Use of Low-Carbon Fuels, assumed only 10 percent of heat pumps would have fuel backup. (IA-Tech-Supplement-Annex-2-Key-Drivers-Outputs.xls, Scenario Detail tab.)

[34] New York State Climate Action Council. 2021. *Draft Scoping Plan, Appendix G: Integration Analysis Technical Supplement, Annex 2*, tabs S2_Space heating-Res, S3_Space heating-Res, and S4_Space heating-Res. IA-Tech-Supplement-Annex-2-Key-Drivers-Outputs.xls.

heavy-duty vehicles and high-temperature industrial.[35] NFG's Initial Long-Term Plan and Preferred Plan appear to ignore these findings of the Draft Scoping Plan.

The Long-Term Plan and NFG's Preferred Plan is even further out of alignment with the Final Scoping Plan, which indicates that to achieve the climate targets, "*a substantial reduction of fossil natural gas use and a strategic downsizing of the gas system"* is required.[36] Yet, the Preferred Plan takes no steps towards targeted retirements and customer transition to electricity.

- The Final Scoping Plan envisioned the transition of a vast majority of current fossil natural gas customers to electricity by 2050 and natural gas use reductions statewide by at least 33 percent by 2030 and by 50 percent by 2035.[37] NFG's scenario modeling is misaligned with this requirement. By the end of the analysis period, the Company retains a majority of residential and commercial customers. For the aggressive scenario, NFG assumed that 48 percent of furnaces and 42 percent of boilers for the residential class are converted to full electrification by 2042. The electrification assumptions for commercial customers are similar; by 2042, 45 percent of furnaces and 40 percent of boilers are converted to full electrification.[38] Thus, it is not clear whether the aggressive scenario, which pursues electrification more aggressively than the NFG's preferred plan, is consistent with the Scoping Plan's expectations on electrification.

- The Final Scoping Plan envisions a "scenario of targeted retirements" and "moving whole streets or neighborhoods at a time from gas infrastructure to a community-based thermal energy network that supports heat pumps."[39] In contrast, NFG recognizes targeted retirements as a decarbonization action, however it was not included in the scenario modeling.[40] NFG states that it would *"consider NPAs as an alternative to replacement of leak-prone pipe if circumstances indicate that it may be possible to abandon segments that would otherwise need to be replaced."*[41]

Ultimately, to be aligned with the Final Scoping Plan, NFG's Revised Long-Term Plan must include a scenario analysis that is fully aligned with the Scoping Plan, and that identifies the Company's options for strategic downsizing of the gas system. This is necessary, even if statutory barriers would make implementation a challenge, in order to (1) create transparency and ensure that the utility does not foreclose its best available options for downsizing the system (for example, by replacing leak-prone pipe that was not actively leaking and could have been abandoned in favor of an NPA), (2) to ensure that electric utilities, stakeholders, and the broader public have insight into locations where pipe is most likely to be abandoned in favor of electrification, and (3) to identify the extent to which statutory

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[35] New York State Climate Action Council. 2021. *Draft Scoping Plan, Appendix G: Integration Analysis Technical Supplement.*
[36] NYS Scoping Plan, p. 20.
[37] Id., p. 350.
[38] NFG Initial Long-Term Plan, p. 41.
[39] NYS Scoping Plan, p. 351.
[40] NFG Initial Long-Term Plan, p. 23.
[41] Id., p. 62.

barriers are making the transition of the gas system more difficult, expensive, or inequitable. As discussed below, NFG's Long-term Plan does not include all of the options available to NFG for downsizing its gas system; for example, it fails to incorporate cost-effective electrification alternatives, such as cold-climate heat pumps as well as utility thermal energy networks.

NFG's Plan is inconsistent with Commission guidance

The Commission's Gas Planning Order requires the gas utilities to include a "no infrastructure" scenario in their long-term plans, unless the utility can demonstrate that such a scenario is not feasible for a particular project, or portion of its long-term plan.[42] The Gas Planning Order also requires the gas utilities to identify "locations of specific segments of LPP that could be abandoned in favor of NPAs and where infrastructure projects may be needed in the near future to maintain reliability" within their annual reports.[43] The order does not specify whether this requirement applies to the long-term plans as well as the interim annual reports; however, such information is important for a thorough examination of resource needs and options, which is a primary function of the long-term plans. In contrast, the annual reports are described as "a useful check-in on the [local distribution company's] progress in implementing its long-term plan."[44] Indeed, the Gas Planning Order asserts that that local distribution companies "should be strategic when planning the removal of LPP and plan in a cost-effective manner that reduces unnecessary investments."[45] The ability to use NPAs to retire segments should be central to any gas resource plan, consistent with the guidance provided by the Final Scoping Plan.

In the case of NFG, the ability to avoid capital investments to replace leak-prone pipe represents a major opportunity for cost savings. Approximately one-fifth of NFG's distribution system (1390 miles of utility main) is considered leak prone.[46] Moreover, NFG's system is highly redundant because mains are typically installed on both sides of the street.[47] As a result, NFG has considerable opportunity to abandon pipe, potentially without removing any customers from the system. Despite this, NFG's Initial Long-Term Plan fails to take NPAs into account, and thus the Plan must be deemed insufficient and incomplete.

NFG claims it complied with the Gas Planning Order's "No Infrastructure" scenarios requirement because its circumstances do not call for any new capacity related capital investments to meet demand growth or address moratoria concerns under the Reference Case or the two alternative scenarios;[48]

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[42] Gas Planning Order, p. 37.

[43] Id., p. 39.

[44] Gas Planning Order, p. 22.

[45] Id.

[46] NFG Initial Long-Term Plan, p. 35; Pipeline and Hazardous Materials Safety Administration, Gas Distribution Annual Data – 2010 to Present, U.S. Dep't of Transp., (last updated Mar. 6, 2023), https://www.phmsa.dot.gov/data-and-statistics/pipeline/gasdistribution-gas-gathering-gas-transmission-hazardous-liquids.

[47] National Fuel Gas Distribution Corporation, Stakeholder Information Session Presentation, Case Nos. 20-G-0131 & 22-G-0610 (Nov. 16, 2022), at slide 78, https://www.nationalfuel.com/wp-content/uploads/documents/NFG-Stakeholder-Event-11-16-22-Compiled-Final-Draft.pdf.

[48] NFG Initial Long-Term Plan, p. 25.

however, under all scenarios NFG assumes it will replace and repair all leak prone pipe in its service territory by 2035, which will require continuing the current pace of replacing approximately 110 miles of pipe per year.[49] NFG projects that its capital expenditures will continue to be driven by the Company's leak-prone pipe replacement program, increasing from a total of approximately $90 million in FY 2023 to approximately $113 million in FY 2034.[50] The Initial Long-Term Plan does not consider any use of NPAs to control these costs. In its scenarios, NFG did not include targeted network abandonment. As noted above, NFG indicates that it will consider NPAs instead of leak-prone pipe replacement, under certain circumstances, but only intends to identify candidate segments in its annual reports.[51] NFG's failure to provide such information and to include targeted network abandonment as a strategy are critical flaws in its plan and blatant violations of the Commission's Gas Planning Order.

NFG's Plan is not aligned with the depreciation study scenarios

In the Gas Planning Order issued on May 12, 2022, the PSC directed the gas utilities to file depreciation studies with three scenarios: "(1) a scenario that fully depreciates all new gas plant installed beginning in 2022 by 2050; (2) a scenario that fully depreciates all gas plant by 2050; and (3) a scenario that assumes 50 percent of gas customers exit the gas system by 2040 and that 10 percent of gas customers remain after 2050."[52] The intention was that these would "inform future discussion on how best to recover the costs of assets and reduce potential stranded costs."[53]

The Long-Term Plan is inconsistent with the NFG depreciation studies in at least two areas. While recognizing that these are two separate reports, creation of shared, consistent scenarios and assumptions between the two would support policy discussions in the future.

First, the modeled scenarios in the Long-Term Plan assumed existing cost recovery ratemaking principles and assume recovery based on existing depreciation methodology[54] for the modeled scenarios.

Secondly, the aggressive scenario that NFG considered is inconsistent with the aggressive scenario defined for the depreciation study. In the aggressive scenario in the Long-Term Plan, NFG projects that less than 50 percent of furnaces and less than 50 percent of boilers are converted to full electrification by 2042.[55] Even accounting for the different timeframes, the aggressive scenario is inconsistent with the depreciation study assumption that 50 percent of gas customers exit by 2040 and that 10 percent of gas customers remain after 2050.

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[49] Id., p. 34.

[50] Id., p. 35.

[51] Id., p. 23.

[52] State of New York Public Service Commission. Order Adopting Gas System Planning Process, Case No. 20-G-0131 and Case No. 12-G-0297, May 12, 2022, p. 61.

[53] Id.

[54] Initial Long-Term Plan, p. 21.

[55] Id., p. 42.

The inconsistencies between the Long-Term Plan and deprecation study create an analytical gap. These two reports seem to exist in different worlds and cannot be used in conjunction.

3.3. NFG used unreasonable assumptions for alternatives to fossil gas

Building electrification

NFG used unreasonable assumptions for heat pumps. First, it used 30 degrees as switchover for heat pumps, which is not optimal. While efficiency declines with temperature, cold-climate heat pumps operate efficiently even as low as 5 degrees F.[56] Assuming a switchover point as high as 30 degrees F represents an inefficient use of resources. If such a scenario is adopted and customers are told to switch to gas at 30 degrees, more gas will be consumed than necessary and more emissions will be released. Also, widespread hybrid heating means that some customers will remain on the gas system longer than necessary, extending the life of the system and potentially saddling ratepayers and shareholders with higher levels of stranded costs.

Second, NFG did not include cold-climate heat pumps in its modeling. NFG dismisses this technology based on cost. However, there is a negligible or nonexistent cost premium for cold-climate heat pumps, according to a study conducted by Navigant for Massachusetts. As shown in Table 1, total installed costs of regular and cold-climate ductless mini-split heat pumps (DMSHP) are comparable. A small cost premium, if there is one, would be easily made up for by the energy savings of cold-climate heat pumps.

[56] Cadmus Group. 2017. *Evaluation of Cold Climate Heat Pumps in Vermont,* Figure 14. Available at: https://publicservice.vermont.gov/sites/dps/files/documents/Energy_Efficiency/Reports/Evaluation%20of%20Cold%20Climate%20Heat%20Pumps%20in%20Vermont.pdf.

Table 1. Total installed cost of DMSHP systems at common SEER-HSPF combinations

Capacity, kBtu/h	Number of Zones	Base Case 15 SEER, 8.2 HSPF	Lower Rebate Threshold 18 SEER, 10 HSPF		Upper Rebate Threshold 20 SEER, 12 HSPF		Above Current Rebate Levels 28 SEER, 14 HSPF	
		Regular	Regular	Cold Climate	Regular	Cold Climate	Regular	Cold Climate
9 ± 1.5	1	$3,643	$3,860	$3,993	$4,212	$4,035	-*	$4,419
12 ± 1.5	1	$3,717	$3,957	$4,058	$4,407	$4,199	$4,407	$4,515
18†	1	$4,276	$4,475	$4,646	$4,956	$4,812	-‡	-‡
24 ± 3	1	$4,586	$4,811	$5,016	$5,256	$5,176	-*	-*
24 ± 3	2	$6,263	$6,679	$7,060	-*	-*	-*	-*
24 ± 3	3	$7,434	$7,852	$8,202	-*	-*	-*	-*
30 ± 3	3	$7,962	$8,024	$9,049	-*	-*	-*	-*
36 ± 3	4	$8,857	$8,857	$10,438	-*	-*	-*	-*

* The evaluation team could not identify any systems available on the market with this combination of capacity, zones, and efficiency levels.

† The evaluation team estimated the equipment costs for 18 kBtu/h using linear interpolation between the equipment costs at 12 kBtu/h and 24 kBtu/h. Based on contractor survey data, the team assumed that installation costs for 18 kBtu/h systems are the same as for 24 kBtu/h systems.

‡ Since the 18 kBtu/h data was estimated based on data for 12 and 24 kBtu/h systems, it could only be calculated for system configurations that are available at both the 12 and 24 kBtu/h capacities.

Source: Navigant. 2018. Ductless Mini-Split Heat Pump Cost Study (RES 28): Final Report. Prepared for the Electric Program Administrators of Massachusetts Part of the Residential Evaluation Program Area.

Third, as discussed above, NFG's Initial Long-term Plan also ignores state and electrification incentives, rebates and tax incentives from the 2022 Inflation Reduction Act (IRA) and other recent federal legislation and state incentives for heat pumps that are available from the electric utilities. These policies will further increase the economic benefits of all-electric homes over all-gas or hybrid gas.

Fourth, NFG failed to account for continued improvements in heat pump technologies and performance over time as the market grows. For example, the National Renewable Energy Laboratory's (NREL) *Electrification Futures Study* projects that efficiencies of residential air-source heat pumps will improve by approximately 65 percent to a COP of over 4 by 2035 under the study's "Moderate Advancement" scenario, and by over 85 percent to a COP of about 4.5 under a more advanced technology scenario.[57] The NREL study also projects that COP values will continue to improve through 2050. Further, NREL's study projects declining costs for heat pumps. More specifically, the study projects that the cost of residential ASHPs will decline by about 25 percent or more by 2050 from the current level under the Moderate Advancement scenario and by over 35 percent under a more advanced technology scenario.[58]

[57] NREL. 2017. *Electrification Futures Study: End-Use Electric Technology Cost and Performance Projections through 2050*. Figure 20. Available at: https://www.nrel.gov/docs/fy18osti/70485.pdf.

[58] Id.

These errors lead NFG to conclude that full electrification of buildings is too expensive, and as a result NFG did not incorporate this approach in its preferred plan. This is a major shortcoming that severely limits the usefulness of NFG's analysis. All-electric homes are already cost-effective for new construction, and electric and gas space heating are nearing cost parity for building retrofits in many parts of the country. This is even more likely to be true given tax and rebate incentives that will soon be available pursuant to the IRA, electrification incentives available from electric utilities, and improvements in heat pump technologies and performance over time as the market grows.

The benefits from transforming in-building heating and hot water systems that currently rely on combustion of fossil fuels to clean, super-efficient systems using renewable electricity are tremendous. And making New York's buildings more efficient will make them more comfortable and affordable to operate. Moreover, electrified buildings can also be active participants in a two-way optimized clean electric system, providing responsive load and reducing the costs of building out our clean, resilient grid powering our buildings and transportation.

Renewable Natural Gas

NFG indicates that it used the 20-year GWP for RNG, as required by the CLCPA. However, it appears that NFG converts the lifecycle emissions intensity of RNG from a 100-year GWP to a 20-year GWP incorrectly. The first step in this conversion is to determine the share of lifecycle emissions attributable to methane (as opposed to carbon dioxide). NFG fails to justify that values that it uses in this calculation. It cites three sources, two of which are simplistic primers on anaerobic digestion, and none of which clearly address the portion of lifecycle emissions attributable to each GHG.[59] Instead, NFG appears to use the volumetric percentage of RNG that is methane, which is a fundamentally different quantity and cannot be substituted directly into the calculation. NFG should either provide additional details to justify its assumptions and should update its GWP calculations, if appropriate.[60]

In addition, NFG is claiming all available RNG supplies from its service area[61] for use in buildings, but buildings generally have better commercially available, low-cost alternatives than other sectors. Other demands for the RNG potential in NFG's area or in other areas of the state may not have cost-effective, readily available alternatives. It is also unclear whether NFG takes into account the cost of infrastructure to connect RNG supplies to its system as well as the cost of retaining the environmental attributes associated with the RNG supply in order to claim the emission reduction benefits for its customers. As such, NFG's assumption that it can use all of the RNG potential to serve its customers is unreasonable and unsupported by any analysis or rationale.

Importantly, RNG is not inherently an environmental solution due to the harmful environmental impacts associated with certain feedstock sources and leakage rates. The lifecycle emissions from various

[59] NFG Initial Long-Term Plan: Appendix A, p. A-23.

[60] Because factors such as leakage rates strongly influence the lifecycle emissions impact of RNG, NFG should also clearly state the assumptions underlying the 100-year GWP lifecycle emissions intensities that are the starting point of this calculation.

[61] NFG Initial Long-Term Plan, p. 57.

sources of feedstocks for biomethane must be carefully examined to ensure a net positive environmental impact. Biomethane is often presented as "zero carbon" because the organic material it is made from has absorbed carbon from the atmosphere and would have released that carbon when it decomposes as part of a natural carbon cycle. However, a full evaluation of the climate impacts of biomethane must account for (1) the energy required to produce it, (2) whether the source creates new methane, and (3) how much methane leaks during production and distribution.[62] Methane has a very high short-term global warming potential (more than 80 times carbon dioxide), and under the CLCPA carbon accounting must incorporate the 20-year and 100-year global warming potential, so methane leakage is a particular near-term climate liability.

In addition to potentially net-positive carbon emissions, RNG also produces toxic air pollutants that are harmful to human health. Biomethane continues the combustion of methane, which creates nitrogen oxides ("NOx") and other harmful air pollutants. NOx pollution can lead to respiratory problems, from coughing and wheezing to decreased lung function. Biomethane does not avoid the many health harms of fossil gas, because its chemistry and use are the same as fossil gas.

Hydrogen

There is also a concern with how the strategy unfolds after the analysis period. Hydrogen produced with renewable energy can have zero GHG emissions, but hydrogen produced this way is not cost-competitive.[63] Further, its production involves large amounts of renewable electricity, and large energy losses, and its combustion creates significant local air pollution. In addition, at over 5 percent of volume in the gas stream, hydrogen could pose safety, cost, and feasibility concerns for distribution within the existing pipeline network and for consumption by existing customer-owned natural gas end-use equipment.[64] In order to mix in higher amounts of hydrogen, the existing distribution system likely needs substantial modification. This is because some metals become brittle when exposed to hydrogen and because end-use equipment is not designed to burn hydrogen safely.

Thermal energy network development

As part of its Preferred Plan, NFG plans to install one networked geothermal system per year in a newly constructed 50-home subdivision starting in 2027.[65] Networked geothermal systems consist of vertical

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[62] Merrian Borgeson, *A Pipe Dream or Climate Solution? The Opportunities and Limits for Biogas and Synthetic Gas to Replace Fossil Gas*, NRDC, 6, (June 2020), https://www.nrdc.org/sites/default/files/pipe-dream-climate-solution-bio-synthetic-gas-ib.pdf.

[63] Howarth, R., Jacobson, M. 2021. "How green is blue hydrogen?" *Energy Science & Engineering*: 12. August. Available at https://onlinelibrary.wiley.com/doi/full/10.1002/ese3.956.

[64] Penchev, M., T. Lim, M. Todd, O. Lever, E. Lever, S. Mathaudhu, A. Martinez-Morales, and A.S.K. Raju. 2022. *Hydrogen Blending Impacts Study Final Report*. Agreement Number: 19NS1662. California Public Utilities Commission. Available at: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M493/K760/493760600.PDF. See also, Melaina, M., Antonia, O., Penev, M. 2013. *Blending Hydrogen into Natural Gas Pipeline Networks: A Review of Key Issues*. National Renewable Energy Laboratory Technical Report NREL/TP-5600-51995. Available at: https://www.nrel.gov/docs/fy13osti/51995.pdf.

[65] NFG Initial Long-Term Plan, p. 50.

geothermal boreholes connected by pipes that circulate ambient temperature water to buildings on the network. A heat pump located within each building draws heat from the water (to heat the building) or expels heat into the water (to cool the building). Along with other states in the northeast,[66] New York is interested in this technology as a building decarbonization strategy and recently passed a law requiring gas utilities to construct networked geothermal pilots in each major utility territory.[67]

NFG finds that thermal energy networks are a particularly expensive measure to reduce GHG emissions reductions.[68] However, its Preferred Plan analysis only considers a sub-optimal application for this technology. The primary advantage of networked geothermal systems over individual air- or ground-source heat pumps comes from energy efficiency; networked systems can be even more efficient than individual heat pumps when the system has load diversity from various different building and end-use types (e.g., heating and cooling demands occurring at the same time from different buildings), resulting in lower net loads for the entire system. For example, on a networked system, a grocery store that requires cooling for its refrigerators could reject heat into the shared geothermal loop, while a home that requires space heating could withdraw that same heat down the street. This reduces the total borehole length necessary to serve load on the system, which lowers installation costs and improves system economics. As a result, networked geothermal systems are best-suited for mixed-use neighborhoods containing buildings with a variety of heating and cooling needs.[69] In contrast, NFG only considered installing the systems in residential neighborhoods composed entirely of single family homes,[70] which would have relatively similar load profiles. Future iterations of the Long-term Plan should consider networked geothermal in mixed-use developments to fully capture their potential benefits.

3.4. NFG's Preferred Plan lacks financial viability

Synapse conducted modeling to better understand the rate, financial, and emissions impacts of NFG's preferred scenario. Using its Gas Rate Model (GRM),[71] Synapse first modeled NFG's Preferred Plan as

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[66] For example, Eversource and National Grid in Massachusetts are also piloting this technology.

[67] State of New York. 2022. *An Act to amend the public service law, the transportation corporations law, the labor law and the public authorities law, in relation to thermal energy networks*. Senate Bill S9422. Available at: https://www.nysenate.gov/legislation/bills/2021/S9422.

[68] NFG Initial Long-Term Plan, p. 52.

[69] Buro Happold Ltd. 2019. *GeoMicroDistrict Feasibility Study*. Prepared for HEET.

[70] NFG Initial Long-Term Plan: Appendix A, p. A-20.

[71] The GRM allows Synapse to project gas or electric utility rates based on different scenarios for utility investment, sales, and financial models. Synapse used input data from annual utility reports to state regulators, alongside data from the Pipeline and Hazardous Materials Safety Administration (for gas pipeline investment data) and rate cases (such as depreciation and cost-of-service studies) to build a model of the past up to the present. The model tracks utility plant in service, depreciation, capital additions and retirements, operations and maintenance, and income taxes. It accounts for capital structure and changes in tax rates. Looking forward from the present, the model allows testing scenarios for different levels of investment and customer growth or decline, pipeline replacement programs, early retirements, stranded costs, and changes in depreciation rates. Synapse has developed ways to map changes in customer numbers to changes in miles of pipeline in service and other aspects of capital plant.

described in the Initial Long-Term Plan document and appendices.[72] NFG did not include volumetric total gas sales for its Initial Long-term Plan in its analyses. As such, Synapse adjusted NFG's reference case gas sales based on the utility's emissions projections in its Initial Long-Term Plan.

NFG Preferred Plan Scenario

Inputs

This scenario included updating NFG's reference case gas sales from the Initial Long-Term Plan documentation to account for the projected decrease in emissions from the utility's Preferred Plan scenario. Accordingly, the modeled NFG Preferred Scenario includes a 23 percent decrease in total volumetric gas sales between 2023 and 2050. Synapse also used NFG's projection for RNG volumetric throughput through 2042 and projected the RNG volume through 2050 using the same growth rate in throughput as in the previous nine years. Finally, Synapse assumed the volume of hydrogen incorporated into the gas sale volume increased to 5 percent of sales by 2039 and held constant at 5 percent through 2050.

NFG's Initial Long-term Plan included RNG prices based on the average RNG production cost by feedstock type. However, this assumes that all RNG feedstocks would be sold at the individual manufacture's production cost. Instead, Synapse expects that RNG suppliers would sell their fuel at the marginal feedstock manufacture's production cost, in order to maximize profits. As such, Synapse used NYSERDA's "Potential of Renewable Natural Gas in New York State" study, prepared by ICF, to determine the marginal price estimates for each RNG feedstock.[73] This is the same source NFG used to determine its average prices.

Synapse used NFG's estimates for green hydrogen prices,[74] as detailed in the Initial Long-Term Plan. For fossil gas prices through 2050, Synapse used the U.S. Energy Information Administration's (EIA) AEO 2022 Henry Hub spot price projections. Based on these assumptions, Synapse then took a weighted average of fuel price based on annual gas throughput volume (including RNG by feedstock, hydrogen, and fossil gas), to determine one total gas throughput price for consumers.

Finally, the NFG Preferred Plan Scenario assumes that customer counts are the same in NFG's reference case and the Initial Long-Term Plan. Synapse also assumed that the split between residential and commercial and industrial (C&I) customers and gas sales remain constant throughout the analysis period.

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[72] National Fuel Gas Distribution Corporation. December 2022. "Initial Long-Term Plan." Case 22-G-0610.

[73] ICF Resources. 2022. "Potential of Renewable Natural Gas in New York State." Prepared for New York State Energy Research and Development Authority. NYSERDA Report Number 21-34.

[74] Green hydrogen refers to hydrogen produced using renewable energy to power electrolysis.

Results

Based on these inputs, NFG's revenue requirement continues to grow through 2035, before flattening out through 2050, as shown in Figure 2.

Figure 2. NFG Preferred Plan Scenario revenue requirement

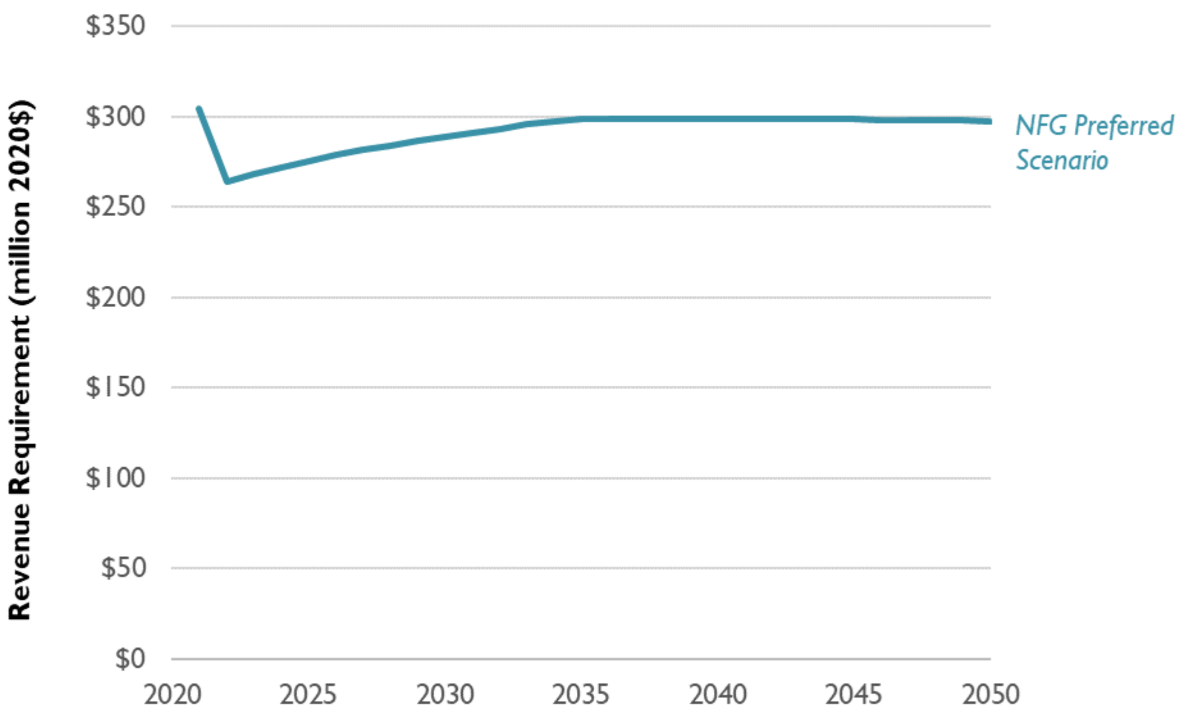
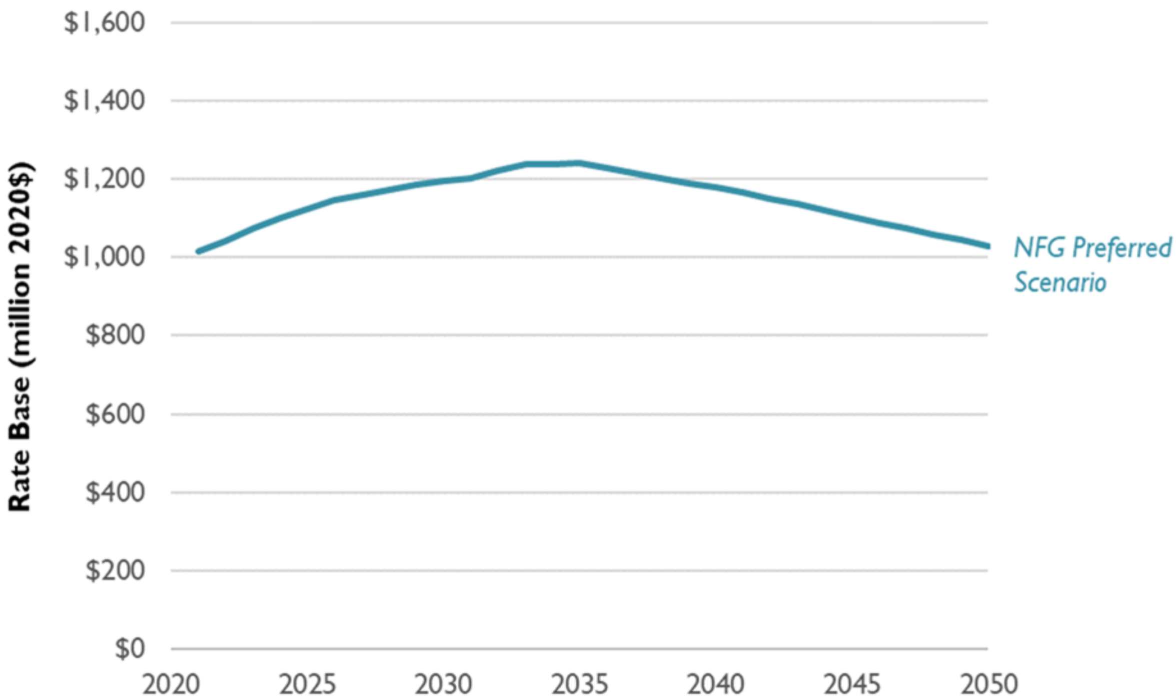


Figure 3 shows that, over the same time period, NFG's rate base increases roughly $200 million before decreasing back to its starting value.

Figure 3. NFG Preferred Plan Scenario rate base



In addition, customer rates steadily rise over the analysis period. The increase in rates is caused by the incorporation of RNG and hydrogen into the gas system, as these alternative fuel types are significantly more expensive than fossil gas. This leads to customer rates more than doubling from 2023 to 2050, shown in Figure 4 and Figure 5.

Figure 4. NFG Preferred Plan Scenario residential revenue per therm

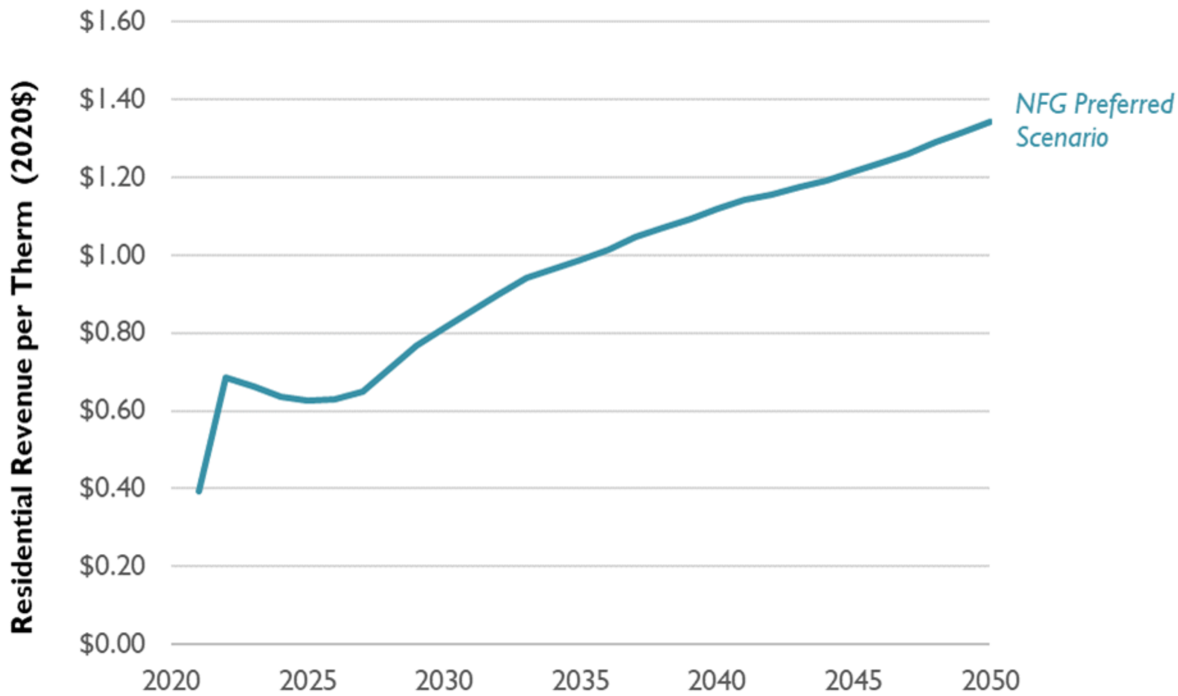
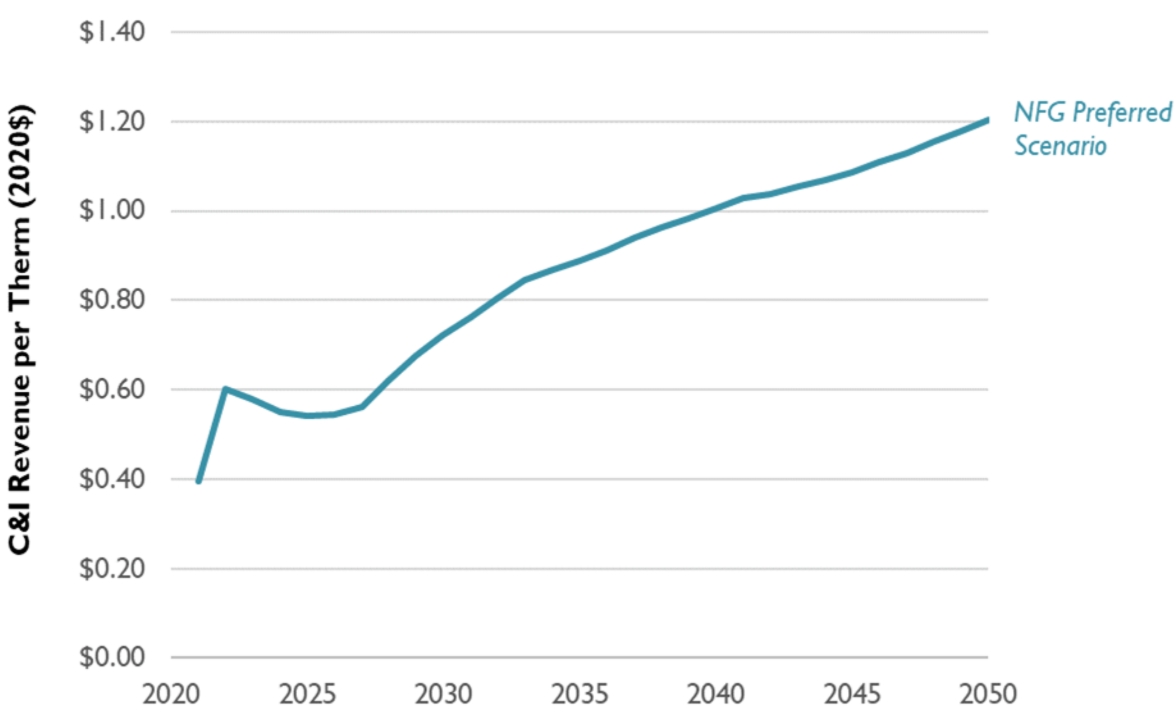


Figure 5. NFG Preferred Plan Scenario C&I revenue per therm



With rates more than doubling between 2023 and 2050, customers will be encouraged to leave the gas system to save money. As customers begin to depart the gas systems, costs for the remaining customers will increase so that NFG can recover its fixed costs.

NFG's Initial Long-Term Plan also ignores state and federal emissions policies and electrification incentives when assuming that no customers will depart the gas system by 2050. For example, as mentioned above, with rebates and tax incentives from the IRA)and other recent federal legislation, heat pumps and heat pump water heaters are cost-effective and attractive alternatives to gas appliances.[75] NFG also did not include any state incentives for heat pumps that are available from the electric utilities.[76] According to National Grid, the electric utility in NFG's service territory, their customers receive average rebates of $3,000 when they install an air source heat pump system, and $7,000 when they install a ground source heat pump system.[77] State and federal emissions policies and electrification incentives further increase the economic benefits of all-electric homes over all-gas or hybrid gas and electric homes, further encouraging customers to switch. This is compounded when taking into consideration additional measures that NFG would need to make to decrease its 2050 emissions to comply with the CLCPA emissions reductions requirements.

Customer Departures Scenario

Inputs

To determine what would happen to customer rates in NFG's territory if customer departures are higher than projected in NFG's Initial Long-Term Plan, Synapse modeled a second scenario, "Customer Departures." This scenario maintains most of NFG's assumptions from its Initial Long-Term Plan, as described above. However, the Customer Departures scenario decreases customers and gas sales through 2050. Synapse modeled the scenario assuming that 50 percent of NFG's customers leave the gas system by 2040 (from a 2023 baseline) and 90 percent of customers depart the system by 2050. Synapse assumed a corresponding decrease in total gas sales.

Within the gas sales, Synapse maintained the total RNG volumetric throughput established in NFG's Initial Long-Term Plan. Similarly, Synapse continued to assume that the hydrogen throughput in the system would increase to 5 percent of volumetric sales by 2039 and hold at 5 percent through 2050. As

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[75] The Efficiency Tax Credit covers 30 percent of the cost of qualified energy efficiency projects, up to $2,000 for heat pumps and heat pump water heaters. The IRA also created the High-Efficiency Electric Home Rebate Program, under which households earning less than 80 percent of the area median income (AMI) are eligible for a rebate of up to 100% of the project cost for electrification upgrades, including space and water heating heat pumps, other electric appliances, panel upgrades, insulation, and wiring. For households earning between 80% and 150% of AMI, rebates cover up to 50 percent of the project cost. (House Committee on Ways & Means and House Committee on Energy & Commerce. 2022. "The Inflation Reduction Act: Information on Energy Rebates and Tax Credits Available to Constituents to Help Them Save Money." Available at https://larsen.house.gov/uploadedfiles/11.29.22_inflation_reduction_act_ira_energy_rebate_and_tax_credit_information_fact_sheet.pdf).

[76] Charles River Associates., *Initial Findings Report: National Fuel Gas Distribution Corporation Initial Long-Term Plan Assessment* NYS DPS Case No 22-G-0610, 19, (Feb. 17, 2023).

[77] *See* https://www.nationalgridus.com/Upstate-NY-Home/Energy-Saving-Programs/Electric-Heating-Cooling .

a result, NFG would be able to eliminate fossil gas throughput in its system by 2050. This has a significant impact on the company's emissions.

Results

If NFG continues to plan for relatively stable customer counts and gas sales, it will continue to recover costs in a similar manner as today. At the same time, the utility's variable costs will decrease as customers and gas throughput decrease. As a result, the utility's revenue requirement and rate base will begin to decrease from 2023 through 2050, shown in Figure 6 and Figure 7.

Figure 6. Revenue requirement

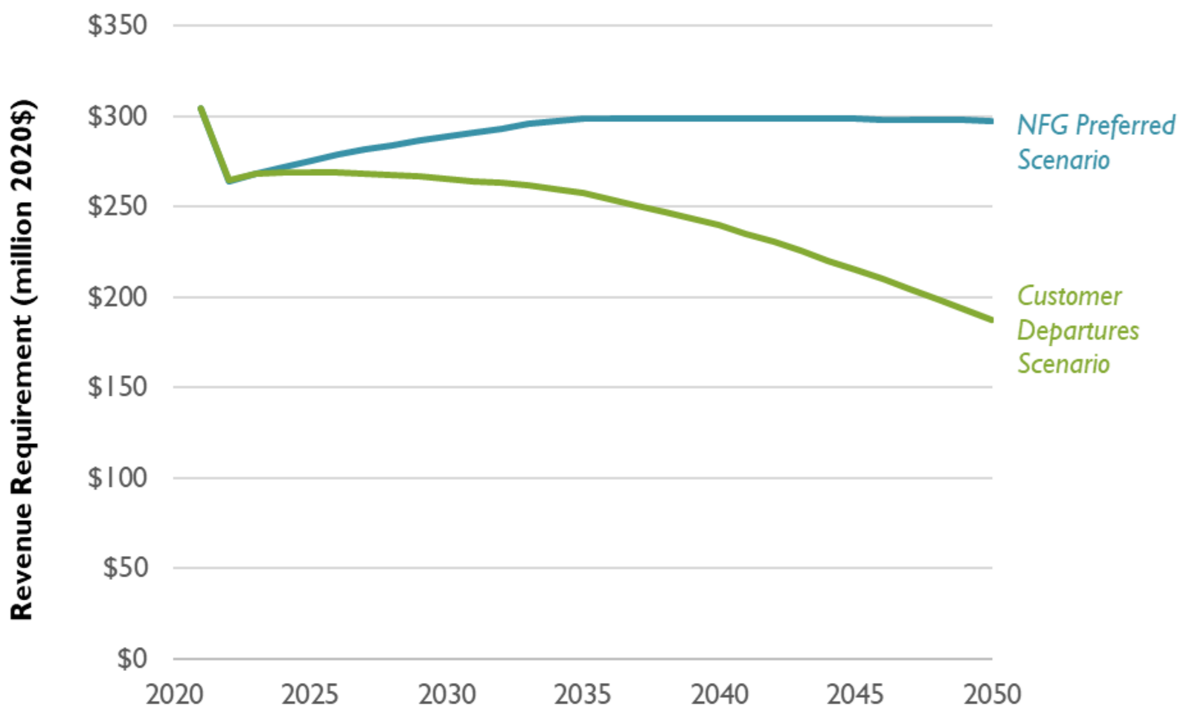
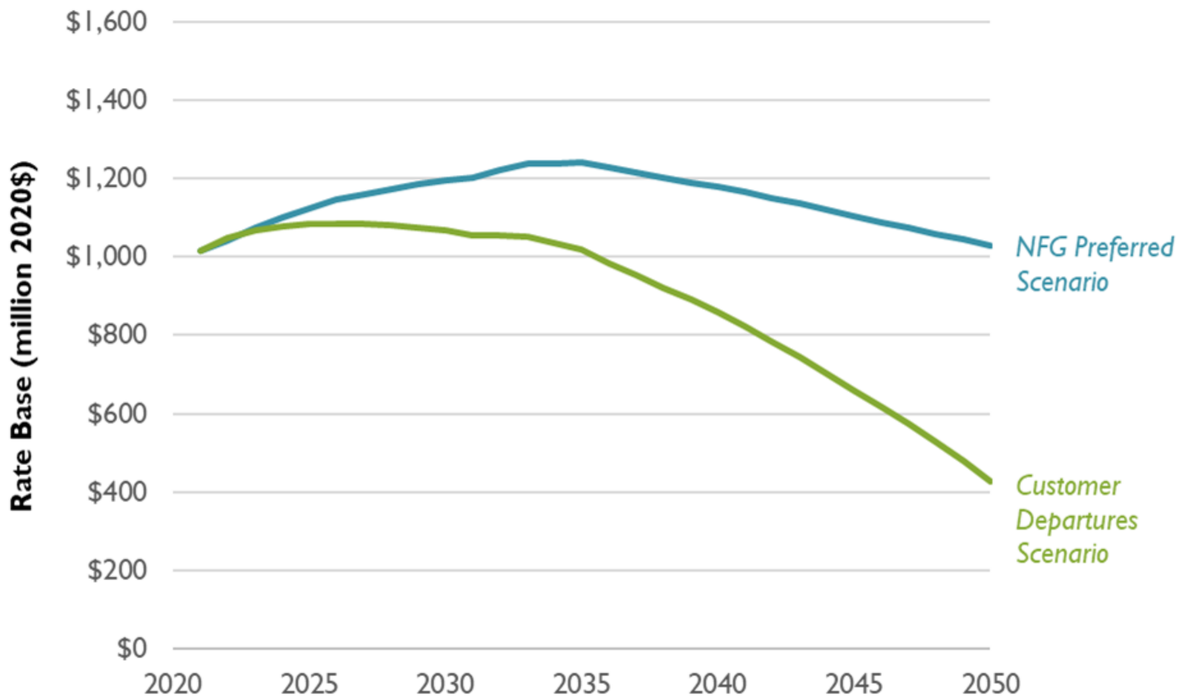
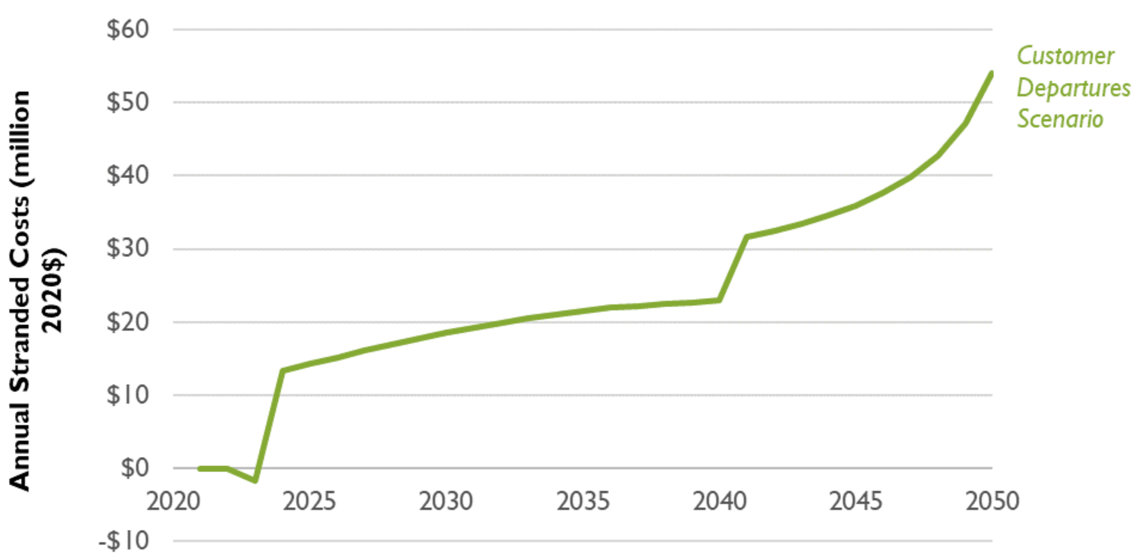


Figure 7. Rate base



At the same time, however, the increasingly rapid speed of customer departures will lead NFG to strand portions of its system, as it cannot recover enough costs from the shrinking customer base. Under the Customer Departures scenario, NFG would strand $54 million in assets in 2050, as shown in Figure 8.

Figure 8. Annual stranded costs



Despite the attempt to mitigate rate increases by stranding assets, customer rates will rapidly increase to account for the decrease in customer base and high level of rate base. Figure 9 and Figure 10 depict this rise in residential and C&I customer rates.

Figure 9. Residential revenue per therm

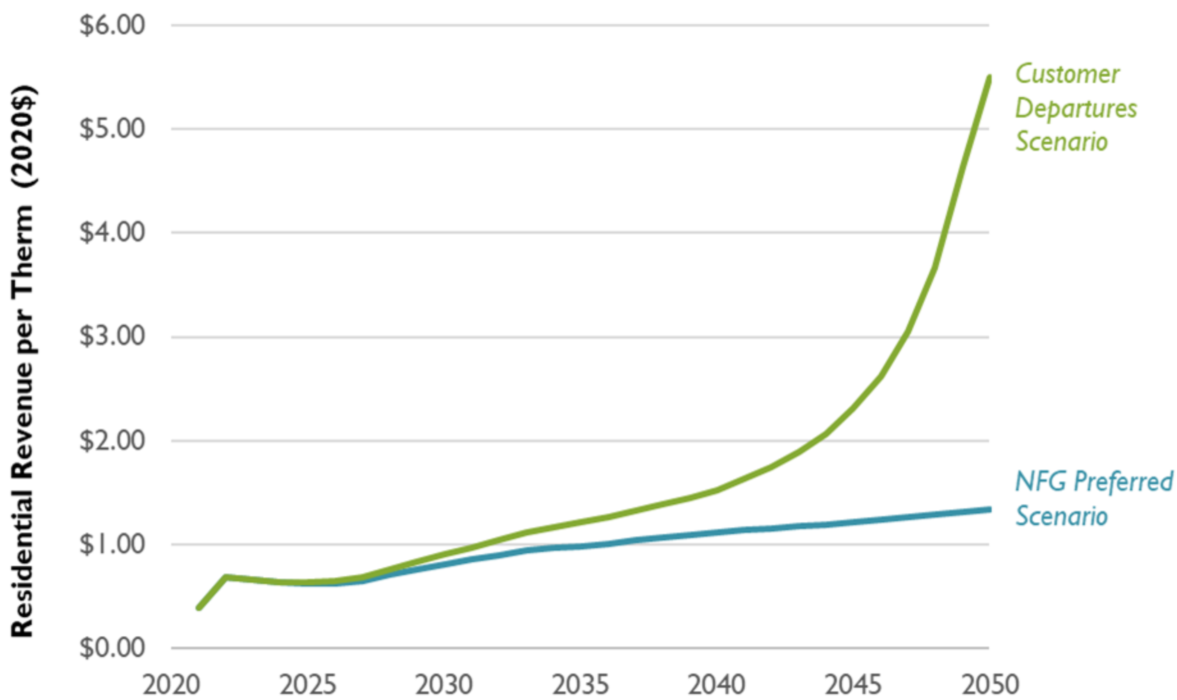
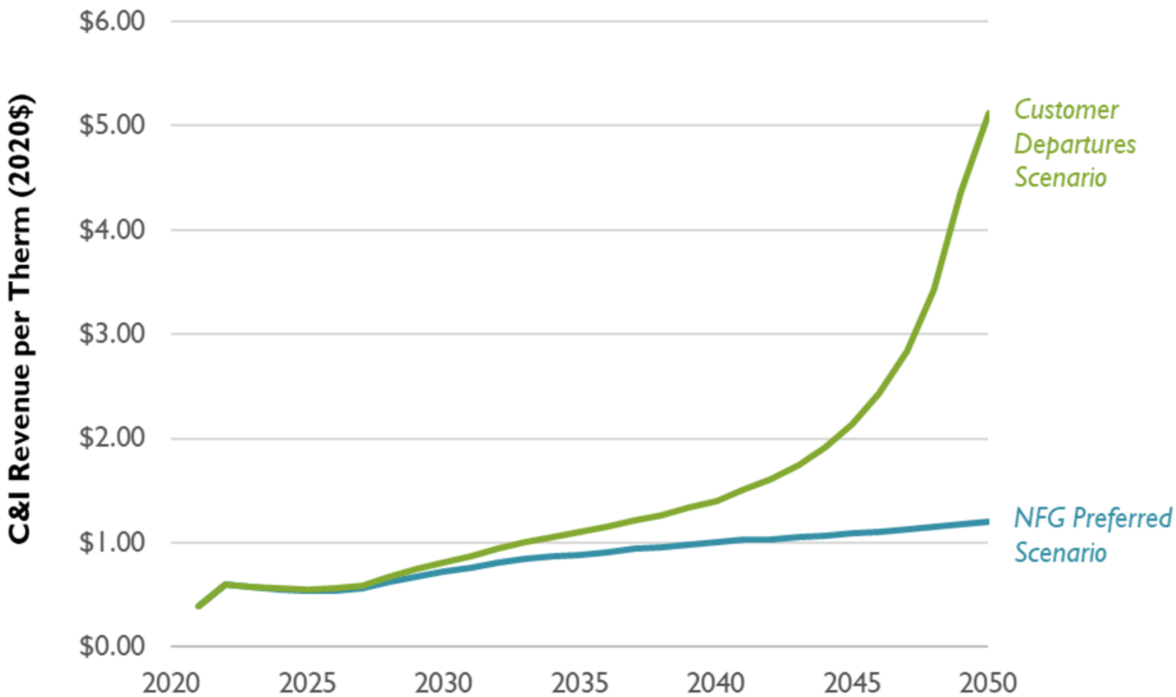
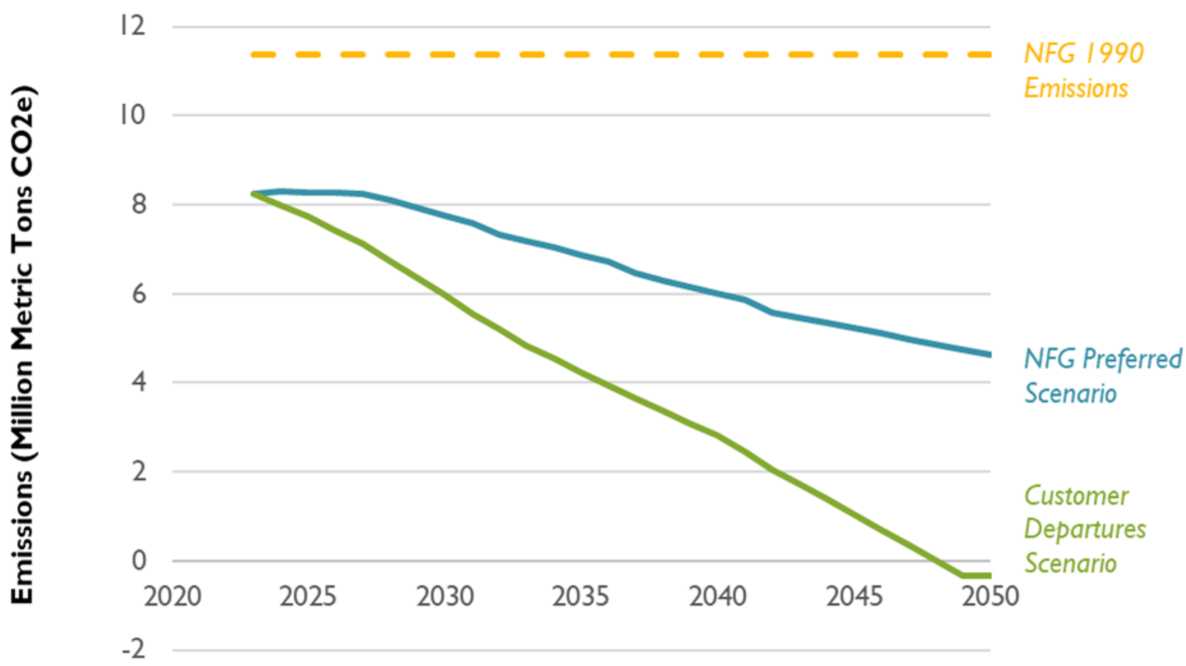


Figure 10. C&I revenue per therm



Using NFG’s emissions rates, Synapse also determined the total million metric tons of CO_2e (20-year global warming potential, or GWP) emissions based on the two modeled scenarios. See Figure 11 below.

Figure 11. Annual NFG emissions



In the modeled NFG Preferred Plan scenario, NFG reduces its emissions by 59 percent of 1990 levels, falling far short of the 85 percent or more emissions reduction required by the CLCPA. Moreover, NFG cannot maintain its current sales using only RNG, as the maximum potential of RNG throughput for NFG's region as used in the Initial Long-Term Plan only accounts for 16 percent of the utility's 2050 Long-Term Plan throughput.

Instead, NFG needs to decrease its volumetric gas sales. As presented in the Customer Departure scenario, if NFG decreases its gas sales to 10 percent of its 2023 levels by 2050, the utility can significantly reduce its emissions. In the Customer Departures scenario, NFG achieves net negative emissions by 2050 due to the RNG throughput in their system.[78] NFG assumed net negative RNG emissions rates for animal manure and food waste RNG feedstocks and net positive emissions for landfill gas and wastewater RNG feedstocks. Animal manure, which accounts for one third of the 2050 RNG throughput, has a significantly negative emissions rate due to the amount of methane emissions

[78] Best practices require that all processes that generate methane use an emissions management plan because without careful monitoring and oversight, these fuels could cause more harm than benefit to the climate. Any policy supporting the development of RNG must include environmental requirements to screen the resources used and differentiate among them through active monitoring and reporting of life-cycle carbon dioxide and methane emissions, accounting for both short-term and long-term climate impacts. It is important to recognize that in addition to potentially net-positive carbon emissions, RNG also produces toxic air pollutants that are harmful to human health. Biomethane continues the combustion of methane, which creates nitrogen oxides ("NOx") and other harmful air pollutants. NOx pollution can lead to respiratory problems, from coughing and wheezing to decreased lung function. Biomethane does not avoid the many health harms of fossil gas, because its chemistry and use are the same as fossil gas.

reductions that NFG is assuming in capturing the RNG. As a result, the total 2050 RNG emissions rate for the Customer Departures scenario is also negative. Accordingly, by 2050, if the utility only uses hydrogen and RNG for its remaining 10 percent of 2023 customers, the utility will be able to completely phase out fossil gas and be aligned with the CLCPA emissions reduction requirements (assuming the emissions rates used in NFG's Initial Long-Term Plan are accurate).

Despite this significant emissions reduction in the Customer Departures scenario, the scenario is unsustainable, as customer rates greatly increase. At this rate of increase, customers are expected to flee the gas system faster than modeled, contributing to a feedback loop of customer departures and rate increases. Customers that have the least control over their building systems, such as renters and low-income households without the financial assets to make investments in their building systems, are the most likely to be left carrying an unsustainable cost. To mitigate this rate increase for customers who remain on the gas system, NFG should plan for the intentional shrinkage of its gas system.

Strategic Downsizing Rate Model

To further illuminate options available to NFG, and potential risks, associated with CLCPA-compliant pathways for pipeline gas use, Synapse used its illustrative gas utility Strategic Downsizing Rate Model (SDRM). This model shares a foundation with the modeling tool used for the analysis presented in earlier sections, but it takes on a different structure to better capture the accounting, tax, rate, and capital recovery issues that arise when throughput falls to a small fraction of its present value and substantial assets are retired.

The SDRM is a simplified model of a hypothetical utility, although the results presented here have been scaled to roughly correspond to NFG to avoid confusion. The SDRM calculates revenue requirements and financial metrics to provide insight into the impacts of a transition from today's state to a smaller gas utility.

The gas system in transition is characterized/driven by two factors: the rate of customer defection and the quantity of gas customers consume. The SDRM is structured to assess the impact of these changes.

The SDRM divides the current gas system into a *retiring* system and an *indefinite* system, with retirements based on assumptions about customer departures. The *retiring* system contains residential and commercial building consumers and is characterized by increased customer defection. Heating and other building appliances and equipment are relatively easy to electrify. Thus, this segment is modeled to exit the natural gas system over time, which also aligns with the Final Scoping Plan scenarios. The indefinite system is composed of customers who need to retain the connection with the gas system as they will not be able to fully electrify. For the purposes of this illustrative analysis, Synapse assumed that these are the industrial customers.

The SDRM calculates the income statement for the entire utility, then produces separate income statements for the retiring system and the indefinite systems. Allocations between these two systems (e.g., for net plant, depreciation, and operations and maintenance) are made based on the same kinds of parameters used in cost allocation in rate cases, namely the number of customers and the amount of gas consumed.

The SDRM as designed has no stranded costs. A key element of the analysis is the depreciation treatment of the utility's assets (its plant). In the model, the utility recovers all return *of* capital and return *on* capital. The model accomplishes this by adjusting straight-line and tax-related depreciation rates for the assets of the retiring system so that assets which retire in each year are fully depreciated at their time of their retirement. The model tracks accumulating deferred income taxes associated with each class of asset so that they also reach zero at the time of retirement. [79]

It may seem counterintuitive to use a model in which stranded costs are not possible to evaluate stranded cost risk. In fact, this structure makes the drivers of capital recovery risk associated with the clean energy transition clear and distinguishable: costs become stranded if rates rise to an unsustainable level. "Unsustainable" is assumed to be the point at which further rate increases reduce revenue by driving customers off the system, rather than increase revenue. In such a situation, it is possible that the utility will not recover its full cost of service, including return of and on its invested capital. Therefore, SDRM can shed light on cases in which gas rates rise to unsustainable levels, as an indication that the utility and regulator would need to work out an approach to managing/mitigating the resulting costs.

The SDRM provides metrics to illustrate the impact to gas utility customers and other stakeholders. The SDRM calculates the hypothetical utility's annual revenue requirement and allocates it to customers of the retiring or indefinite systems. This allows calculation of the potential rate impact per customer and financial metrics of interest to regulators, debt holders and shareholders, such as debt coverage ratios and return ratios.

The SDRM is intended as a simple model, and there are numerous aspects of utility finance it does not capture. These simplifications include:

- All assets are treated as part of a single asset type, with lifetime determined by the retirement date, uniform salvage costs, etc.;
- O&M costs only roughly disaggregated; and
- Assets retiring in a given year are assumed to be sampled evenly from all ages of existing plant (e.g., rather than targeting retirement of older assets first).[80]

These simplifications result in a tractable model that can capture important ratemaking principles, practices, and risks, and thereby provide useful results to inform planning and policymaking.

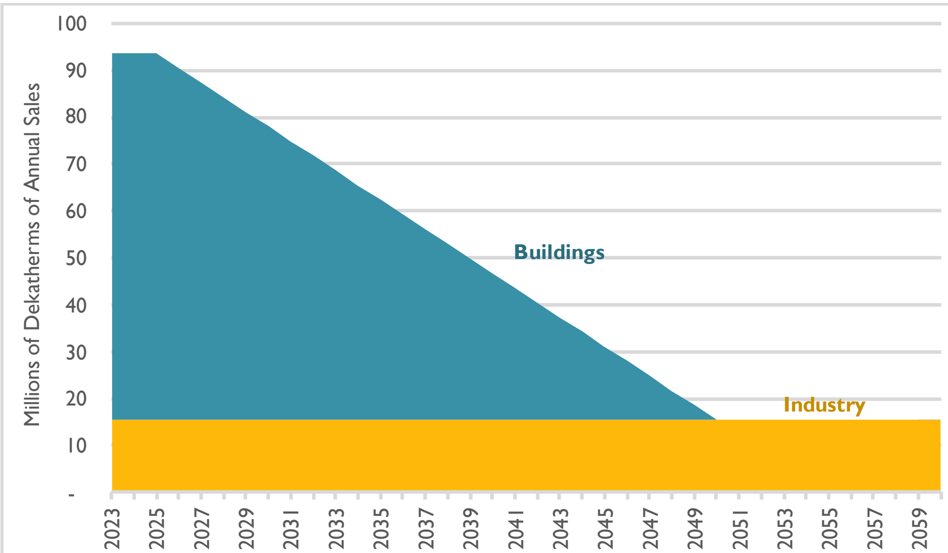
For the purposes of illuminating important issues regarding NFG's Initial Long-Term Plan, Synapse scaled the SDRM to the key characteristics of NFG's system: its net plant, O&M costs, and allocation of sales

[79] Accumulated deferred income taxes arise because of the difference in depreciation schedules between straight-line depreciation used for ratemaking and the accelerated depreciation used in the tax code.

[80] This reflects the fact that asset ages are likely to be mixed throughout the utility's service territory, and that, absent explicit targeted asset retirement programs, customer departures are independent of the age of the gas system assets serving them. Specific utility planning could include such targeting, which would lower near-term depreciation cost impacts.

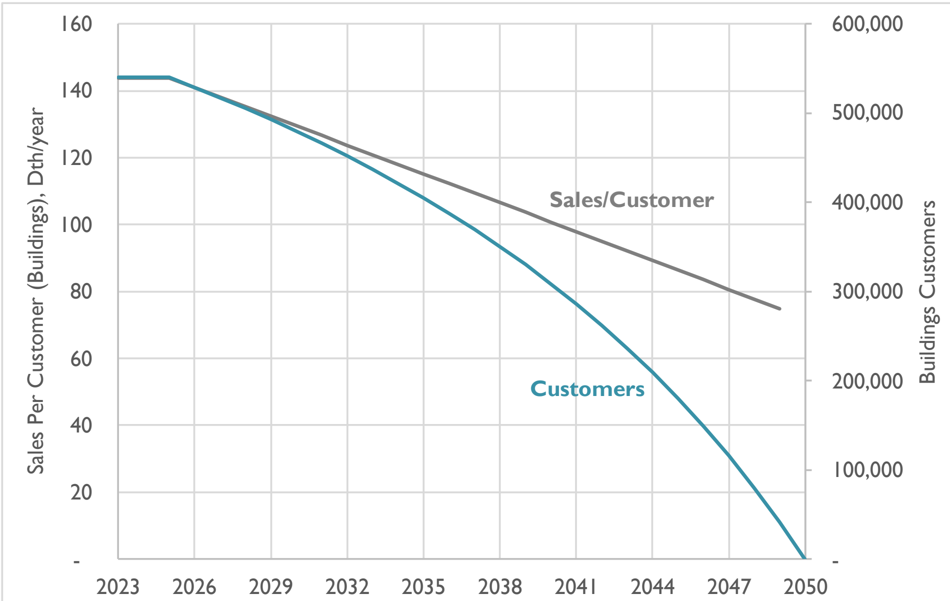
and customers between classes. Figure 12 shows a case in which residential and commercial sales decline linearly to zero from 2025 to 2050, while industrial customers and associated sales remain unchanged.

Figure 12 . Assumed SDRM sales of gas to buildings (blue) and industry (yellow)



The scenario assumes that gas demand per customer for building customers falls linearly from today's level to half of that level by 2050, as shown in Figure 13. This reflects that customers would shift individual end uses away from gas as equipment reaches the end of its life, before making the final system transition to depart the gas system. This also means that the number of building customers does not fall as quickly as sales.

Figure 13. Assumed SDRM sales per building customer (gray line; left axis) and total number of building customers (blue line, right axis)



In this illustrative model, the assets required to serve the indefinite system (consisting primarily of high-pressure distribution pipe and the services and meters for industrial customers) constitute about 12 percent of the utility's plant in service. A portion of the plant in the retiring system is removed from plant each year, having been fully depreciated, including net salvage (assumed to be a 25 percent cost). This portion consists of the meters and services for customers who leave the gas system, as well as a portion of the mains that serve the retiring system. The mains portion that retires increases each year, reflecting the increasing likelihood that a departing customer is the final customer on a segment of main that can then be retired.

Results

Utility rate base consists of a utility's plant in service, minus the amount by which that plant has been depreciated,[81] and further adjusted for accumulated deferred income taxes. Figure 14 shows these components in the modeled SDRM scenario; the visible blue area (comprising the net plant adjusted for income taxes) is the utility's rate base. Rate base falls through the mid-2040s, then begins to rise as the retiring system's assets retire, and the salvage cost funds (which are acting as a credit against rate base) are used to decommission the system. If the cost of pipe retirement (referred to as the net salvage cost) is higher, rate base can actually turn negative before becoming positive again.

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[81] The depreciation reserve accounts for the funds that have been collected to replace or return the capital invested in the utility's assets. Plant assets that are in service are depreciated over their lifetime so that the investors receive return of their capital by the end of the equipment's useful life, and then have the funds available to make further investments (which traditionally includes replacing the retiring assets).

Figure 14. Calculated rate base (blue area) in the SDRM scenario as a function of plant in service (black line), accumulated deferred income tax (red area) and depreciation reserve (yellow area)

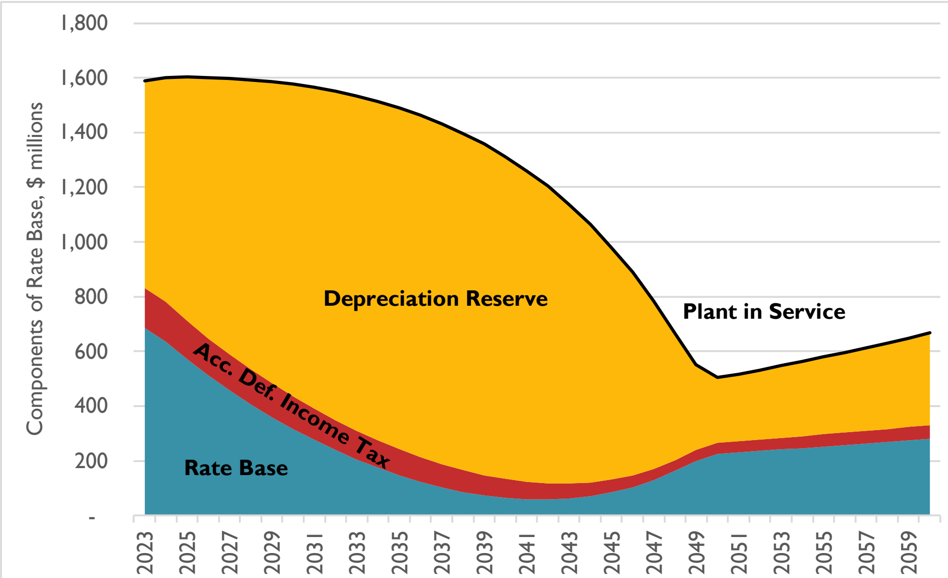
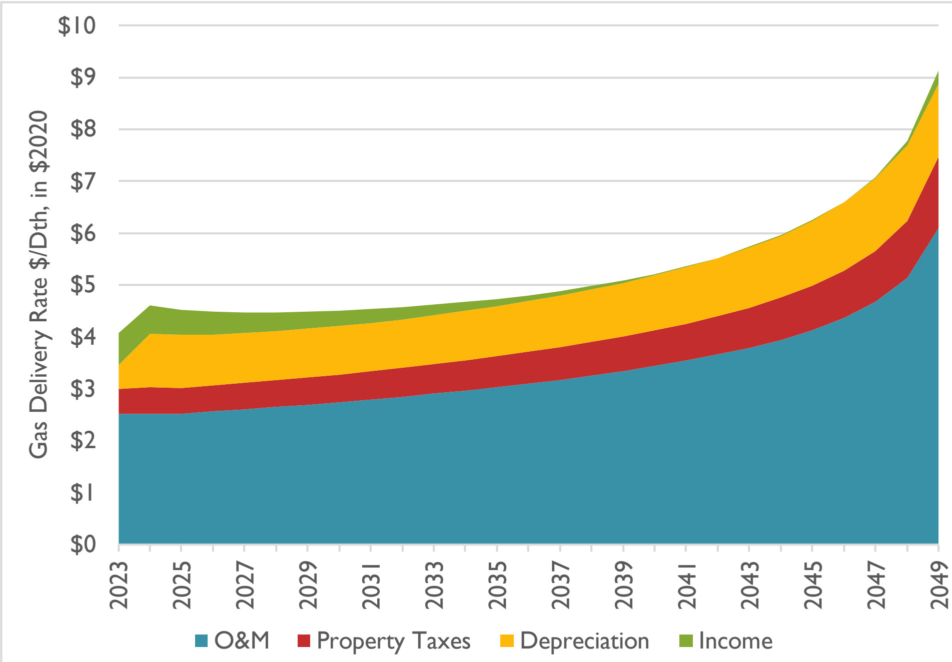


Figure 15 shows the average per-therm delivery rate for building customers (those served by the retiring system). While changes in depreciation rates are essential for eliminating stranded cost risk, it is the misalignment between the extent of assets in service and falling sales that is the primary driver of rising rates. Rising O&M costs per therm, which dominate the increase over time, result from the fact that there is more distribution system per customer to maintain. Similarly, property taxes do not scale down with sales, and are only reduced when plant retires.

The near-term rate increase from changing depreciation rates to account for the retiring system is noticeable, at about 50 cents per dekatherm (5 cents per therm).

Figure 15. Gas delivery rate to buildings customers, calculated as revenue requirement divided by sales, showing cost components

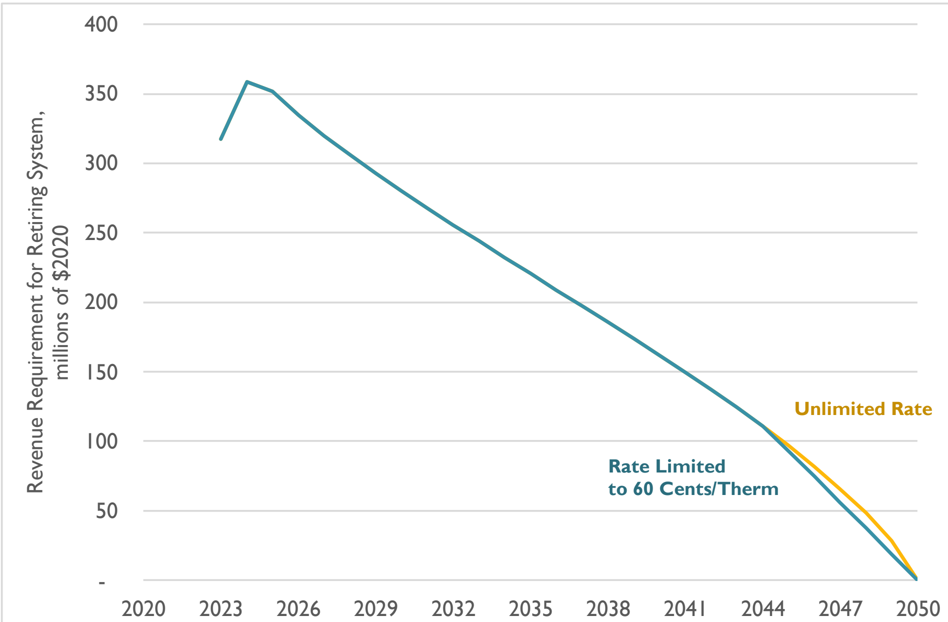


Industrial customer rates rise gradually, passing $1 per Dth (in $2020) in the late 2030s, as customer departures from the retiring system begin to result in increased costs allocated to the indefinite system. Rates after 2050, on the smaller remaining system, are higher by about a factor of four from today's industrial rates (on a per-therm basis) but remain low compared with the cost of gas supply (and especially the cost of low-carbon gas supply, which could be required to meet the goals of the CLCPA).[82]

While the increase in building-sector gas rates is considerable, especially after 2045 as they pass $6 per dekatherm (60 cents per therm), the utility's overall revenue requirement has fallen substantially by this date. If rates were capped at $6 per dekatherm to limit the rate of customer departures and partially mitigate equity implications for the last decade of customers to electrify, utility revenues would fall short of the revenue requirement by about $42 million. On a present value basis, however, this shortfall is equivalent to a cost of only about 0.2 cents per therm collected between 2024 and 2045, when the rate cap kicks in.

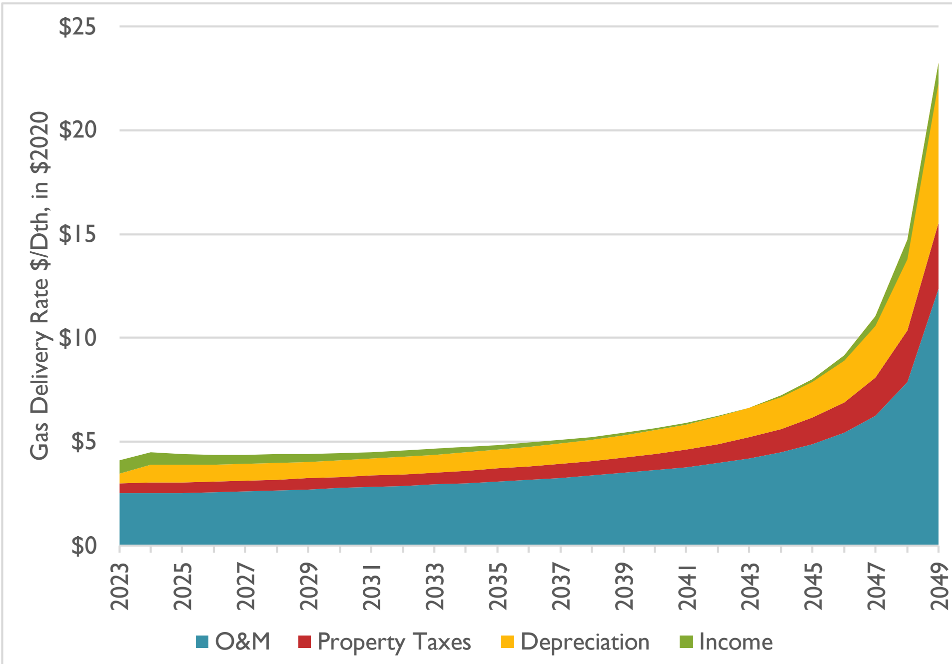
[82] NFG assumes a cost of fossil gas of roughly $6 per Dth (Long-term Plan Appendix B, p. B-3); low-carbon gas costs range from $11 to $35 per Dth (Long-term Plan Appendix A, pages A-23 and A-26). A dekatherm is almost identical to one MCF (thousand cubic feet) and one MMBTU (million BTU).

Figure 16. Revenue requirement for buildings customers (yellow line), and the revenue raised if rates were limited to an average of 60 cents per therm (in $2020). The difference reflects potential stranded cost risk.



In the event that the utility did not retire mains until 2050, the change in depreciation costs would lower near-term rates by about one cent. Figure 17 shows the rate trajectory in this case. Because the system is not strategically downsized along the way, O&M costs per customer drive much higher rates.

Figure 17. Gas delivery rate to buildings customers, calculated as revenue requirement divided by sales, showing cost components, for a case in which distribution mains are not retired until all buildings customers depart the system



In addition, stranded cost risk would increase substantially in this case because rates would rise much more quickly as 2050 approaches. If rates were capped at 60 cents/therm to limit competitive risk, the unrecovered revenue requirement would exceed $247 million; this is still only equivalent to a cost of 1.2 cents/therm between 2024 and 2042. Note that if this cost were actually collected in a transition fund, the overall rate would be higher than in the scenario's base case (with main retirements before 2050), because the savings from depreciation costs would be more than offset by the transition charge.

These SDRM results are not meant to lay out a specific path forward for NFG, or depict a specific case that NFG should have modeled in its Initial Long-Term Plan. However, these results illuminate the depth and range of analysis that NFG has *not* conducted. This gap is cause for concern that NFG is increasing stranded-cost risk down the road—when choices will be more costly and more limited. Because of NFG's failure to consider and analyze scenarios that take the binding implications of the CLCPA seriously, policymakers, regulators, and stakeholders are left with an incomplete picture, and only external analyses like this one to illuminate the implications for NFG of cases which deviate from the utility's preferred, broadly business-as-usual, approach.

3.5. Path dependence

As discussed above, NFG's strategy relies on expensive and problematic lower-carbon fuels and fails to put NFG on a path consistent with the CLCPA. In addition to the failure to put NFG on a path to achieving CLCPA targets, a foundational concern with this approach is that it delays the adoption of available options in favor of costly fuel options that will lead to increased rates and increase the risk of unmanageable customer defection later on.

NFG's actions to integrate and to promote RNG and hydrogen fuels risk sending customers the message that these fuels provide an environmentally preferable alternative to fossil gas, leading some customers to stay on the gas system. Such decisions will come with longer-term financial impacts, including customer reinvestment in gas-burning appliances and company investment in pipe replacement as pipes age, adding to rate base. An emphasis on hybrid heating would result in heat pumps not sized or designed to serve the full building heating load, adding expense later on when the existing gas backup systems reach the end of their useful life, and the size of the heat pump needs to be increased to serve the full heating load. In this way, the transition to the options that are aligned with CLCPA targets (including full building electrification) would become more costly. Such an outcome would also be less equitable, since those facing the highest barriers to electrification—renters and low- and moderate-income customers—will remain on the gas system longer than those with the financial means to disconnect from it and escape rising gas rates.

4. Conclusions and Recommendations

The Preferred Plan suffers from critical shortcomings and flaws that limit its usefulness as a strategy for meeting state policy objectives. It is inconsistent with state policies and guidance, including the CLCPA, Final Scoping Plan, and the Gas Planning Order. The Preferred Plan has fundamental flaws in its modeling, including erroneous assumptions about resource options and omission of viable options such as full electrification of buildings. Non-pipeline alternatives should supplant pipeline replacement as low-hanging fruit for gas reduction in compliance with the CLCPA. Also, the Preferred Plan lacks affordability, because rates will increase in an unmanaged way as customers respond to changing economics and switch to alternatives.

The next iteration of the Long-Term Plan should factor in the Integration Analysis utilized in the Scoping Plan, particularly as it relates to targeted retirements, customer transition to electricity, and natural gas use reduction. NFG should re-evaluate the options/measures identified in its Initial Long-Term Plan.

NFG's Revised Long-Term Plan must also include a scenario analysis that is fully aligned with the Final Scoping Plan, and that identifies the Company's options for strategic downsizing of the gas system. This is necessary, even if current statutory barriers would make implementation a challenge, in order to: (1) create transparency and ensure that the utility does not foreclose its best available options for downsizing the system (for example, by replacing leak-prone pipe that was not actively leaking and could have been abandoned in favor of an NPA), (2) ensure that electric utilities, stakeholders, and the broader public have insight into locations where pipe is most likely to be abandoned in favor of electrification, and (3) identify the extent to which statutory barriers are making the transition of the gas system more difficult, expensive, or inequitable.