Final Report on National Grid's Final Long Term Gas Plan

24-G-0248

Prepared for New York Department of Public Service

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Glossary

AE - Accelerated Electrification
AEB - All-Electric Building Act
AESD - Automated Emergency Shutdown
AMR - Automated Meter Reading
ASTM - American Society Testing Materials
BAU - Business as Usual
BCA - Benefit-Cost Analysis
BE - Building Electrification
C&I - Commercial & Industrial
CAC - Climate Action Council
CapEx - Capital Expenditure
CCA - Current Clean Agenda
ccASHP - cold climate air source heat pump
CEV - Clean Energy Vision
CHIPS - Creating Helpful Incentives to Produce Semiconductors
CHP - Clean Heat Program
CJWG - Climate Justice Working Group
CLCPA - Climate Leadership and Community Protection Act
CNG - Compressed Natural Gas
Cogen - Cogeneration
Commission - New York State Public Service Commission
CT-DEEP - Connecticut Department of Energy & Environmental Protection
DIMP - Distribution System Implementation Plan
DMM - Document and Matter Management
DOB - Department of Buildings
DPS - New York State Department of Public Service
DR - Data Request
DSA - Demand Side Analytics
DSIP - Distribution System Implementation Plan
DSM - Demand side management
DSNY - Downstate New York
EDF - Environmental Defense Fund
EE - Energy efficiency
EGTS - Eastern Gas Transmission and Storage
EMP - Total Employment
ESCO - Energy Service Company
ETS2 - Energy Transfer Station #2
ExC - Iroquois Enhancement by Compression
FLT - Final Long-Term Plan
FO - Fuel oil consisting of ultra-low sulfur diesel, which emits more CO2 when combusted than natural gas
FY - Fiscal Year
GDE - Gas Distribution Engineering
GHG - Greenhouse gas
GMP - Gross Metro Product
Greenpoint - Greenpoint Energy Center
GSHP - Ground source heat pump
GSLTP - Gas System Long-Term Plan
HDD - Heating Degree Day
HP - Heat pump
HPWH - Heat pump water heater
IEP - Integrated Energy Planning
ILI - In-Line Inspection
ILT Plan - Initial Long-Term Plan
Initial Report - PA's report filed on September 18, 2024
IRA - Inflation Reduction Act
Iroquois ExC / ExC - Iroquois Enhancement by Compression
JP - Joint Proposal
June 2024 - Company's Annual Load Forecast
KEDLI - KeySpan Gas East Corporation
KEDNY - Brooklyn Union Gas Company
LCA - Life Cycle Analysis
LCF - Low-carbon fuel
LDC - Local Distribution Company
LIHEAP - Low-Income Home Energy Assistance Program
LL 154 - Local Law 154
LL 97 - Local Law 97
LNG - Liquified Natural Gas
LPP - Leak-prone Pipe
MAOP - Maximum allowable operating pressure
MAPE - Mean Absolute Percentage Error
MDth/d - Thousand Dekatherms per day
NCA - Newtown Creek Alliance
NE:NY - New Efficiency New York
NMPC - Niagara Mohawk Power Corporation
NNI - No New Infrastructure
NPA - Non-Pipe Alternative
NRDC - Natural Resources Defense Council
NREL - National Renewable Energy Laboratory

NYC - New York City

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NYCP - New Yorkers for Clean Power
NYCRR - New York Codes, Rules, and Regulations
NYDEC - New York Department of Environmental Conservation
NYFS - New York Facilities System
NYPSC - New York Public Service Commission
NYS - New York State
NYS CHP - New York State Clean Heat Plan
NYSERDA - New York State Energy Research & Development
O&M - Operations & Maintenance
PA - PA Consulting Group, Inc.
PHMSA - Pipeline and Hazardous Materials Safety Administration
Planning Proceeding - Gas Planning Proceeding Case Number 20-G-0131
PRA - Pressure Regulating Assets
psig - Pounds per square inch gauge
PUT - Pipe Use Transformation
R&R - Reinforcement & Reliability
RFP - Request for Proposal
RH - Residential Heating
RLT - Revised Long-Term Plan
RN - Residential non-Heating
RNG - Renewable natural gas
RR - Revenue Requirement
RSG - Responsibly sourced gas
Sales - Volumetric Gas
SCT - Societal Cost Test
SME - Subject Matter Expert
SMYS - Specified Minimum Yield Strength
Staff - State Department of Public Service Staff
TBtu - Trillion British Thermal Units
TETCO - Texas Eastern Transmission Pipeline Company
TGP - Tennessee Gas Pipeline
the Company - National Grid
the Department - New York State Department of Public Service
the Order - Gas System Planning Order
TMA - Transportation Mode Alternatives
Transco - Transcontinental Gas Pipeline
UPC - Usage Per Customer
USNY - Upstate New York
UTEN - Utility Thermal Energy Network
VRF - Variable refrigerant flow
YOU - Youth Opportunity Union

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1 Executive Summary

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

On May 12, 2022, the Commission issued an order Adopting Gas System Planning Process (The Order) requiring natural gas utilities to submit comprehensive long-term plans, to ensure that planning is conducted in a manner consistent with the Climate Leadership and Community Protection Act (CLCPA) on a repeating three-year cycle.[1] PA Consulting Group, Inc. (PA) was retained to assess National Grid's Long-Term Plan for its Upstate and Downstate natural gas service territories. On June 3, 2024, National Grid (the Company) filed its Initial Gas System Long-Term Plan (ILT Plan) in Proceeding Case Number 24-G-0248. On September 27, 2024, PA filed an Initial Report (Initial Report) summarizing our initial approach, observations, and recommendations. On October 23, 2024, the Company filed its Revised Gas System Long Term Plan (RLT Plan), on January 30, 2025, PA's Preliminary Findings Report was filed and on March 7, 2025, the Company filed its Final Gas System Long-Term Plan (FLT Plan). In this report (Final Report), we comment on PA's observations from our review of the Company's FLT Plan, our assessment of filed comments to date and the results of our latest analyses. Building upon our Initial and Preliminary Findings Report's' observations, in this Final Report we revise recommendations to confirm and/or clarify, add new recommendations, or remove prior recommendations that have been addressed by the Company.

As previously discussed within our Preliminary Findings Report, National Grid says its gas system long-term plan (GSLTP) is designed to transform its New York gas utilities to enable economy-wide decarbonization while ensuring customers have equitable access to safe, reliable and affordable energy.[2] However, National Grid indicates its analysis finds the necessary conditions to fully meet these objectives do not exist today and identifies a number of policy and regulatory changes needed to overcome present-day barriers and challenges. In review of the FLT Plan, PA observes the Company changed its supply forecasts such that it now expects increased supply from newly acquired firm pipeline and city-gate peaking sources. The Company did not revise its demand forecast; therefore, PA's assessment of the Company's demand forecast from its Preliminary Findings Report remains unchanged, consistent with its demand forecasts finalized in June 2024. However, PA's analysis of the Company's updated supply-demand shortfall (and potential moratorium) winter seasons has changed and is further discussed within Section 4 and elsewhere within this Final Report.

PA continues to find the Design Day demand forecast for a given winter season is an important component of the process, especially considering the Company's assertion, based on its Reference Case, that relatively little spare supply may cause its Downstate New York Region (DSNY or Downstate) to experience a supply-demand shortfall by the winter of 2028-29 (a one-year change from its previous estimate of 2027-28), whereas its Upstate New York Region (USNY or Upstate) may experience a shortfall by the winter of 2030-31, which remains unchanged in its FLT Plan.[3] Notably, PA observes in this Final Report that when the Company's Clean Energy Vision (CEV) and Accelerated Electrification (AE) Cases' Design Day demand forecasts are applied, no shortfall exists at any point in the study period for USNY and DSNY. Notably, within the FLT Plan, National Grid identifies the CEV scenario as a preferred scenario but notes that "policies to put this scenario into practice are not currently in place."[4] Furthermore, as discussed below PA's analysis suggests that the Company should consider making certain adjustments to its demand forecast that could delay or, in some cases, eliminate the supply shortfall for the Company's Reference Case. If the Company were to adopt the demand forecast adjustments recommended by PA, such changes could delay the USNY shortfall date to 2032-33 or later and delay the DSNY shortfall date to 2032-33 or later as well – assuming availability of Iroquois ExC. Supply shortfalls are further discussed in Section 4.

[1] The Order, p. 19 and 20.
[2] Source: FLT Plan Section 1.2.
[3] Source: FLT Plan Section 5.14.2.
[4] Source: FLT Plan Section 10.1.

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The Niagara Mohawk Power Corporation (NMPC) and DSNY[5] supply portfolios are composed of a diverse mix of capacity sources and contract types including long-term contracted supplies, city gate peaking supplies, compressed natural gas (CNG), liquefied natural gas (LNG), and cogeneration (cogen) peaking. PA evaluated each component of the NMPC and DSNY supply portfolio to understand the unique attributes and risks that each component provides to the Company and their ability to serve design demand going forward, further discussed within Section 4. In Section 5 of this Report, we address the available supply and other requirements related to the Greenpoint Energy Center (Greenpoint) that are outlined in the Joint Proposal (JP), among KeySpan Gas East Corporation (KEDLI), Brooklyn Union Gas Company (KEDNY), New York State Department of Public Service Staff (Staff), Environmental Defense Fund, NRG Energy, Inc., and the City of New York (collectively, the Signatory Parties), which was approved by the Commission on August 15, 2024.[6]

It is PA's understanding that National Grid's scenario-based investment plans for the period 2025-50 support the objectives of each scenario, as noted in Section 8 of the FLT Plan. PA's observations of the Company's investment plans as presented in the FLT Plan are discussed in Section 6. PA observes that the CapEx forecast for each planning scenario is lower than the forecasts discussed in our Preliminary Findings Report. Of note, we also observed a net increase in forecasted CapEx investments supporting customer growth; we would not have expected a more recent forecast to reflect higher amounts of such investments given the policies in place in New York. However, following recent discussions with the Company, PA confirmed the FLT Plan is reflective of its most recently updated CapEx investment plans. PA recognizes such long-term forecasts tend to evolve and change over time as trends in customer behavior and the needs of their distribution systems are continuously evaluated. While the CapEx forecasts presented by National Grid in support of its FLT Plan differ from those discussed in our Preliminary Findings Report, those overall differences are not considered material given the magnitude of planned investments overall as well as the long-term nature of the planning period.

Consistent with our Preliminary Findings Report, in our review of regional macroeconomic forecasts, we predict slowing to negative population growth. When coupled with legislation limiting certain fossil gas fueled equipment and building systems, as well as federal and state incentives for electrification, we expect the Company to begin experiencing a decline in the number of new gas heating customers and volumes. More specifically, PA observes the Company's Reference Case does not appear to have adequately reflected evolving policy, macroeconomic and electrification factors in development of the customer count and volume forecasts across customer classes. Further the Company's Reference Case Usage Per Customer (UPC) (and therefore annual retail volumes, wholesale volumes and Design Day demand) do not fully reflect the expected impacts on usage from accelerated electrification and changes in heating degree days, among other factors.

In this Final Report, we maintain our prior observation that the Reference Case does not fully account for the downward impacts associated with a number of variables, such as macroeconomic population trends, electrification of space heat, the limitations on gas furnaces for most new construction in New York City (NYC), the limiting of the installation of fossil fuel systems or equipment in new construction up to seven stories tall starting in 2026, and in all new buildings from 2029 onwards – as specified under the All-Electric Building Act (AEB), and resulting UPC impacts. For example, under some of the Company's additional scenarios, projected Design Day demand starts to decline almost immediately in Upstate New York (UNY) and before 2030 in Downstate New York (DSNY).

Within our Final Report, PA's assessment of the Company's bill impacts, benefit cost ratios and potential greenhouse gas (GHG) emissions remains largely unchanged. We further discuss our detailed assessments of the Economic and Environmental aspects of the FLT Plan and identify opportunities for improvement the Company should consider in future iterations of the GSLTP within Sections 8 and 9, respectively.

We continue to make several observations (and associated recommendations) for proposed modifications to the Reference Case for the Company to consider in developing future GSLTPs. Given that National Grid has openly communicated the potential for a moratorium in DSNY and vulnerable locations in UNY[7], PA requested

[5] Some of the components of the DSNY supply portfolio are shared between KEDNY and KEDLI, so our analysis of the supply portfolio for this region is done in the aggregate.

[6] Case 23-G-0225 et al., KEDNY and KEDLI-Rates, Order Approving Terms of Joint Proposal and Establishing Gas Rate Plans, With Minor Modification and Corrections (issued August 15, 2024).

[7] Source: FLT Plan Sections 4.15.3 and 4.16.

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the Company develop a Moratorium scenario in its Preliminary Findings report. In the FLT Plan, National Grid declined to incorporate a moratorium scenario in its gas long-term planning in light of recent progress related to the Iroquois ExC project and success in securing incremental supplies. While we acknowledge some time would be required to prepare this scenario and that incremental supplies have pushed the shortfall date predicted in the RLT Plan out one year to 2028-29, PA believes its inclusion would enhance the completeness of long-term gas planning. Therefore, before any moratorium is declared, PA recommends the Company develop this scenario and allow time for input from Stakeholders and Commission review.

In the following sections we summarize the NMPC and DSNY service territories, followed by observations of the three scenarios presented within the FLT Plan and conclude with a summary of our key observations on the overall Supply, LNG, Capital Expenditure (CapEx), Demand, Economic and Environmental factors discussed in this report.

1.1 Service Territory Summary

In Upstate or USNY, NMPC supplies gas services to parts of Jefferson, Oswego, Onondaga, Madison, Oneida, Herkimer, Fulton, Montgomery, Warren, Saratoga, Schenectady, Albany, Washington, Rensselaer, and Columbia counties, shaded in green in Figure 1-1, below. As of year-end 2023, NMPC served around 630,000 gas customers through approximately 9,220 miles of gas mains.[8]

Figure 1-1: NMPC LDC Map

In Downstate or DSNY, The Brooklyn Union Gas Company, operating as National Grid NY (KEDNY), serves Staten Island, Brooklyn, and parts of Queens. KeySpan Gas East Corporation, also operating as National Grid (KEDLI), covers Nassau and Suffolk counties and the Rockaway Peninsula in Queens. Figure 1-2 below presents the KEDNY and KEDLI service territories in yellow. Combined, KEDNY and KEDLI serve about 1.2 million and 590,000 customers, respectively, amounting to around 1.8 million total customers.[9] As of December 2023, National Grid's DSNY gas network spanned approximately 13,030 miles of gas mains.[10]

[8] US. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA), Gas Distribution Annual Data
2010 to present.
[9] Case 19-G-0309 et al., Proceeding on Motion of the Commission as to the Rates, Charges, Rules, and Regulations of The Brooklyn Union Gas Company d/b/a National Grid NY for Gas Service, "Order Approving Joint Proposal, As Modified, and Imposing Additional Requirements," p 9, (Issued and Effective August 12, 2021).
[10] US. Department of Transportation PHMSA, Gas Distribution Annual Data 2010 to present.

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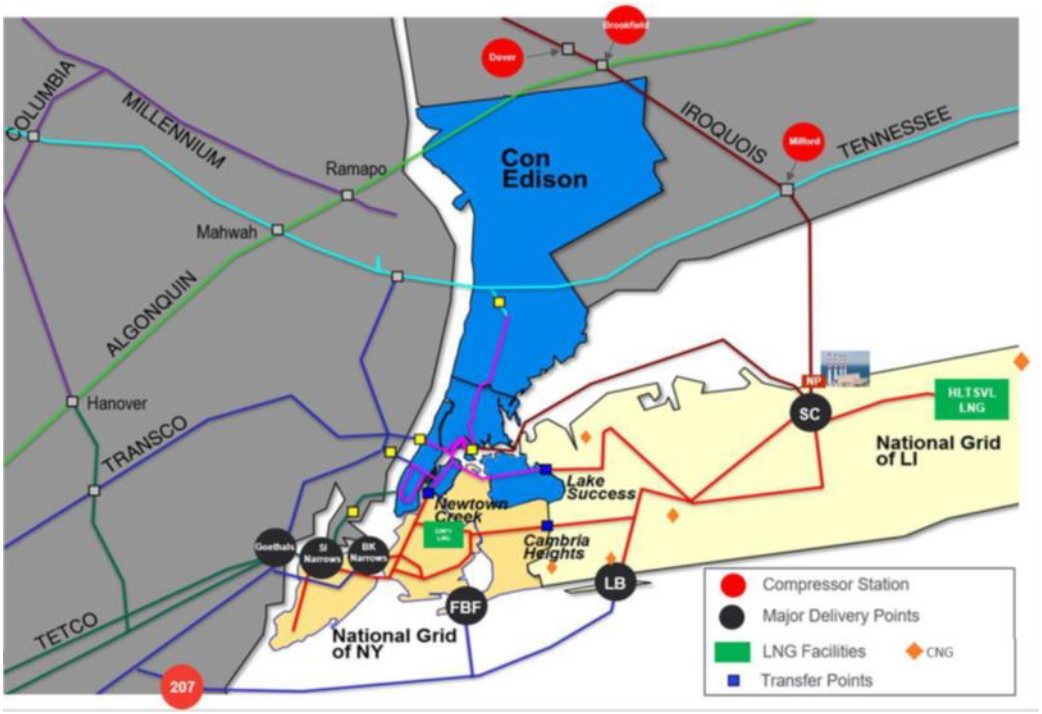
Figure 1-2: DSNY LDC Map



1.2 Summary of Scenarios

Within this section, we discuss our understanding and initial observations of the three scenarios described within the FLT Plan. National Grid explains that the Reference Case, Clean Energy Vision, and Accelerated Electrification Scenarios were selected to illustrate a range of potential future states for the Company's gas distribution network. The three scenarios are:

1. **Reference Case Scenario (Reference Case)** baseline forecast representing a continuation of current legal, policy, and market conditions. National Grid explains that this scenario includes actions it can take without legislative or policy changes but does not achieve New York economy-wide or National Grid decarbonization objectives by 2050. This case includes the Company's most recent macroeconomic outlook, natural gas and electricity price forecasts, and assumptions regarding the availability of end-use technologies. It is intended to serve as a baseline to understand GHG emissions reductions and associated costs that result from implementing the other scenarios.
2. **Clean Energy Vision Scenario (CEV)** is the Company's preferred pathway and, aligns with National Grid's Corporate decarbonization goals. This scenario represents a hybrid approach to decarbonizing the gas distribution system where most of the forecasted 2050 heating load is met through rapidly expanding electrification and energy efficiency (EE), as well as through the use of low carbon fuels.
3. **Accelerated Electrification Scenario (AE)** is based on a Scenario 3 from the Climate Action Council's (CAC's) Integration Analysis.[12] The AE assumes higher levels of electrification and lower (yet significant) volumes of low-carbon alternative fuels, as compared to the CEV. This scenario decarbonizes the gas distribution system at a higher cost and with a lower benefit-cost ratio than the CEV. AE anticipates a more limited role for RNG, and hydrogen and higher levels of electrification as compared to the CEV.

The FLT Plan describes that in the CEV scenario assumptions were adjusted based on geography to account for the different demand profiles and technology mixes within regions. Assumptions on feasibility of low and zero-carbon replacements, as well as the influence of local policies, such as NYC's Local Law 97 and the All-Electric Buildings Act, varied by region. For example, and as discussed in greater detail within this Report, heating oil is still fairly prevalent within the NMPC region and KEDLI service area, which impacts the regions'

[12] New York State Climate Action Council Scoping Plan, Appendix G: Integration Analysis Technical Supplement.

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energy profiles and decarbonization options. While the AE scenario is based upon Scenario 3 of the CAC's Integration Analysis,[12] the FLT Plan also highlights areas of alignment with the CEV and the CAC Scoping Plan's (Scoping Plan) findings, including:

- Recognition that electrification and EE will be essential to decarbonization of the buildings sector. The Scoping Plan's vision for 2050 is for 85% of residential and commercial buildings to be electrified "with a diverse mix of energy efficient heat pump technologies, and thermal energy networks,"[13] and the value of strategic coordinated approach to electrification and gas system transition.[14]
- Recognition that decarbonization will "entail a substantial reduction of fossil natural gas use and strategic downsizing and decarbonization of the gas system."[15]
- Recognition of the strategic role that clean alternative fuels may play "to meet customer needs for space heating or process use where electrification is not yet feasible or to decarbonize the gas system as it transitions."[16]
- Recognition that the pace of gas network transition will depend on the pace of customer adoption of alternative heating technologies, and that gas utilities retain an obligation to provide safe and reliable service.[17]

PA observes significant differences between the Reference Case, CEV and AE scenario Design Day demand forecasts. As discussed throughout the report, and in greater detail within Section 7, the Reference Case reflects a number of assumptions that Stakeholders and PA consider to be overly conservative. PA appreciates the challenges of a single point forecast when many variables are at play and finds a discussion on the range of possibilities is reasonable and useful. PA acknowledges the expectation that the Company identify a preferred plan within this proceeding. Some Stakeholders have expressed concern that important decisions such as resource allocations require near-term decisions and, absent a preferred plan, resource allocations may not be efficient, presenting apprehensions of stranded asset risk. PA appreciates that the Company expects to follow the Reference Case in the near-term but notes the CEV is an optimal pathway for the gas decarbonization transition with respect to affordability and feasibility. However, PA observes that, despite the Commission's recent Order on Consolidated Edison and Orange and Rockland GSLTP, directing the utilities to select a preferred pathway in their next long-term plan filing, the FLT Plan here is unclear regarding which scenario is intended to inform the Company's long-term planning and investment decisions. PA finds this important given that clear tradeoffs exist between each pathway, and it is inefficient and impracticable to pursue all pathways identified to date at the same time. Also, PA encourages use of a multivariable optimization process to identify the preferred pathway, as such an optimization process examines the highest emissions reductions potential and lowest impact on affordability in the next GSLTP.[18]

Additionally, the FLT Plan discusses several key outcomes of the decarbonization scenarios, including with respect to gas supply mix, changes in net sales, avoided CO_2 emissions, and results of the Company's benefit-cost ratio analysis. Table 1-1 compares the key outcomes of the assumptions applied under each scenario through the forecast period to 2043.

[13] Source: Scoping Plan, p. 180.
[14] Source: Scoping Plan, p. 361.
[15] Source: Scoping Plan, p. 350.
[16] Source: Scoping Plan, p. 361.
[17] Source: Scoping Plan, p. 353.
[18] Commission's Order in Case 23-G-0147, In the Matter of a Review of the Long-Term Gas System Plans of Consolidated Edison Company of New York, Inc. and Orange and Rockland Utilities, Inc., issued September 20, 2024, page 30.

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Table 1-1 Planning Scenario Key Outcomes Fiscal Year (FY) 2025-50

	Reference	CEV	AE
Capital Expenditures ($ billion).[19]	$64.7	$68.8	$44.4
Gas Supply Mix (2050)	0% RNG 0% Hydrogen	-20% RNG -7% Blended Hydrogen -11% 100% Hydrogen.[20]	-5% RNG -0% Blended Hydrogen -1% 100% Hydrogen.[21]
Avoided GHG Emissions from Gas Combustion ($millions)	$12,045	$86,668	$90,689
Avoided Emissions from Methane Leakage ($ millions)	$2,892	$3,118	$3,782
Benefit Cost Ratio (National Grid Territory Total)	0.46	0.60	0.59

Each of these items is discussed in more detail below.

In the FLT Plan, the Company only presents the supply-demand shortfall from the context of the Reference Case under which shortfalls are anticipated in both DSNY and NMPC. However, the FLT Plan does say that "under the CEV and AE scenarios, supply-demand gaps do not appear.[22]" This statement is consistent with our analysis and expectations, to the extent the AE and CEV scenarios anticipate paths towards lower Design Day demand. PA's analysis and suggested adjustments to the demand forecast, including Design Day demand, shows that the supply shortfall identified by the Company in the Reference Case could be delayed – affording the Company additional time to pursue supply alternatives and/or demand reduction initiatives. As noted above and discussed in Section 1.3.4, PA would recommend the Company revisit several assumptions underlying its demand forecasts in future GSLTPs.

Based on PA's analysis, these changes could eliminate the supply shortfall for NMPC and assuming implementation of ExC, delay further supply shortfall (and the need for Vaporizers 13&14) for DSNY as shown in Figure 1-3 and Figure 1-4 in Section 1.3.1 below.

As discussed further within this report, PA believes there is value in defining a de-contracting approach to identify excess capacity and caution should be used regarding the nature and term of any new capacity. Such an exercise would be particularly valuable for the AE and CEV scenarios. Table 1-2 and Table 1-3 below show the 2025-26 Design Day capacity by supply source under the Company's Reference Case. We further discuss our observations on the supply stack in Section 4.

[19] Source: FLT Plan, Table 8-1.
[20] 100% hydrogen refers to the share of non-residential customers that will transition to 100% hydrogen gas service by 2050. 11% of non-residential customers will be serviced by 100% hydrogen in the CEV scenario, and 5% of non-residential customers will be serviced by 100% hydrogen in the AE scenario. Source: FLT Plan, pg. 41.
[21] *Ibid.*
[22] Source: FLT Plan, Section 5.14.2

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Table 1-2: NMPC 2025-26 Supply Sources[23]

Supply Source	Design Day Capacity (MDth/d)
Firm Pipeline and Storage	964
City Gate Peaking	20
CNG	18
Cogen Peaking Contracts	13
Total	**1,015**

Table 1-3: DSNY 2025-26 Supply Sources[24]

Supply Source	Design Day Capacity (MDth/d)
Firm Pipeline and Storage	2,390
LNG	395
City Gate Peaking	98
CNG	53
Cogen Peaking Contracts	56
RNG	<1
Total	**2,992**

Winter season supply and Design Day demand are key areas of our analysis, especially considering the anticipated shortfalls. The DSNY supply stack includes continuation of the 395 MDth/d of LNG capacity referenced in Table 1-3 above through 2050, to ensure reliable and adequate service. We further discuss our observations on LNG and Greenpoint in Section 5.

Table 1-4 below summarizes the total CapEx forecast for the Company in 2025-50 as presented in the FLT Plan. We observe the Company anticipates $64.7 billion in the Reference Case, $68.8 billion in the CEV Scenario, and $44.4 billion in the AE Scenario. At a high level, more than two-thirds of the difference between the Reference and AE Scenario is driven by lower CapEx requirements (in the AE Scenario) related to retirement of leak-prone pipe (LPP), customer growth, and relocation of facilities due to public works projects. We further discuss our observations on CapEx in Section 6.

Table 1-4: FY 2025-50 CapEx (billions)[25]

Scenario	Reference	CEV	AE
KEDLI	$21.3	$20.3	$14.2
KEDNY	$35.1	$36.2	$22.8
NMPC	$8.4	$12.4	$7.6
Total	**$64.7**	**$68.8**	**$44.4**

PA understands the Reference Case volumes are developed using a bottom-up approach that starts with annual forecasts of meter counts, customers, and UPCs for each customer segment separately for NMPC, and DSNY (KEDNY and KEDLI). As a result, we focused our analysis on retail sales (as compared to Design

[23] Source: Company's response to PA-232.
[24] Source: Company's response to PA-232.
[25] Source: FLT Plan, Table 8-1 and Company's responses to PA-027 and PA-054 updated March 21, 2025.

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Day), given that percentage change in the former leads to approximately the same percentage change in the latter.

In Section 7, we discuss our observations of customer counts for all scenarios, along with our observations on Reference Case UPCs for several key customer classes. PA observes the Company does not appear to have adequately reflected evolving policy, macroeconomic and electrification factors in development of the customer count forecasts across customer classes. Further, the Company's UPC (and therefore annual retail volumes, wholesale volumes and Design Day demand) do not fully reflect the impact and trends from 2023 as well as the expected impacts on usage from accelerated electrification and changes in heating degree days, among other factors. We have made several observations that suggest the annual retail volumes (and Design Day demand forecasts), especially pertaining to the Reference Case, are over-stated.

PA is also has assessed the reasonableness of the Company's modeling assumptions with respect to the potential rate of heat pump adoption in each scenario over the forecast period. In particular, PA learned through subject matter expert (SME) discussions and data request (DR) responses, that the Company has not yet developed a view on the economics of heat pumps from the perspective of existing or new customers. It is crucially important to understand how the cost of installing and operating heat pumps compares to traditional solutions such as gas furnace for new construction, and how the cost of installing a heat pump compares to traditional technologies upon the failure of gas furnace or AC units in existing homes. Customer behavior will be heavily driven by the economics of heat pumps and can be impacted by federal and state incentives and rebates. Similar analyses need to be done for water heating and other gas use cases. These analyses will be critical for Stakeholders to understand the implications of customer decisions and the potential significant long-term implications for rate payers and the State of New York under each scenario. Thus, PA would recommend, in future GSLTPs, that the Company provide evidence and studies on the implications of the economics of heat pumps on customer counts and use-per-customer (UPC) and how it may change over time.

We further discuss our observations on the demand assessment in Section 7.

PA understands the Company developed a bill impact calculation for select service classes across the KEDNY, KEDLI, and NMPC service territories, utilizing forecasted revenue requirements and meter counts for each scenario. PA encourages the Company and Stakeholders to use the illustrative and directional analysis conducted by the Company to help inform investment decisions that will be made in the near term. Table 1-5 below summarizes our analysis of average residential bills for each company and scenario.

Table 1-5: Average Monthly Residential Bill – Average of NMPC, KEDNY, KEDLI[26]

Year	Reference (% increase from 2024)	CEV (% increase from 2024)	AE (% increase from 2024)
2024	$136	$136	$136
2030	$204 (49%)	$252 (85%)	$279 (105%)
2040	$263 (93%)	$355 (160%)	$718 (427%)
2050	$302 (121%)	$442 (224%)	$4,691 (3,340%)

In the FLT Plan, the Company included benefit cost analysis (BCA) for the three FLT Plan scenarios using methodology established in the BCA Framework Order, presented in Table 1-6.[27] Overall, PA observes the CEV and AE scenarios result in higher benefit-cost ratios than the Reference Case for KEDLI, KEDNY and NMPC. The CEV scenario results in the highest benefit-cost test ratio, representing the most favorable cost test for the total service territory. We further discuss our observations on the economic assessment in Section 8.

[26] Source: FLT Plan, Table 8-2.
[27] Source: FLT Plan, p. 156.

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Table 1-6: Benefit-Cost Test Ratios by Operating Company and Scenario[28]

Operating Company	Benefit-Cost Test	Reference	CEV	AE
NMPC	Societal Cost Test (SCT)	0.69	0.70	0.76
KEDNY	SCT	0.36	0.50	0.48
KEDLI	SCT	0.49	0.68	0.65
National Grid Territory Total	SCT	0.46	0.60	0.59

In the FLT Plan, the Company presents the emission impacts using the 20-year Global Warming Potential approach. The emission reductions are largely attributed to avoided gas combustion net of increased electric sector emissions, including an assumption that emissions from the electric grid decline through 2040, after which the electrical demand system is assumed to have zero emissions, as required by the CLCPA. See Table 1-7, below.

Table 1-7: GHG Emissions Reductions by Scenario[29]

Operating Company	Impact Type	Reference	CEV	AE
NMPC	CO_2e (metric tons)	64,064,604	299,328,384	321,310,675
KEDNY	CO_2e (metric tons)	84,910,484	464,975,112	496,770,362
KEDLI	CO_2e (metric tons)	74,808,236	333,241,644	372,236,435
Total	CO_2e (metric tons)	223,783,325	1,097,545,140	1,190,317,472

Although the CEV and AE scenarios appear to be more effective at reducing GHG emissions, discussed in further detail in Section 9 of this report, the two scenarios result in significantly higher bills for customers who remain on the gas network. The Company includes their overall finding that "new approaches to manage bill impacts for remaining gas customers will be essential for any successful gas decarbonization transition pathway."[30]

1.3 Summary of Key Observations

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

[28] Source: FLT Plan, Table 8-7.
[29] Source: FLT Plan, Table 8-8.
[30] Source: FLT Plan, Section 8.3.1.

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

1.3.1 Supply

In the FLT Plan, the Company's supply stack for DSNY changed and reflects a slightly different supply makeup than what was in place for the RLT Plan. Notably – the Company is not renegotiating cogen peaking contracts (instead allowing them to expire) and has acquired new supply: a mix of long-term firm transport capacity and new citygate peaking contracts. The acquisition of new capacity results in shifts to the expected supply-demand shortfall in DSNY. The newly projected shortfalls are discussed more thoroughly in Section 4.3.2.

In the FLT Plan, the Company indicates its Reference Case Design Day demand will exceed available gas capacity in National Grid's Downstate and Upstate service areas. Due to increasing Design Day demand and relatively little spare supply, DSNY may experience a supply-demand shortfall in the winter of 2028-29 (a one-year shift from the 2027-28 shortfall reflected in the Preliminary Report and RLT Plan) and USNY may experience a shortfall in the winter of 2030-31. However, Design Day demand for both NMPC and DSNY under both the CEV and AE scenarios can be met without a supply shortfall.

The NMPC and DSNY supply portfolios are composed of a diverse mix of capacity sources and contract types including long-term contracted supplies, city gate peaking supplies, CNG, LNG, and cogen peaking agreements. PA evaluated each component of the NMPC and DSNY supply portfolio to understand the unique attributes and risks that these introduce to the Company and their ability to serve design demand going forward. Below we summarize a few notable changes to the contracted supply stacks for both Upstate and Downstate, further discussed within Section 4.

- The expiration of cogen peaking contacts,
- Incremental capacity from new CNG injection facilities,
- The reversion of cogen peaking contracts to long-term contracted volumes, and
- The expiration of city gate peaking volumes.

PA understands National Grid is dependent on supply from the Iroquois Enhancement by Compression (Iroquois ExC or ExC) project being placed in-service to be capable of meeting Design Day demand in the coming years and delaying or avoiding a moratorium in DSNY.[31] Further, we observe that, while recent additions to its supply stack include incremental city gate peaking services, the Company does acknowledge the limitations and risks associated with relying on delivered services and city gate peaking services.

PA also notes that the timing and severity of a supply-demand shortfall is heavily dependent on the Design Day demand that is paired against the Company's supply stack. Based on PA's analysis of Design Day demand, under both the CEV and AE scenarios for both NMPC and DSNY, a supply-demand gap could be mitigated entirely across the study period. However, PA's analysis shows that under the Company's Reference Case for NMPC, a gap is possible in either 2030-31 or 2040-41, depending on the timing of the Energy Transfer Station #2 (ETS2) CNG project and the addition of incremental capacity on the Empire pipeline, respectively. Based on PA's proposed adjustments to the Company's Reference Case Design Day demand forecast, a shortfall is possible in 2032-33 in a scenario where only ETS2 is present, but a shortfall may be mitigated across the study period if incremental Empire capacity is acquired. This outcome is shown in Figure 1-3.

[31] The FLT Plan also indicates that there is a 2-year minimum construction lead time between project approval and when Iroquois ExC would be in-service and that given the lead-time required to complete the addition of the Greenpoint Vaporizers 13 & 14, the ExC project is – in the Company's view – the best positioned project to address the Company's projected supply-demand gap in 2028-29.

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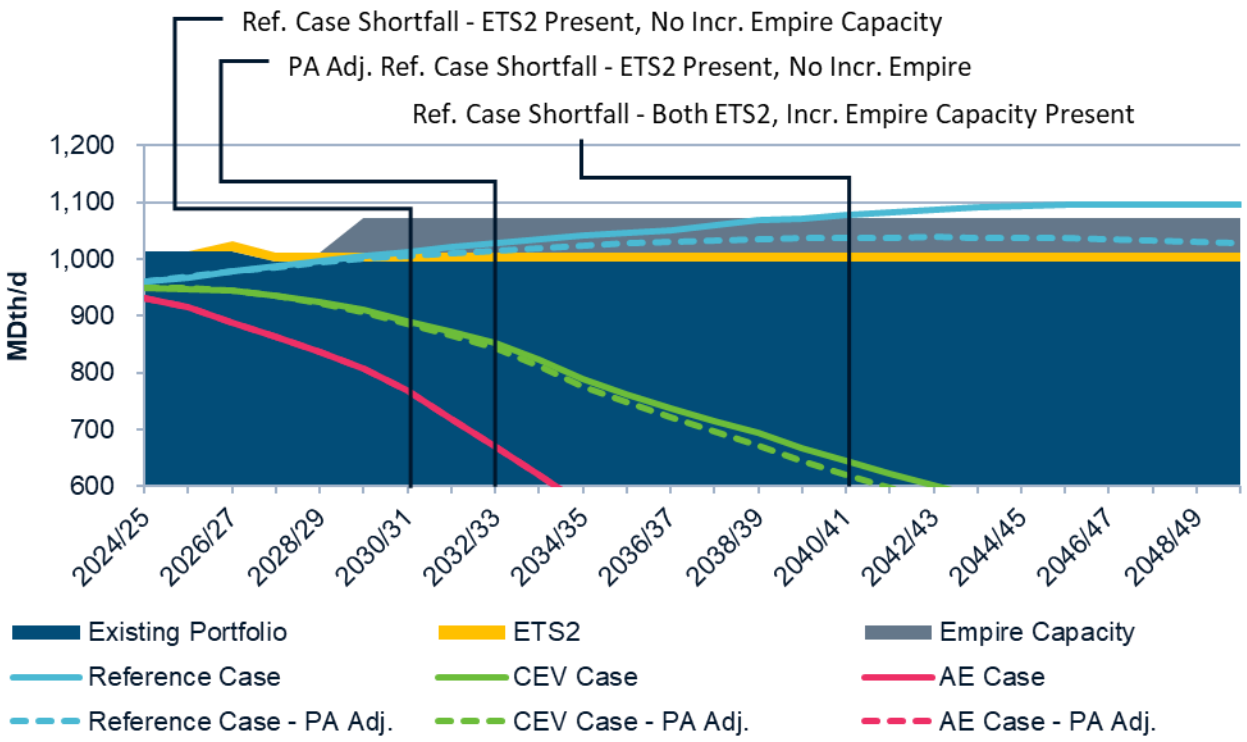
Figure 1-3: NMPC Design Day Supply Demand Shortfalls[32]



Further, under the Company's Reference Case in DSNY depending on the timing and success of both the Iroquois ExC project and Greenpoint Vaporizers 13/14 the timing of a shortfall can vary between 2028-29, 2030-31, and 2032-33 as is visible in Figure 1-4, below. However, based on PA's proposed adjustments to the Company's Reference Case Design Day demand forecast, it is possible that a supply-demand shortfall could vary between 2032-33, 2036-37, or 2042-43 depending on the timing for implementation of either Iroquois ExC and/or Greenpoint Vaporizers 13&14. PA's analysis shows that the ExC project would be required to meet Design Day demand by 2032-33 and a small amount of additional supply would be required beginning in 2036-37 that could be met by Greenpoint 13&14. However, other supply resources such as additional NPAs or potentially more economical delivered services might also fill the gap by 2036-37. If Greenpoint 13&14 are placed in service by 2036-37, a small shortfall still re-emerges in 2042-43 but is projected to revert to an oversupply in 2045-46 as Design Day demand subsides.

It is important to note that projects like Iroquois ExC and Greenpoint 13&14 also provide reliability benefits that are not fully captured simply by evaluating high level supply-demand shortfalls on a Design Day. These benefits are discussed further in the Report. In order for projected supply-demand gaps to be assessed by the Company, Stakeholders, and the Commission, the Company must ensure its demand forecast incorporates realistic current assumptions for economic, technological, and regulatory developments. PA suggests the Company re-examine several aspects of its demand forecast as outlined in Sections 1.3.4 and 7 below.

Furthermore, the demand forecast will impact the need for (and timing of) any moratorium on new connections that the Company has indicated may be required as discussed in more detail in Section 4.5.

[32] PA's view of the AE Case is the same as the Company's AE Case.

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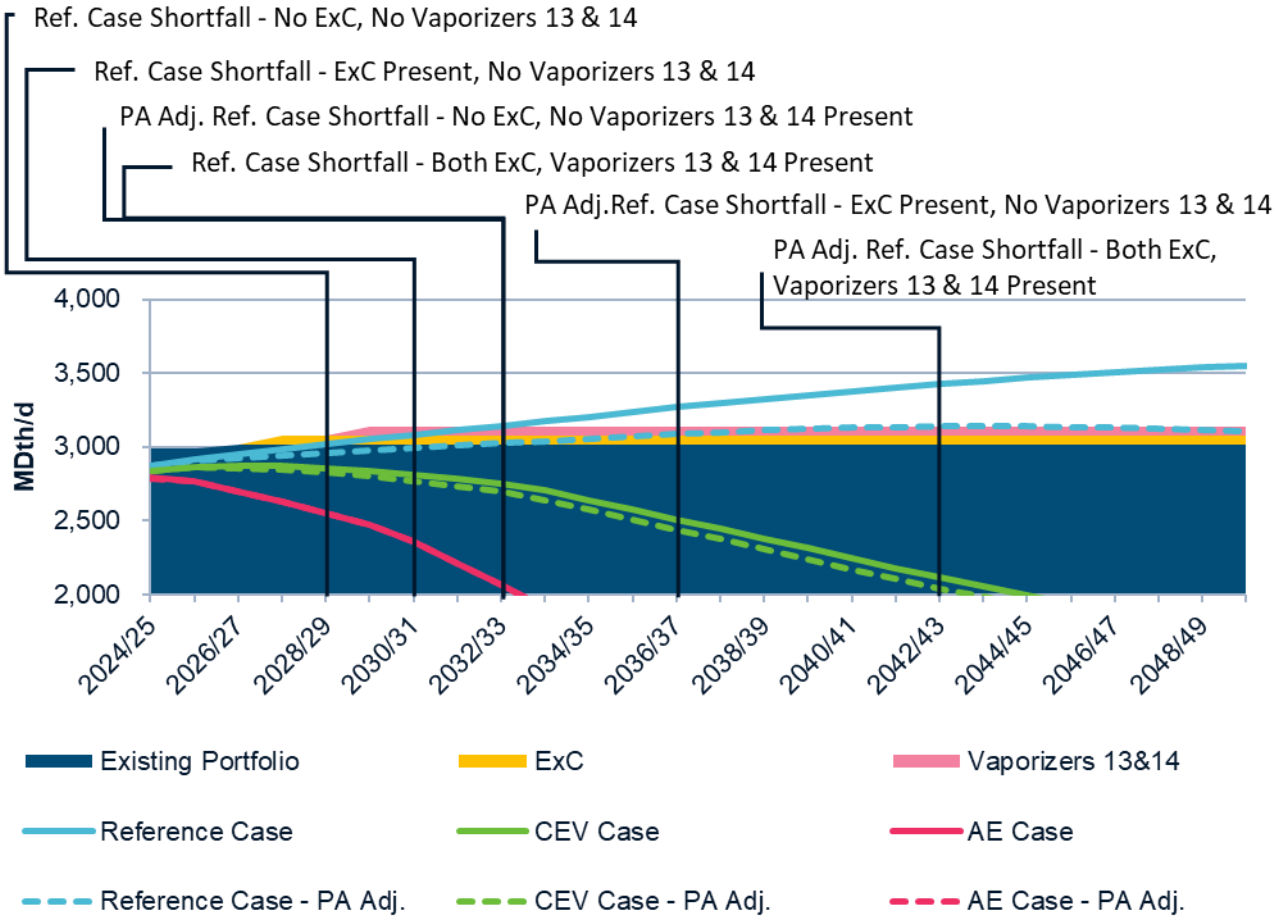
Figure 1-4: DSNY Design Day Supply-Demand Shortfalls[33]



PA has undertaken a review of hydraulic modeling scenarios that depict how the local distribution company (LDC) distribution systems are expected to operate under Design Day conditions, with and without any incremental supply assets that may be in service over time. The Design Day demand forecast for a given winter season is an important component of the process.

In NMPC, the Company has identified vulnerable locations within both the West Gate and East Gate and anticipates several reinforcement projects are needed to provide adequate gas deliveries to the various distribution regulator stations in the system. We discuss our observations on the NMPC hydraulic modeling scenarios in greater detail within Section 4.4.1.

In DSNY, the Company has identified vulnerabilities in Brooklyn and Queens under its Reference Case design day forecast, and points to the Iroquois ExC and Greenpoint Vaporizers 13/14 projects as required solutions. We discuss our observations on hydraulic modeling scenarios in DSNY in Section 4.4.2.

Given the potential DSNY shortfall in winter of 2028-29 and NMPC shortfall in winter of 2030-31 forecasted by the Company under the Reference Case, we find it critical that the Company conveys all components of their portfolio that may be at risk and the measures they have at their disposal to alleviate that risk. It is especially critical that the Company indicates the degree to which the forecast shortfall date may vary due to contract expiration and other factors and how the timing of any moratorium could be impacted. Prior to beginning preparation for a moratorium, PA recommends a specific Moratorium scenario analysis be developed in a similar manner as the CEV and AE scenarios. This new scenario should include:

- Identification of areas where a moratorium would apply;
- Revised customer counts and Design Day demand forecasts;

[33] PA's view of the AE Case is the same as the Company's AE Case.

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- Revised CapEx forecasts;
- Revised hydraulic models;
- Emissions impacts;
- Bill impacts;
- Potential portfolios of Non-Pipe Alternatives (NPAs), EE, DSM, and Electrification that could be deployed to address the moratorium;
- An analysis of circumstances under which a moratorium could be lifted;
- Engagement with Stakeholders in designing the analysis and scenario, including discussion of if, how, and why Stakeholders' recommendations were incorporated in the analysis.

While the timing of a supply-demand gap can be heavily dependent upon the assumptions that inform the demand forecasts, it must be noted that incorporating incremental firm pipeline capacity (like that provided by Iroquois ExC) in the Company's supply portfolio contributes reliability benefits that are not fully evident in high level evaluations of supply-demand shortfall timing (like those discussed in Section 4.3). The firm pipeline capacity that can be made available by placing Iroquois ExC in-service provides reliability benefits that cannot be provided by other incremental supply options like CNG or delivered services – both of which pose unique reliability challenges. Incremental firm pipeline capacity lacks the re-contracting and expense risks that come with incremental delivered services. Firm pipeline capacity lacks the operational risks that are paired with CNG; namely, delivery risks during Design Day conditions, logistical risks associated with trailer availability, and the execution risks associated with calling on CNG capacity when necessary to supplement the design day portfolio. These risks are discussed more fully in the CNG evaluation within Section 4.2.2. Incremental firm pipeline capacity would come with renewal provisions, can be called upon readily during Design Day conditions, are relatively de-risked from a delivery standpoint, and can be retained in the Company's supply portfolio until demand subsides sufficiently for the Company to consider a measured de-contracting approach. While as discussed in Section 4.3.2 several years may pass (under the Company's Reference Case) before Iroquois ExC is necessary from a supply-demand shortfall standpoint, that additional time should not diminish the reliability characteristics that are paired with long-term contracted supply.

1.3.2 LNG

National Grid's two LNG plants at Greenpoint and Holtsville can provide a total of 394,500 Dth of supply on a Design Day to the Downstate distribution system, or approximately 13% of Design Day supply for the 2024-25 winter.[34] Both the Greenpoint and Holtsville LNG assets provide DSNY with the ability to deliver reliable, incremental supply on a Design Day to the distribution system to the extent required to meet peak demand or supplement the distribution system as necessary on colder days, increased ability to support system supply maintenance or unplanned outages, and an alternate source of supply in the event other assets are unavailable (e.g., CNG or city-gate pipeline supply). Given the anticipated supply-demand shortfalls, a careful review of the supply assets including LNG is warranted. In Section 5, we provide an overview of each of these LNG facilities, along with a discussion on the Greenpoint related requirements of the Joint Proposal in the recently completed Downstate rate case. We include our observations about the CapEx forecast associated with LNG facilities and conclude with a summary of the role the Company's LNG assets played during Winter Storm Elliott. Recognizing the Company's projection of a DSNY supply shortfall in 2028-29, the potential completion of both the Iroquois ExC and of Vaporizers 13/14 would push this supply shortfall to 2032-33 (under the Company's Reference Case Design Day demand forecast) – though this result is heavily dependent upon Iroquois ExC. The FLT Plan indicates that, given the lead time for construction (under the assumption that the necessary permits are approved), Vaporizers 13/14 cannot prevent a supply shortfall if Iroquois ExC is not placed in-service. From an overall supply perspective, Iroquois ExC and Vaporizers 13/14 are necessary to avoid a supply shortfall under the Company's Reference Case Design Day demand forecast but are not necessary under the Company's AE or CEV forecasts. Because supply planning decisions rely so

[34] Source: FLT Plan and Company's response to PA-02.

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heavily on demand forecasts, it is imperative that the need for Iroquois ExC and Vaporizers 13/14 be considered under a demand forecast that is reasonably representative of future conditions.[35]

Building upon our Initial Report and Preliminary Findings Report observations and based upon conversations with Company SMEs and a number of data requests, in this Final Report we also describe our observations on the impacts of decommissioning, and the feasibility of alternatives to, Greenpoint LNG. Considering the current system design, natural gas supplies and the corresponding demands in the KEDNY territory, the current Greenpoint LNG facility[36] appears necessary for meeting Design Day demand. The extent of time for which Greenpoint LNG will continue to be required from a supply perspective will depend on the planning scenario that is pursued. Based on PA's analysis of the Reference Case the current Greenpoint vaporizers are required for the foreseeable future to meet Design Day supply needs. However – when considering only the total supply available to meet total demand -under both the Company's CEV and AE scenarios and PA's adjusted CEV scenario, it is possible that Greenpoint LNG could be decommissioned by 2034-35.

The Greenpoint LNG facility must also be considered in the context of service reliability. An on-system asset such as Greenpoint (as well as Holtsville) LNG can be called upon quickly under a number of scenarios, including unexpected cold snaps, upstream pipeline disruptions and other unanticipated operating issues. While the proposed PA adjustments to the Company's Reference Case analysis would delay a potential oversupply until 2032-33 this oversupply is not significant enough to justify retiring the Greenpoint LNG facility for the foreseeable future. Even if the ExC project is implemented to alleviate the shortfall forecast in 2032-33, it is possible additional supply from Greenpoint Vaporizers 13 & 14 could be required in 2036-37; however, by that time period, additional alternative sources of supply could be available. Therefore, based on PA's analysis of the Company's Reference Case Design Day demand forecast, the Greenpoint LNG facility still appears to be a necessary component of the supply stack to meet Design Day demand. However, this requirement could change if substantial load is shed, as is the case under PA's and the Company's view of the CEV and AE forecasts.

In our request to the Company for reasonable substitutes for the LNG supply, we observe supply-side alternatives such as CNG could provide a buffer to the use of Greenpoint LNG but cannot act as a full replacement. As indicated in the FLT Plan, the Company estimates the cost of replacing the current peaking capacity of Greenpoint LNG with CNG at $850,000,000, including the sourcing of 794 CNG trucks per day to meet the Design Day demand, which is clearly infeasible. With regard to DSM programs replacing (or offsetting the need for) Greenpoint LNG, the historical trend would indicate that these measures are also non-feasible. While DSM programs continue, many are outside of the direct control of the Company, and likely will not be able to offset the natural demand growth that is occurring within the KEDNY service area in the near or even medium term. As a result, we observe the potential for fully shutting down the current Greenpoint LNG vaporizers before 2050 is unlikely in light of the Company's current obligation to provide service without interruption. However, we note that the potential moratorium scenario discussed elsewhere in this report could change this analysis.

1.3.3 CapEx

National Grid provided PA with CapEx forecasts from 2025-50, for NMPC, KEDLI and KEDNY and for each scenario.[37] Each forecast includes National Grid's projection of capital requirements to continue to provide safe, reliable service. PA observes programs to remove leak-prone pipe from the distribution system continue in each scenario, with lesser investment in the AE Scenario related to actions the Company would take under that scenario to strategically eliminate segments of the respective systems (thus eliminating the need to replace any leak-prone pipe in those segments). The Downstate forecasts include material investments in CNG and LNG assets to meet expected supply shortfalls, particularly in the next 5-7 years. Investments to serve new customers are also prominent in the Reference and CEV Scenarios; in the CEV scenario, we

[35] Section 1.3.2 indicates that the most immediate risk facing the Company with respect to moratoria are the supply-demand gap projected in DSNY in 2027-28 without approval, construction, and commissioning of the Iroquois ExC Project, whereas Section 4.14.2 indicates that without additional capacity from the Iroquois ExC Project **and** the Greenpoint Vaporizer 13/14 Project (emphasis added), National Grid anticipates a supply gap for peak gas demand in winter 2027-28.

[36] The "current" Greenpoint facility does not include the new vaporizers 13 and 14.

[37] Source: Company's responses to PA-027 and PA-054, Supplemental Attachment 1.

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believe customer fuel conversions will continue to drive those CapEx requirements. Alternatively, customer growth investments cease in the AE Scenario beginning in 2034.

Table 1-8 summarizes the Company's CapEx forecasts for each planning scenario. In our opinion, it is reasonable to assume that under any set of planning assumptions, the Company will be required to continue to invest in the gas delivery system well into the future. We recognize that there is a risk that continued investment can potentially result in stranded costs, absent steps to mitigate that risk such as accelerated depreciation of certain assets. As discussed in this report, we believe it is appropriate for the Company to consider what modifications are necessary to its CapEx forecasts (particularly the Company's Reference Case forecast) based on changes to the design day demand forecast.

Table 1-8: FY 2025-50 CapEx (billions)[38]

Scenario	Reference	CEV	AE
KEDLI	$21.3	$20.3	$14.2
KEDNY	$35.1	$36.2	$22.8
NMPC	$8.4	$12.4	$7.6
Total	**$64.7**	**$68.8**	**$44.4**

1.3.4 Demand Forecast

PA has reviewed the demand and load forecast provided in support of the FLT Plan, requested significant supporting data from the Company and participated in technical conferences and multiple SME discussions on this topic. We observe no changes to the demand and load forecasts within the Company's FLT Plan. As a result, our assessment is unchanged from the Preliminary Findings Report where we began with observations relative to the critical state and local laws influencing customer counts and/or UPCs, macroeconomic indicators, heating fuel trends and customer base composition. Next, we evaluated the Company's forecasted customer counts and UPCs and the most impactful underlying assumptions such as electrification of heating, energy efficiency, and customer conversions from other heating fuels. As further discussed within Section 7, PA observes several drivers that are expected to influence customer counts and/or UPC driven by the following dynamics, that will influence the forecasted annual sales and Design Day demand, both for NMPC and DSNY:

- Macro-economic factors, influencing organic growth (declines) in customer counts driven by evolving service territory demographics (i.e., macro-economic factors such as Population and Households),
- Appropriate level of sustained additions to customer counts due to customers switching from fuel oil (FO), wood, etc. to natural gas as the primary heating fuel, and
- Impacts from electrification and EE – a combination of gas customers installing heat pumps and leaving (or reducing reliance on) the gas system reducing UPC - propelled by a combination of technological change, state and federal policy evolution, and local laws.

In this Final Report, PA now includes the results of its analysis with the goal to highlight and summarize key aspects of the Company's forecast that seemed inconsistent with our understanding of certain impactful meter count dynamics, recent trends, and intrinsic market phenomena such as falling UPC due to improving appliance efficiency and other energy efficiency measures. In this Report, we include proposed adjustments to National Grid's forecast to demonstrate that reasonable adjustments to the several key assumptions would suggest outcomes that are different and should be considered by the Company in developing future GSLTPs. The initial results of this effort are identified and discussed throughout this Report as "Reference Case – PA Adj." Reference Case – PA Adj serves as an illustration of the impact of potential adjustments to the Company's Reference Case design day forecast outcomes over the long-term as further discussed within Section 7. PA also uses its Reference Case – PA Adj. to illustrate the potential implications of proposed

[38] Source: Company response to PA-027, Supplemental Attachment 2 and PA 054, Supplemental Attachment 1.

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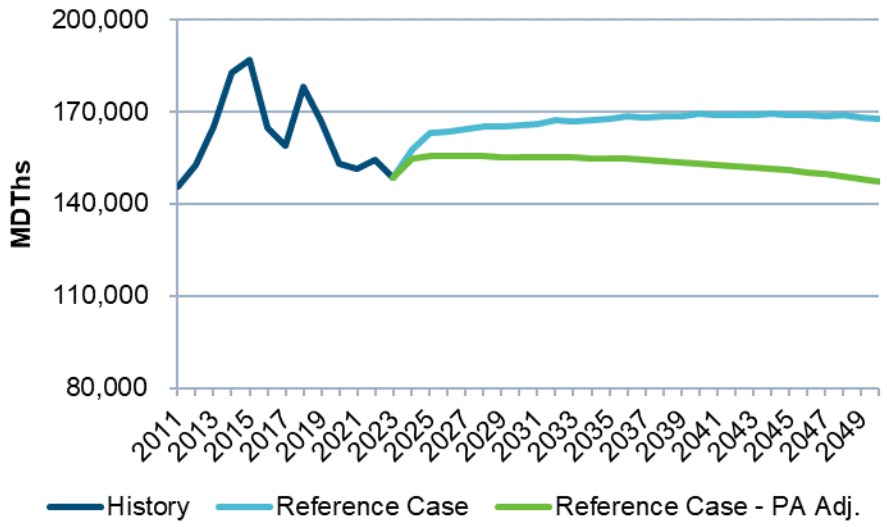
adjustments to the Company's Reference Case or the Company's CEV scenarios, as discussed below within Section 4.3. Volumetric Forecasts

NMPC: Based on these factors, PA's analysis of Customer Counts and UPC (and hence volumes and Design Day demand) suggests the Company should consider adjustments in preparation of Annual Updates as required by the Commission. Our analysis finds that the Company's projected immediate uptick in volumes is not supported. In addition, two major companies in the region – GlobalFoundries and Micron - have recently published plans to expand operations which could impact their demand for natural gas.[39, 40] PA considers the overall volume will follow a path that reflects the combined impact of demographic changes, the evolving macroeconomic landscape, and electrification and fuel-switching patterns. While volumes might increase in the short term, they could also begin to decrease by 2035 with an acceleration occurring in the early 2040s. The 2050 level of 147,770 MDth is just under 2% below our estimate of the weather normalized level in 2023 as shown in Figure 1-5.

Figure 1-5: NMPC Total Volumetric Forecast



DSNY: PA's analysis of Customer Counts for KEDLI and KEDNY begins with assessments of macroeconomic factors and electrification at an LDC level. However, for presentation, Customer Counts, UPCs and volumes are aggregated together. This aggregation is necessary to compare demand forecasts to the supply stack, which for DSNY is only available at a total DSNY level. Figure 1-6 provides PA's perspective of the total volumetric forecast, which is basically a sum of the volumetric forecasts for the major customer segments. As shown in this figure, the Company's forecast includes a near step-change uptick in volumes that is not supported by recent trends or macroeconomic data and is not consistent with expectations for continued electrification of heating. These factors result in a higher glidepath than PA's analysis suggests is likely.

[39] Source: GlobalFoundaries. (November 20, 2024). https://gf.com/gf-press-release/globalfoundries-and-u-s-department-of-commerce-announce-award-agreement-on-chips-act-funding-for-essential-chip-manufacturing/.
[40] Source: Micron. (April 25, 2024). https://investors.micron.com/news-releases/news-release-details/micron-biden-harris-administration-us-senate-majority-leader.

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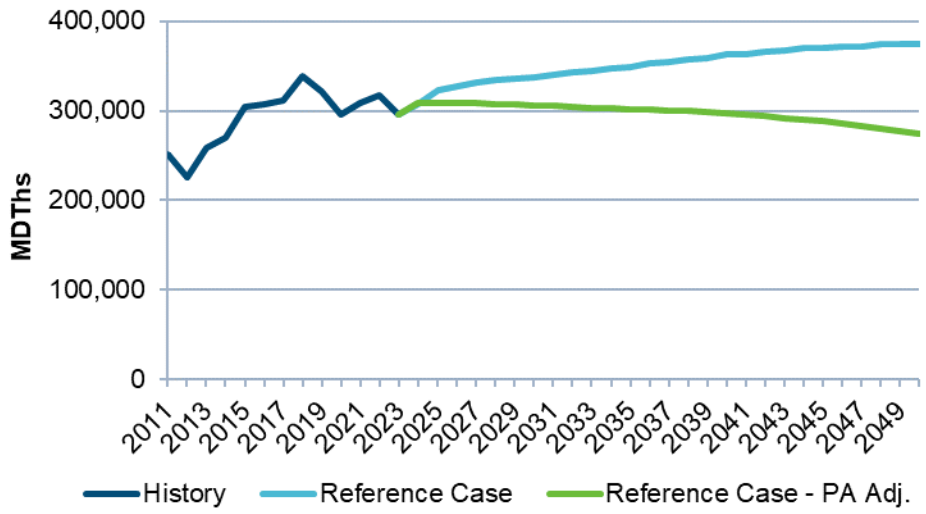
Figure 1-6: DSNY Total Volumetric Forecast



The adjustments proposed by PA to the Company's demand forecasts reasonably illustrate that the impacts of electrification and projected macroeconomic forces will lead to volume patterns that show consistency with recent trends as well as reflects the expected shrinking market for natural gas in the region as opposed to the upwards step change forecast by the Company.

We recommend that the Company consider revisiting their forecast analysis based on a more thorough assessment of macroeconomic factors and electrification and these changes could be reflected in its next Annual Update, and/or next full GSLTP filing annual sales forecasts or rate cases. It is our determination that the current demand forecast underlying the Company's Reference Case is on the high side and that a more reasonable view ought to result in lower levels.

Design Day Demand

To develop our perspective on the Design Day demand forecast underlying the Company's Reference Case, we applied an adjusted Load Factor to the PA proposed adjustments to the Company's Reference Case volumetric forecast. Further, we scaled the Company's CEV scenario forecast based on the differential between the Reference Case and CEV forecasts. PA accepted the Company's AE scenario forecast. Figure 1-7 and Figure 1-8 show the original and PA versions for NMPC and DSNY. The main drivers of the differences between the PA and Company view are adjusted load factors and the lower expected volumetric forecasts discussed above and in more detail in Section 7.

NMPC: Based on our analysis for NMPC, PA's proposed adjustments to the Company's Reference Case Design Day forecast ends at 1,028 MDth/day in 2050 as compared to the Company's forecast of 1,096 MDth/day (i.e., 6% lower). Correspondingly, for the CEV scenario, PA's adjustments to the Company's Design Day demand forecast for 2050 is 435 MDth/day as compared to 464 MDth/day (i.e., 6% lower) in the Company's forecast.

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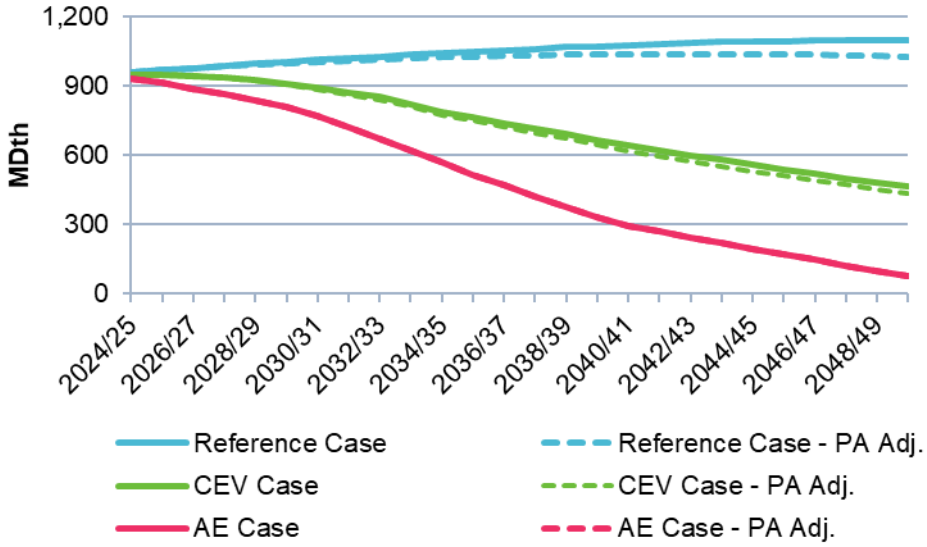
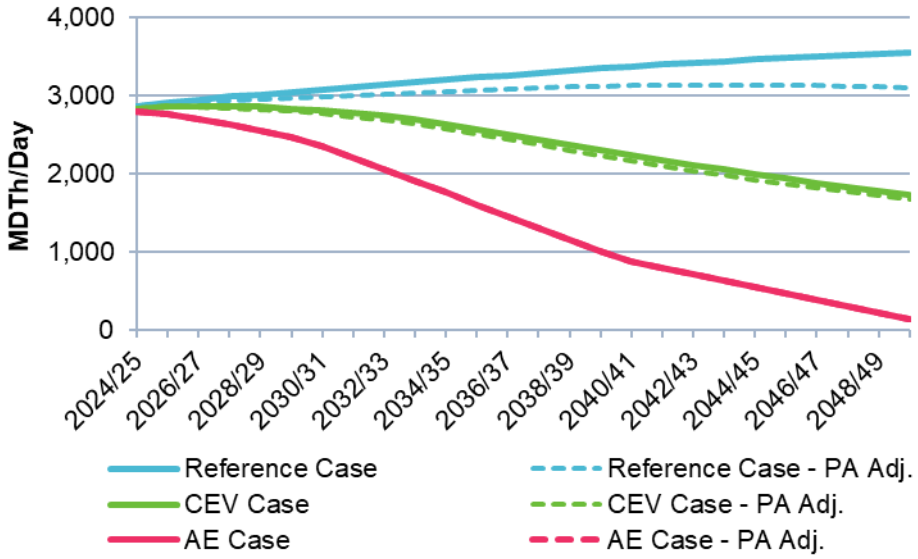
Figure 1-7: NMPC Design Day Forecasts



DSNY: Based on our analysis of DSNY, PA's proposed adjustments to the Company's Reference Case Design Day demand forecast results in 3,101 MDth/day in 2050 as compared to the Company's forecast of 3,551 MDth/Day – i.e., 12% lower. This gap is ostensibly due to the rather aggressive volumetric forecast in the Company's Reference Case. Correspondingly, for the CEV scenario, PA's adjustments to the Company's Design Day demand forecast are 1,673 MDth/day as compared to 1,733 MDth/day in the Company's forecast (i.e., 3% lower). We adopted the AE scenario forecast as provided by the Company.

Figure 1-8: DSNY Design Day Demand Forecasts



An assessment of supply shortfalls based on PA's adjustments to the Company's Reference Case noted here to the Design Day demand forecast and other scenarios is discussed above in Section 1.3.1 and in more detail in Section 4.3 below.

1.3.5 Economic

In the FLT Plan, the Company outlines their bill impact methodology for select service classes across the KEDNY, KEDLI, and NMPC service territories. We understand the Company's approach entails forecasted revenue requirements, meter counts, and total volumes of gas delivered for each scenario and is intended to be illustrative given uncertainties surrounding a few assumptions. We have also identified several key

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assumptions which we believe are critical and may result in an over or under-estimation of bill impacts throughout the forecast period. The Company should consider revisiting these assumptions and further test the sensitivity of these assumptions in future long-term plans.

- First, PA anticipates that energy policies across New York and technological improvements will lessen the demand for natural gas in the future. All else being equal, lower gas volumes delivered to customers over the forecast period will result in an upward pressure on bill impacts for customers remaining on the gas network.
- Second, costs associated with the development of LCFs are highly speculative and are likely under-estimated, given the nascent commercial scale, limited supply, and high demand from hard to electrify sectors for these fuels. Even in an optimistic scenario where the cost of LCFs declines significantly over the forecast period, RNG and hydrogen will remain premium products and will be 3-6 times more expensive than natural gas. The higher cost for gas supply blended with LCFs will drive supply costs upward, resulting in higher gas bills for customers. In addition, the gas network needs significant investments to safely deliver such fuels blended with gas to end-use customers, making the economics of LCFs even less favorable.
- Third, the combination of lower volumes and high gas costs associated with the blending of LCFs has the potential to increase rates and gas bills precipitously to a point that rates could get out of control. The Company's Final LT suggests that under the AE scenario, by 2050 a typical customer could experience a 3,340% bill increase compared to 2024.[41] Such a dramatic bill increase is not sustainable nor acceptable and the Company and Stakeholders should identify measures to proactively manage rate increases.

In addition, the increase in gas bills will further improve the economic favorability of heat pumps and result in higher electrification of various end use cases. Paired with policy and electrification incentives, PA observes that heat pump adoption and economic favorability could be undervalued by the Company in the FLT Plan. The Company should update both its demand forecast and bill impact analyses to reflect the increasing economic favorability of heat pumps separately for NMPC, KEDNY and KEDLI.

During a SME discussion, the Company explained that based on their modeling efforts, under some scenarios, there is a potential risk of cross subsidization among customer classes. As such, under some scenarios, no customers are forecasted to be left in certain customer classes to pay the revenue requirement of that rate class. This topic is a very important and sensitive area that should be discussed and evaluated. Cross subsidization across customer classes has direct economic and fairness implications and the Company should plan for this scenario in advance to avoid it to the greatest extent possible.

In the FLT Plan, the Company included BCA for the three scenarios. Overall, PA observes the CEV and AE scenarios result in higher benefit-cost ratios than the Reference Case for NMPC, KEDLI and KEDNY as shown in Table 1-9. However, all three of the benefit cost ratios are less than 1.0, meaning the present value of costs outweighs the present value of benefits. Like all other models, the BCA is built on a plethora of assumptions, some of which are speculative and uncertain, and therefore have not been monetized and included in the BCA calculation.

In addition, there are significant path dependencies in this long-term planning, meaning an action taken today will limit the range of options available to the Company and the favorability of these options in the future. PA encourages the Stakeholders to provide input to the Company in their final filed comments on no-regret strategies for solutions that could be deployed to maximize the value of investments made today under each scenario given the abundance of uncertainties in policy, technology, customer sentiment, etc.

[41] Source: FLT Plan, p. 147.

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Table 1-9: Benefit-Cost Test Ratios – FLT Plan[42]

Operating Company	Benefit-Cost Test	Reference	CEV	AE
NMPC	Societal Cost Test (SCT)	0.69	0.70	0.76
KEDNY	Societal Cost Test (SCT)	0.36	0.50	0.48
KEDLI	Societal Cost Test (SCT)	0.49	0.68	0.65
National Grid Territory Total	Societal Cost Test (SCT)	0.46	0.60	0.59

The Company is in the process of developing tools and programs to better serve and protect the Disadvantaged Communities throughout the company's decarbonization journey. Despite the progress that has been made to date, PA has identified the need for a more robust and targeted planning in the near future to develop programs and strategies that would proactively protect the most vulnerable customers. As learned through a data request, the Company has obtained census tract information and is working to further identify customer accounts located in Disadvantaged Communities.[43] The Company is working to operationalize processes to enable more detailed analysis and updating of information on regular cadence. PA encourages the Company to develop targeted analyses that considers similarities and differences between Disadvantaged Communities and the rest of the customer base. This analysis should consider barriers preventing these customers from decarbonizing their energy use, best practices for supporting these communities through the energy transition journey, information gaps, and the potential level of funding needed to support these customers to properly inform the bill impact of each scenario on customers in Disadvantaged Communities and how it may differ from the rest of the customer base. In addition, the Company should develop targeted programs to support this vulnerable customer segment and develop effective solutions and strategies to mitigate the bill impacts throughout its decarbonization journey. Information such as annual gas consumption, annual customer bills, and end-uses for gas could help inform how Disadvantaged Communities would be impacted under the different decarbonization scenarios. We further discuss our observations on bill impacts, Disadvantaged Communities and BCAs in Section 8.

1.3.6 Environmental

PA has evaluated the environmental-related aspects of the FLT Plan, including the potential GHG emissions reductions associated with the Company's scenarios and their plans to blend LCFs into the gas network. The Company has assessed the emissions impact of the CEV and AE scenarios relative to the Reference Case scenario using the New York Department of Environmental Conservation (NYDEC) current accounting framework.[44] The Company presents reduced emissions from avoided gas combustion net of increased electric sector emissions needed to deliver energy previously served by the gas network. The CEV and AE scenarios are projected to reduce emissions over one billion metric tons of CO_2e by 2050. The AE scenario heavily relies on electrification to achieve these GHG reductions, whereas the CEV scenario in the FLT Plan also includes strong reliance on LCFs." PA is encouraged that the Company has agreed to further research the limited supply and high costs of LCFs and the practicality of achieving large reductions in emissions in an affordable manner throughout the forecast period.[45] Targeted and strategic deployment of electrification and LCFs will help the Company achieve emission reductions, while keeping the impact to customer bills low, and the Company has agreed to investigate the feasibility of targeted LCFs deployment.[46] Collaboration between

[42] Source: FLT Plan, Table 8-6.
[43] Source: Company response PA – 082.
[44] NYSERDA (2023). "Fossil and Biogenic Fuel Greenhouse Gas Emission Factors". Available at: https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Publications/Energy-Analysis/22-23-Fossil-and- Biogenic-Fuel-Greenhouse-Gas-Emission-Factors.pdf.
[45] Source: FLT Plan, p. 29.
[46] *Ibid.*

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Stakeholders, regulators, customers, and the Commission can benefit the Company in deepening emission reduction efforts and maintaining long-lasting results, while maintaining customer affordability.

1.4 Summary of Recommendations to Improve Future GSLTPs

In this section we summarize our Final Report Recommendations that are designed to improve the Company's future GSLTPs. We note the Company has addressed some of the recommendations made by PA and Stakeholders throughout this process. However, PA finds the Companies have yet to adequately address several recommendations made by PA and Stakeholders. To the extent these recommendations have been addressed in the FLT Plan, they have not been repeated in this report.

PA recognizes that the Company proposed an East Gate Reliability Assessment (EGRA) in its pending rate case in Case 24-G-0323. While the Company's Initial and Preliminary Long-Term Plans filed in this proceeding made reference to its request for funding for the EGRA in the rate case, its Final GSLTP indicates it is seeking Commission approval to conduct the EGRA as part of this long-term plan. Moreover, PA observes that the Joint Proposal filed in the pending rate case, if approved, provides the opportunity for approval of the EGRA in another proceeding (including, but not limited to, this proceeding). PA has reviewed the Upstate supply situation and finds that with installation of the ETS2 facility there is sufficient supply until the winter of 2032-33.

Below PA provides the following recommendations for the Company to consider in developing future GSLTPs. PA recommends that the Company make the necessary modifications to address these recommendations in its next Annual Update and/or next full GSLTP filing.

1. The presence of supply-demand shortfalls is heavily dependent upon demand forecasts that are substantially variable. Under the Company's Reference Case, supply shortfalls are projected in 2030-31 and 2028-29 for NMPC and DSNY respectively, whereas in the CEV and AE scenarios, no projected shortfalls are projected. The Company should identify a realistic planning scenario based on a demand forecast that does not simply show heavily divergent scenarios – but instead a practical, pursuable demand forecast that incorporates expected changes to the technological and regulatory environment. Heavily variable demand forecasts and – by extension – variable expectations for when supply shortfalls can be predicted, serves only to muddy the waters for supply planning. Reliance on the Reference Case enhances the risk that the Company will invest in resources that could ultimately become stranded or, in the alternative, the Company may declare a moratorium on new connections for some period of time.
2. Formulate an analysis that discusses the impacts of a moratorium implementation in both USNY and DSNY which includes:
    a. Identification of areas where a moratorium would apply;
    b. Revised customer counts and Design Day demand forecasts;
    c. Revised CapEx forecasts;
    d. Revised hydraulic models;
    e. Emissions impacts;
    f. Bill impacts;
    g. Potential portfolios of NPAs, EE, DSM, and Electrification that could be deployed to address the moratorium;
    h. An analysis of circumstances under which a moratorium could be lifted;
    i. Engagement with Stakeholders in designing the analysis, including discussion of if, how, and why Stakeholders' recommendations were incorporated in the analysis.
3. Include discussion of if or how operating the Greenpoint facility impacts the health and environment of nearby communities in addition to its existing discussion of how removing the facility would enhance risks associated with interrupting natural gas service.
4. Discuss how the operation of Greenpoint LNG impacts an average customer's bill and compare that against other types of supply including CNG, firm pipeline contracts, and delivered services. Include

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Greenpoint LNG's bill impact both as the facility currently exists and with the incremental CapEx that has been identified.

5. The Company should confirm whether decommissioning costs are included or excluded from the amounts included in its CapEx forecasts provided to PA.
6. The Company should include plans that aggressively pursue alternatives to adding customers to the gas system. A decision by a single consumer to not connect to the gas system will avoid (at a minimum) the installation of a service line as well as the purchase of a new meter (or other investments such as the purchase of an AMR device or a smart meter) for that customer. Targeted implementation of NPAs for specific parts of the distribution system could eliminate investment in multiple meters.
7. Provide evidence and studies on the implications of the economics of heat pumps on customer counts and use-per-customer (UPC) and how it may change over time.
8. Provide a detailed description of the nature of customers included in the "Other" category for NMPC, KEDLI and KEDNY as well more insights into new or additional load they have factored into their forecast.
9. Review PA's observations pertaining to the (1) macroeconomic, (2) fuel conversions and (3) electrification assumptions and consider revisiting the demand forecast Annual Updates to the long-term plan.
10. Reconcile the heat pump forecast(s) for the projections published by the regional electric utilities in Annual Updates to the long-term plan.
11. Provide specific impact, if any, of new non-residential customers on its UPC, sales, and Design Day demand forecasts in the NMPC territory in Annual Updates.
12. Provide updated hydraulic models that reflect any such incremental demand related to new non-residential customers in Annual Updates.
13. The Company and Stakeholders are encouraged to continue discussing revenue requirements and cost allocations, as this is an important topic to explore the most optimal solutions for addressing the potential cost shift, cross subsidization risk, and reasonableness of changes proposed by the Company to the cost allocation formulas in other appropriate regulatory proceedings.
14. Develop a targeted deployment of LCFs for hard-to-electrify customers to reduce the capital expenses associated with LCFs development and deployment and promote electrification and NPAs.
15. Develop a targeted analysis to inform the bill impact for customers in Disadvantaged Communities and how it may differ from the rest of the customer base. PA recommends retrieving aggregated customer information specific to Disadvantaged Communities to inform the bill impact of the decarbonization scenarios on customers in Disadvantaged Communities.
16. Estimate a forecast of customers in Disadvantaged Communities as part of the long-term gas planning effort and level of low-income assistance funding needed to support customers if rates increase as projected by the Company under AE and CEV cases.
17. Consider enacting minimum investment thresholds for NPA considerations, where an NPA assessment would be triggered if a capital project were above a certain financial and timeline threshold. In addition, we recommend the Company design guidelines to provide adequate time for NPA solicitation and deployment as this market is less mature than traditional investments in the gas network.
18. Consider discussing the potential cost shifting risk across various rate classes to explore the most optimal solutions for addressing the potential cost shift and reasonableness of changes proposed by the Company to the cost allocation formulas in other appropriate regulatory proceedings.
19. Explore strategies to identify barriers to deploy coordinated electrification and other solutions that can maximize the value of electrification across the service territories.
20. Continue exploring solutions to rapidly scale deployment of NPAs to minimize the overall system cost with the ultimate goal of keeping rates and bills manageable for all customers.

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21. Further describe the practicality of securing an RNG market share of 7.2% of average potential RNG in the eastern US given the limited RNG supply and high demand at projected price points and proximity to the Company's territories.
22. Conduct an analysis to determine the price point where blending RNG or hydrogen is more expensive than using heat pumps for space heating in residential and small commercial buildings.
23. PA recommends that the Company provide an update regarding reliability metrics in the East Gate in its annual updates to this long-term plan and in its next long-term plan filing, including the implications of load growth impacting the East Gate and the results of hydraulic modeling that may demonstrate the need for additional supply and pipeline capacity.

Our analysis of the Company's FLT Plan and development of this Final Report resulted in the observations and conclusions summarized above in this Executive Summary and discussed in greater detail within the following sections of this Final Report.

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2 Introduction

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

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

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

This Final Report summarizes our findings and observations pertaining to the FLT Plan and outlines suggested improvements for the Company to consider in future long-term gas planning.

2.1 Scope of Work

PA's review of the ILT Plan was conducted over approximately three months and our work leading up to the Preliminary Findings Report encompassed another two months of review of the RLT Plan. PA reviewed the FLT Plan over the course of approximately 1 month and has summarized its final recommendations in this Final Report. During this period, PA submitted and received responses from the Company to over 200 data requests, held several virtual meetings with various SMEs from the Company, and attended a number of technical conference presentations. Company personnel have provided significant amounts of requested data and have made their experts available for meetings and cooperation with PA.

Figure 2-1 below illustrates the scope of work completed to date within the red-dashed box and our plan for the remainder of the evaluation process.

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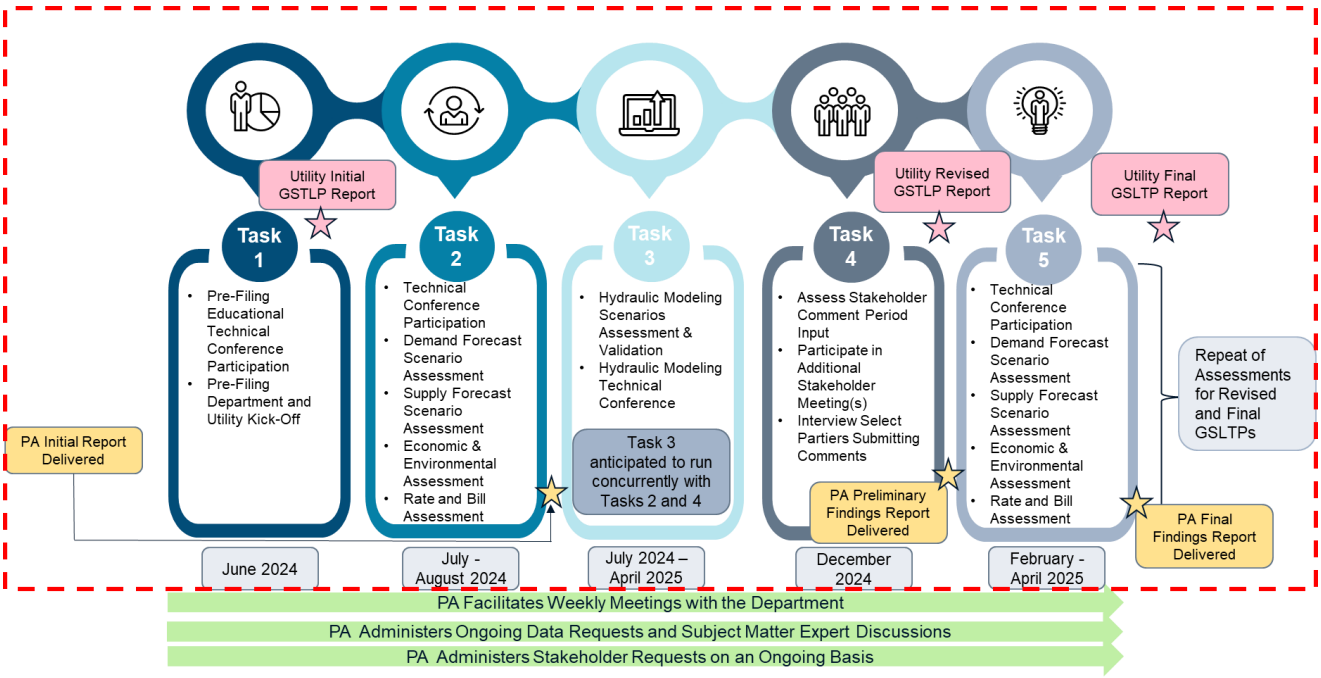
Figure 2-1: PA Scope of Work and Schedule



We have organized our Final Report to first address the supply (including a specific section devoted to LNG and Greenpoint) and demand considerations which form the basis of evaluating future investments, followed by the other aspects of the FLT Plan which cumulatively provide the basis for PA's overall recommendations. Below is a list of the key topics we will cover:

- Stakeholder Engagement, including:
  - Summary of Stakeholder Comments
  - Company Comments
  - Stakeholder Comments on PA's Preliminary Findings Report
  - Technical Conferences
  - Public Statement Hearings
  - Data Requests
- Supply Assessment, including:
  - Assessment of Existing Supply
  - Supply Stack
  - Supply Stack Scenarios
  - Hydraulic Modeling
  - Moratorium Considerations
- LNG Assessment, including:
  - Greenpoint
  - Holtsville
  - Winter Storm Elliot
- CapEx Assessment, including:
  - General Observations
  - Gas Transmission Asset CapEx
  - Investments in Customer Growth CapEx
  - Distribution System Reinforcement and Reliability CapEx

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  - Leak Prone Pipe Replacements CapEx
  - Other Gas Distribution CapEx
  - Public Works and City State Construction CapEx
  - Pressure Regulating Assets CapEx
  - Meters CapEx
  - CNG and LNG CapEx
  - On-System CapEx
  - Future of Heat CapEx
- Demand Assessment, including:
  - State and Local Policy
  - General Overview
  - NMPC
    - Macroeconomics, heating fuels, customer count, volumetric, and design day forecasts
  - Downstate
    - Macroeconomics, heating fuels, customer count, volumetric, and design day forecasts
- Economic Assessment, including:
  - Bill Impact
  - Disadvantaged Communities
  - Benefit Cost Analysis
  - Non-Pipe Alternatives
- Environmental Assessment, including:
  - GHG Emissions
  - Low Carbon Fuels

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3 Stakeholder Engagement

The Order encourages gas utilities to engage in a process that is understandable to Stakeholders and enables meaningful Stakeholder participation. PA understands our role is not only to evaluate the plans but also to assess and help facilitate a robust Stakeholder engagement process. Within this section of our Final Report, we discuss comments from the Stakeholders engaging in the proceeding, including participation in technical conferences held to date, all of which we will continue to refine throughout this process. Overall, there were over 1,500 public comments in addition to numerous Stakeholder written comments filed for this proceeding.

3.1 Summary Stakeholder Comments

3.1.1 Initial Comments on Company ILT Plan

A number of Stakeholders filed comments on the Company's ILT Plan. On September 18, 2024, Natural Resources Defense Council (NRDC) filed, followed by New Yorkers for Clean Power (NYCP) on September 19, 2024. Then again on October 3 and 4, 2024, a number of other Stakeholders filed comments. Within this section of the report, Stakeholder comments are summarized at a high-level. Stakeholder comments are then discussed in greater detail within the respective assessment sections of this report. In these sections of the report PA outlines our observations, analyses, and recommendations in each of these areas, including how Stakeholder comments have been considered in our analysis.

Stakeholders filing comments on the ILT Plan include City of New York, Environmental Defense Fund (EDF), Sierra Club, Margot Spindelman, SANE Energy, NRDC, and NYCP. Many of the Stakeholder comments focused on similar themes as summarized in Table 3-1. The most common themes included comments related to National Grid's ILT Plan not aligning with CLCPA goals, general concern about the LCFs assumed in the ILT Plan (RNG and hydrogen) particularly the CEV scenario, and concern with the demand and load forecast. All the above-mentioned Stakeholders emphasized that the ILT Plan needs to align with CLCPA goals. The City of New York also mentioned data gaps and inconsistencies between the ILT Plan and the CLCPA. All of the Stakeholders agree that hydrogen and RNG are not viable alternatives to natural gas or decarbonization. For example, the City of New York stated, "It has been clear that hydrogen is not currently a viable solution to replace natural gas, and the Company has not addressed the City's safety concern or demonstrated that hydrogen can be produced at scale with zero lifecycle GHG and criteria air emissions."[47] The City of New York expresses support for the use of RNG for hard-to-electrify end-uses but only if the RNG is produced locally. Additionally, the City of New York outlines the need for clear criteria around what fuels should be considered zero emissions and local and the need for guidance on an accurate and standard methodology for lifecycle emissions. Meanwhile, Margot Spindelman stated, "Hydrogen and RNG aren't good decarbonization strategies and allow National Grid to keep gas in their pipes and profit."[48] NRDC expressed concern with a decarbonization strategy that relies primarily on RNG and hydrogen for building-sector energy needs. NRDC suggests such a strategy is very risky and likely not compliant with the CLCPA, due to uncertainty in the price, availability, technical feasibility, and impact on emissions from these fuels.

Some of the Stakeholders (City of New York, Sierra Club, NRDC) took issue with National Grid's demand and load forecast, indicating that the load forecasting model and Design Day forecast appear flawed. Other Stakeholders like SANE Energy mention that National Grid should reduce demand, but it likely won't materialize as it threatens Company profits.

Regarding the other topics, most Stakeholders mentioned that Disadvantaged Communities should be prioritized, and capital spending should focus on NPAs with decarbonization goals embedded. NRDC recommends improvements to the NPA processes and specifically suggests application of something similar to Pacific Gas and Electric's Gas Asset Analysis Tool[49] to enable adoption of NPAs. The City of New York, Margot Spindelman, and SANE Energy also mention concern around Greenpoint LNG – specifically the facility's impact on Disadvantaged Communities and that capital spending for upgrading and maintaining the

[47] Source: City of New York Comments on National Grid ILT Plan. Filed October 3, 2024.
[48] Source: Margot Spindelman Comments on National Grid ILT Plan. Filed September 17, 2024.
[49] Pacific Gas and Electric Company's Opening Comments on Amended Scoping Memo, Track 2A, Questions 2.1(B)-2.1(K), in Case R.20-01-007, Order Instituting Rulemaking to Establish Policies, Processes, and Rules to Ensure Safe and Reliable Gas Systems in California and Perform Long-Term Gas System Planning. June 15, 2022. https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M485/K545/485545029.PDF

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facility should be re-directed to NPAs. These Stakeholders also challenged National Grid on the assertion that Greenpoint LNG is a necessary supply asset to maintain reliability.

SANE Energy writes the ILT Plan does not meet all of the requirements set by the Order and therefore requests the PSC rejects National Grid's ILT Plan and urges National Grid to work collaboratively to develop a plan "that prioritizes the health and safety of New Yorks and paves the way for a sustainable, clean energy future.[50]" Additionally, SANE Energy believes the ILT Plan, with respect to Greenpoint, does not meet the needs of stakeholders and requests creation of a stakeholder working group to specifically address the role of Greenpoint over the long-term.

Table 3-1: Summary of Initial Stakeholder Comments

Stakeholder	General Plan Info	Bill Impacts	BCA	Capital Spending	Greenpoint	Demand and Load	NPAs	LCFs	Disadvantaged Communities	Policy	Calls for PSC Changes	Other
City of New York	X	X		X	X	X	X	X	X	X		X
EDF	X			X		X	X	X	X			
Sierra Club	X	X	X	X		X	X	X	X	X		X
Margot Spindelman	X	X			X	X		X			X	
SANE Energy	X	X		X	X	X		X	X		X	X
NRDC		X				X	X	X				
NYCP				X			X					

On November 11, 2024, SANE Energy filed a second set of reply comments. In this brief filing, SANE raises two points. The first is a request that National Grid provide a redline version of the changes made between the RLT Plan vs. the ILT Plan, so that Stakeholders can efficiently and accurately review and assess modifications made during the revision process. Secondly, SANE expresses surprise and disappointment that none of the recommendations or input provided by Stakeholders have been incorporated into the RLT Plan. SANE also stated that no explanation was provided as to why recommendations were excluded.

PA observes several key issues emerging from filed comments:

1. Further clarity on forecasted customer counts and UPC, including macroeconomic trends, electrification incentives, regulatory requirements and heat pump assumptions is recommended by all Stakeholders and PA;
2. Further scrutiny of the Downstate Design Day forecast, considering historical heating degree day trends;
3. Substantial comments on the safety, cost, and use of LCFs such as RNG and hydrogen.
4. Considerable comments on concerns related to the CEV scenario.

[50] Source: Sane Energy Project Comments on National Grid ILT Plan. Filed September 18, 2024.

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3.1.2 Comments on Company RLT Plan

A number of Stakeholders filed comments on the Company's RLT Plan. On December 10 and 11, 2024, two individuals filed, followed by NYSERDA, EDF, NRDC and Sierra Club, and AGREE-NY on December 13, 2024. Two other individuals filed comments on December 16, 2024, with SANE Energy providing comments on January 15, 2025. On February 21, 2025 the City of New York filed comments on PA's Preliminary Findings Report. Within this section of the report, Stakeholder comments are summarized at a high-level. Stakeholder comments are then discussed in greater detail within the respective assessment sections of this report. In these sections of the report PA outlines our observations, analyses, and recommendations in each of these areas, including how Stakeholder comments have been considered in our analysis.

Stakeholders filing comments on the RLT Plan include NYSERDA, EDF, NRDC and Sierra Club, AGREE-NY, SANE, and various individuals (Judith Canepa and Hélène Filion Onserud). Many of the Stakeholder comments focused on similar themes as summarized in Table 3-2.

The most common themes included comments related to National Grid's RLT Plan not aligning with CLCPA goals and general concern about the LCFs assumed in the RLT Plan (RNG and hydrogen) particularly the CEV scenario. EDF, NRDC and Sierra Club, and some of the individuals emphasized that the RLT Plan needs to align with CLCPA goals. All of the Stakeholders agree that hydrogen and RNG are not viable solutions for natural gas or decarbonization. For example, EDF stated, "The inclusion of hydrogen blending in the CEV scenario – which the Company expresses a preference for – is inappropriate. Hydrogen blending is not a viable decarbonization strategy for homes and buildings."[51] NYSERDA indicates that they would like to see further analysis to support the role of hydrogen in National Grid's CEV scenario to understand safety, technical, and cost implications. AGREE-NY mentions that the cost assumptions for RNG are significantly understated and that National Grid needs to account for the cost of RNG's environmental attributes.

Regarding the other topics, most Stakeholders mentioned that Disadvantaged Communities should be prioritized, and capital spending should focus on NPAs with decarbonization goals embedded. NYSERDA mentioned that National Grid should take more proactive steps to identify and implement NPAs. Margot Spindelman and SANE Energy also mention concern around Greenpoint LNG – specifically the facility's impact on Disadvantaged Communities and that capital spending for upgrading and maintaining the facility should be re-directed to NPAs. These Stakeholders also challenged National Grid on the assertion that Greenpoint LNG is a necessary supply asset to maintain reliability. SANE also expresses concern around the lack of notification of an incident at the Greenpoint facility in August 2022. Additionally, SANE Energy and Margot Spindelman believe the RLT Plan, with respect to Greenpoint, does not meet the needs of stakeholders and requests creation of a stakeholder working group to specifically address the role of Greenpoint over the long-term.

Table 3-2: Summary of Revised Stakeholder Comments

Stakeholder	General Plan Info	Bill Impacts	BCA	Greenpoint	Demand and Load	NPAs	LCFs	Disadvantaged Communities	Policy	Calls for PSC Changes	Other
NYSERDA		X	X			X	X				X
EDF	X					X	X				
NRDC / Sierra Club	X	X					X		X		
AGREE-NY			X	X			X				
SANE Energy				X	X		X			X	

[51] Source: Environmental Defense Fund Comments on National Grid RLT Plan. Filed December 13, 2024.

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Various Individuals[52]	X	X	X	X	X	X

3.1.3 Comments on Company FLT Plan

Stakeholders also filed comments on National Grid's FLT Plan, including EDF, the City of New York, the Newtown Creek Alliance (NCA), and Margot Spindelman on April 2-4, 2025. EDF re-emphasized their previous comments on the ILT and RLT Plans, including opposition to the inclusion of hydrogen investments within the CEV scenario, citing safety, environmental and health risks. Similar to PA, EDF argues hydrogen blending should only be targeted to hard-to-electrify sectors. EDF recommends focusing on electrification for residential and commercial customers and further exploration of the risks of hydrogen in residential applications.

The City of New York's comments express concerns the CEV is not viable given renewable natural gas and hydrogen assumptions, asserting renewable natural gas should be limited to hard-to-electrify uses and hydrogen is unsafe and cost-prohibitive. Additionally, the City of New York expresses apprehension about the affordability and high costs of both the CEV and AE scenarios but ultimately prefers AE over CEV. The City of New York also discrepancies between the Company's demand forecast and PA's proposed adjustments to the Company's Reference Case and requests that the Commission closely examine both. The City of New York recommends further analysis to mitigate costs for vulnerable populations and further scrutiny of the Company's demand forecast.

NCA takes issue with how National Grid uses old weather data that does not reflect our current climate, depicts an inaccurate valuation of Greenpoint LNG in Winter Storm Elliot, how any upgrades to Greenpoint will fall onto ratepayers, and how Greenpoint disproportionately disadvantages certain communities. NCA is also calling on the Commission to better serve the community with respect to decommissioning Greenpoint. NCA expressed strong opposition to any investment, rate-increase, or long-term planning at the Greenpoint that does not prioritize clean up as well as a transition away from storage of LNG at Greenpoint. NCA recommends updated temperature forecasting reflective of more current climate trends and challenges the long-term necessity of Greenpoint. Margot Spindelman expresses concerns of Greenpoint residents and further writes the FLT Plan does not meet all of the requirements set by the Order and therefore requests the PSC rejects National Grid's FLT Plan and urges National Grid to work collaboratively to develop a plan "that focuses on the rapid decommissioning of the Greenpoint Energy Center."[53]

3.2 Company Comments

3.2.1 Response to Initial Report and Stakeholder Comments

National Grid filed its response to PA's Initial Report and Stakeholder Comments on October 3, 2024, in which the Company also identified and responded to comments made by the City of New York, EDF, Sierra Club, Margot Spindelman, and SANE Energy. PA found the responses somewhat receptive to the feedback the Company received on the ILT Plan. The Company's comments are organized in eight parts and outlined below within Table 3-2 and described in greater detail following the table.

Table 3-3: National Grid's Reply Comments

Categories	Subtopics
Demand Forecast	Econometric Modeling Post-Model Adjustment Assumptions Design Planning

[52] Includes Judith Canepa and Hélène Filion Onserud.
[53] Source: Margot Spindelman Comments on National Grid RLT and FLT Plan. Filed April 2, 2025.

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Categories	Subtopics
Low Carbon Fuels	RNG and Hydrogen
Scenario Modeling	none
Energy Efficiency and Demand Response	none
Affordability	none
NPAs and LPP Replacement	none
Supply Planning	Delivered Services CNG Iroquois ExC Project, Greenpoint, No-Infrastructure Scenario
Depreciation and Other Matters	none
CapEx	none

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

Demand Forecast

National Grid agreed to address underlying econometric models, specific assumptions regarding the post-model adjustment process related to the impact of electrification, and design planning standards but did not specify when any updates to reflect these items might be made. The Company pointed Stakeholders to Section 3.2 Demand Forecasting Methods of the RLT Plan for a detailed description of the forecasting process. Further the Company offered a review of forecasts previously issued by Stakeholders in this proceeding to determine the Mean Absolute Percentage Error (MAPE) for these provided forecasts. Regarding PA's observations on forecasted meter counts, the Company pointed to an increasing reliance on housing forecasts over population or households, of which Moody's projects increasing trends.

The Company could not reproduce a number of figures included within PA's Initial Report and asserted PA's conclusions are unsubstantiated. As discussed within our Initial Report, PA began our UPC analysis with historical and forecast data received in response to PA-047 and prepared the following figures based upon this data. Over the course of our Initial Report fact-check process, National Grid recommended use of data provided in response to PA-089, which is presented in a different format than the data provided in response to PA-047. Additionally, the Company's June 2024 demand forecast update was used in development of the Company's RLT Plan. In development of the Preliminary Findings Report PA adopted the Company's response to PA-0149 through PA-0154 in our analysis of the June 2024 Update (and RLT Plan) and been informed by several meetings with Company SMEs. However, as discussed in Section 7 of this report, PA identified several aspects of the demand forecast underlying the RLT Plan that were worthy of further consideration by the Company.

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Finally, the Company argued there was uncertainty on the impact of laws such as the AEB and Local Law 154, given exemptions. PA agreed there was some uncertainty; however, our analysis found the Company's Reference Case modeling of the impact of customers who are assumed to electrify fully or partially to be understated as discussed in Section 7 of the Preliminary Findings Report.

NRDC and Sierra Club recommend a lower switchover temperature for dual-fuel, partially electrified customers, to which the Company disagreed and cited a recent study in Massachusetts and Connecticut that supports 30-degrees Fahrenheit.[54]

The Company pointed to its established Design Day and Design Year weather standards as appropriate in the regions to ensure safe and reliable service to its gas customers, as described in Section 3.1 of the RLT Plan, and noted it will periodically review and update its design year standards.

Low Carbon Fuels

Stakeholders filed extensive comments on the Company's assumptions related to the safety, cost, and application of RNG and Hydrogen. The Company noted that both the Gas System Planning Process and Scoping Plan identified that alternative fuels such as RNG should be considered. Further, the Company cited that the Scoping Plan CLCPA-compliant scenarios do utilize significant volumes of RNG and hydrogen and therefore assert such fuels should not be excluded from the planning process. Additionally, National Grid clarified that while the Company believes the CEV scenario represents an optimal pathway, it is not suggesting the CEV should be enabled to the exclusion of any other CLCPA-compliant pathway and that volumes of LCF required by either the CEV or the AE cannot be achieved without new policy and regulatory frameworks. Regarding the high cost of RNG and Hydrogen, the Company acknowledged a presently limited supply and high cost of LCFs are valid concerns but also suggested legislation supportive of production increases. National Grid welcomes alternative data points around the cost of LCFs and the respective bill impacts.

Regarding recommendations on targeted use of LCFs for specific customers facing barriers to electrification, the Company argued a more beneficial approach is to maximize targeted electrification and the broad adoption of technologies to reduce gas demand, including full and partial electrification and EE, while using LCFs to reduce the carbon intensity of all remaining gas load. However, National Grid does support near-term targeted deployment to inform development of a comprehensive suite of LCF-enabling frameworks for long-term deployment.

Scenario Modeling

Stakeholders and PA asked questions of National Grid and provided comments in an attempt to understand and assess National Grid's underlying assumptions. PA's recommendations focused on CapEx forecasts, LPP replacement programs, UTENs, 100% hydrogen infrastructure, and electrification. Stakeholder comments focused on tracking GHG emissions, heat pumps, BCAs, accounting for RNG, and general characterization of the AE scenario in the GSLTP.

National Grid stated it appreciates the requests for greater detail on scenario CapEx, costs related to UTENs, and 100% hydrogen infrastructure, and that the Company worked to include detailed projections of these Scenario Analyses in the GSLTP, in addition to providing work papers. National Grid noted that including UTENs and 100% hydrogen infrastructure costs in gas customer bill impacts is not consistent with Company strategy or current regulatory policies. However, National Grid indicated that they look forward to working with regulators, policymakers, and Stakeholders to establish processes that capture the potential benefits of these decarbonization strategies while also not increasing the cost burden on gas customers.

National Grid agreed that targeted electrification is essential to the gas transition, but within existing policy and regulatory frameworks. The Company mentioned achieving 'targeted electrification at scale' will require new innovative policies and regulations including frameworks for Integrated Energy Planning (IEP), but they are committed to moving forward to 'the greatest extent feasible.' Regarding GHG emissions accounting, National Grid indicated their approach is consistent with New York's established approach using guidance from NYSERDA, but the Company welcomes additional discussion around this to accurately account for GHG emissions using the best available science. National Grid supports accounting for all upstream and

[54] Massachusetts and Connecticut Heat Pump Metering Study (MA22R51-B-HPMS) / (CT R2246) Comprehensive Report, at p. 98 (May 15, 2024). Available at: https://ma-eeac.org/wp-content/uploads/MA-HPMS-CT-R2246-Heat-Pump-Metering-Study-Final-Report_2024-05-15.pdf

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downstream GHG emissions, including RNG, using a life cycle analysis (LCA). However, the Company did not employ an LCA because there is not yet enough guidance and consensuses on a commonly accepted methodology in New York. National Grid calculated BCAs in accordance with existing BCA frameworks and best practices and noted that Sierra Club has not provided any substantive support for other benefit estimates.

Energy Efficiency and Demand Response

Overall, Stakeholder comments support National Grid's efforts on EE, demand response, and UTENs, but the City of New York sought additional insights on bringing UTENs to scale, delays regarding EE deployment, and accelerating heat pump installations.

National Grid defended their EE and DR programs and clarified how they have been effective at reducing peak demand and gas consumption. The Company indicated plans to relaunch their residential weatherization program with a goal of enrolling contractors and processing rebate applications. National Grid is also working with LIPA to coordinate weatherization and other EE programs in that part of New York.

Affordability

A number of PA and Stakeholder comments focused on the economics of heat pumps, bill impact analyses for LMI customers, and general affordability for customers. The City of New York specifically mentioned increasing enrollment in EAP programs and meeting the 35% obligation under the CLCPA for Disadvantaged Communities. NRDC also conducted a bill impact analysis.

National Grid appreciated the focus on affordability and did not want burdensome costs borne by customers during the gas transition. The Company indicated that developing a fully formed view of the economics of heat pumps is beyond the scope of The Order. National Grid commented it must work within the scope of The Order which may not address all points on affordability and equity raised by Stakeholders. National Grid questioned NRDC's bill impact analysis and notes that rate design alone cannot solve the affordability challenges related to decarbonization.

CapEx

National Grid indicated that it would work to ensure the detailed projections embedded in the Scenario Analysis are readily accessible in the text of the LT Plan itself in addition to the workpapers that have been provided through responses to information requests. We observed that those details did not appear to be included in the RLT Plan.

NPAs and LPP Replacement

Some Stakeholders (City of New York, NRDC, and EDF) sought additional strategy and commentary on National Grid's NPA framework and implementation and LPP replacement plan.

National Grid indicated that the criteria for NPAs are based on current available data at the time, but the Company will continue to explore additional types of NPAs. National Grid was also beginning to develop its capabilities around IEP, which will provide insight into electrification based NPAs and deploying those without needing to build out a lot of electrical infrastructure. They also indicated they are working closely with Stakeholders to leverage their knowledge of customers and regions and are committed to enhancing NPA processes. However, NPA adoption in Disadvantaged Communities included a number of hurdles such as a larger number of renters and greater affordability issues.

Supply Planning

PA's recommendations focused on the risks of delivered service supplies and city gate peaking services, risks of CNG, supply-demand shortfalls, the Iroquois ExC project and Greenpoint. The City of New York requested that National Grid refine its no-infrastructure scenario.

National Grid detailed their delivered services including cogen peaking and their CNG. They note that they cannot rely on filling or refilling trailers with CNG during peak periods from their own gas system and note general logistical challenges.

PA recommended a discussion of planned reliance and alternatives to the Iroquois ExC project, but National Grid stated there wasn't an alternative. National Grid indicated the assessment of alternatives was documented in numerous reports filed with the Commission, and Iroquois ExC was the only resource that can

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close the projected 2027-28 supply and demand gap.[55] DPS also confirmed the need for the Iroquois ExC project to support safety and reliability in New York. National Grid has not moved forward with the Greenpoint vaporization project following the Commission's Order Denying Cost Recovery for Vaporizers 13 & 14 Project.[56] The Company and PA recognize that National Grid has no direct control over whether the ExC project is approved and placed in service. As such, National Grid identified the potential need for a moratorium on new gas connections beginning in winter 2027-28 in the RLT Plan, which was revised to 2028-29 in the FLT Plan after the Company secured additional supply.[57]

Depreciation and Other Matters

Various Stakeholders commented on other items including regulatory changes to the energy assistance program, indoor air quality, expanding the gas planning proceeding to electric planning, and other depreciation methodologies. National Grid stated they appreciate these issues and welcome engagement on these issues within its rate cases.

3.2.2 Response to Preliminary Findings Report and Stakeholder Comments

National Grid filed its response to PA's Preliminary Findings Report on February 24, 2025. These comments focus on PA's observations that the reliability of the gas system is essential for public health and safety and PA's findings regarding National Grid's demand forecast. PA finds the responses somewhat receptive to the feedback the Company received on the RLT Plan.

Reliability

The Company strongly supports PA's conclusion that their focus should be to "ensure that appropriate investments in the gas system are made to maintain safe, reliable, and adequate service to customers who continue to rely on gas to meet their energy needs."[58] National Grid also states that "this finding clearly supports the need for continued investment in gas infrastructure in the coming years,"[59] and points to PA acknowledging that Greenpoint and the Vaporizer 13/14 upgrade is needed for reliability-purposes. National Grid fully supports PA's findings on the reliability topic.

Demand Forecast

The Company disagrees with PA's assumptions around the long-term demand forecast and the impact of regulatory frameworks and policy uncertainty. National Grid does see alignment with PA with regard to incremental supply projects bolstering reliability of the gas system. Overall, the Company indicates PA's analysis affirms the Company's forecast and is essentially a low sensitivity of the Company's forecast. However, the Company asserts it ultimately believes it would be inappropriate and unnecessary to replace its current methodology with PA's.

3.3 Stakeholder Comments on PA's Preliminary Findings Report

The City of New York filed comments on PA's Preliminary Findings Report. Overall, the City of New York supports PA's findings. Their comments discuss PA's adjustments to National Grid's demand forecast and the need to choose a preferred pathway. The City of New York mentions population growth discrepancies and supply and demand gap disparities as it relates to a moratorium. The City of New York agrees with PA's recommendation for National Grid to provide additional analysis on a potential moratorium. The City of New York also agrees with PA's recommendation that National Grid needs to choose a preferred pathway. The City of New York is concerned with affordability and supports PA's assertion that the Company has understated the potential bill impacts and needs to provide updated analyses.

[55] This was the projected shortfall date as of the ILT and RLT Plans but has been revised to 2028-29 in the FLT Plan.
[56] Source: RLT Plan Section 4.15.1.
[57] Source: RLT Plan Section 1.3.2 and FLT Plan Section 1.3.2.
[58] Source: National Grid Reply Comments on PA's Preliminary Findings Report. Filed February 24, 2025.
[59] *Ibid*.

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3.4 Technical Conferences

In addition to the filed comments discussed in Sections 3.1 through 3.3, the Department, customers and Stakeholders engaged in a comprehensive process with over 1,500 public comments available in the Department's Document and Matter Management (DMM) system. Additionally, parties had the opportunity to participate in a number of Technical Conferences throughout this proceeding. As previously discussed within our Initial and Preliminary Findings Reports, PA was also in attendance and summarizes here the Technical Conferences held to date and further discussed in detail throughout this Report.

May 8, 2024

Pre-Filing Educational Technical Conference

The Company hosted a Pre-Filing Educational Technical Conference on May 8, 2024. The session began with an overview of the natural gas industry, which provided the audience with foundational information about how the gas utility system operates. SMEs from the Company then provided more detailed information about a variety of topics that collectively inform the ILT Plan. These topics included: customer demographics, usage trends and demand forecasting, decarbonization efforts, gas supply procurement, transportation and storage, distribution system engineering and operation, UTENs, and utility emissions. Several Stakeholders also attended, and instructions for submitting questions to PA throughout the review process were provided.

June 27, 2024

Long-Term Plan Technical Conference

DPS facilitated a Technical Conference to discuss the ILT Plan with Stakeholders. In this Technical Conference, the Company reviewed assumptions and modeling methodology pertaining to the three presented scenarios. Topics covered included: gas demand modeling, supply planning, CapEx, NPAs, LCFs, bill impacts, and results. This session provided Stakeholders an opportunity to receive an overview of the ILT Plan and ask clarifying questions.

July 17, 2024

Downstate Joint Proposal and NMPC Rate Case Technical Conference

A Technical Conference was facilitated by DPS to discuss the KEDLI and KEDNY Joint Proposal filed on April 9, 2024, in Case Nos. 23-G-0225 and 23-G-0226,[60] as well as the pending NMPC Rate Case. In this Technical Conference, the Company described the proposal and rate case approach. Topics covered included NPAs, TENs, and DSM. This session provided Stakeholders an opportunity to receive an overview of the Joint Proposal and Rate Case and ask clarifying questions.

July 30, 2024

Demand Forecast Technical Conference

Staff facilitated a Technical Conference to discuss the demand forecast within the ILT Plan[61] with Stakeholders. In this Technical Conference, the Company reviewed assumptions and modeling methodology pertaining to the demand forecast. Topics covered included: gas demand modeling, design day, retail and wholesale demand, DR, customer counts, and electrification, and results for each scenario. This session provided Stakeholders an opportunity to receive an overview of National Grid's demand forecast and ask clarifying questions.

August 28, 2024

Clean Energy Programs Technical Conference

Staff hosted a Technical Conference at which the Company shared more information with Stakeholders on a variety of topics related to various Clean Energy Programs. Topics covered in this session included a variety of clean energy programs that the Company has offered historically or is planning to offer in the near future on energy efficiency, weatherization, heat electrification, Clean Heat, gas demand response, NPAs, and

[60] The Joint Proposal in the recent downstate rate cases was approved, with minor modification and corrections, by the Commission on August 15, 2024.

[61] National Grid updated its demand forecast in June 2024 and used that more current forecast in support of the RLT Plan. However, the general methodology employed by the Company was similar to the forecast discussed during this technical conference.

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UTENs among other topics. The Company also presented some of the barriers they have identified on scaling energy efficiency in their service territory.

September 5, 2024

Low Carbon Fuels Technical Conference

Staff facilitated a Technical Conference in early September, to discuss the topic of Low Carbon Fuels. During this presentation the Company shared their view on the role of LCFs in decarbonizing the building sector, sources, and methodology they used for forecasting cost of LCFs, and recommendations on properly accounting for life cycle GHG emissions of RNG production.

September 12, 2024

Geothermal Applications SME Technical Conference

Staff facilitated a Technical Conference at which the New York Geothermal Energy Organization, Buffalo Geothermal, LLC presented information on the costs and benefits of geothermal applications. The New York Geothermal Energy Optimization company discussed the benefits of geothermal projects on a few multifamily and single-family passive house case studies, the pros, and cons of geothermal vs. air-source heat pumps, and some examples of how much a geothermal system would cost to a homeowner before and after rebates and tax credits. This session provided Stakeholders with information about geothermal and engaged participants in discussions on the role of geothermal in decarbonizing buildings in New York.

October 10, 2024

Bill Impacts and Affordability Technical Conference

A Technical Conference was facilitated by Staff to discuss bill impacts and affordability within the ILT Plan[62] with Stakeholders. In this Technical Conference, the Company reviewed components of their bill impact analysis. Topics covered included: detailed analysis of customer bills, revenue requirements, maintaining the gas system vs. electrification, and results for each scenario. This session provided Stakeholders an opportunity to receive an overview of National Grid's bill impact analysis and ask clarifying questions.

October 17, 2024

Moratorium Management Technical Conference

A Technical Conference was facilitated by Staff to discuss the possibility of a moratorium and its potential consequences with Stakeholders. In this Technical Conference, the Company reviewed moratorium implementation protocols and associated risks. Topics covered included: supply and demand assumptions and risks, gas growth, potential mortarium implementation steps, and how the Company would communicate this information. This session provided Stakeholders an opportunity to receive information about a potential moratorium and ask clarifying questions.

November 20, 2024, and December 12, 2024

LNG/Greenpoint Technical Conference

Two Technical Conferences were facilitated by Staff to discuss general information about LNG and the Greenpoint facility with Stakeholders. Topics covered in the Technical Conference included: information about LNG sites, safety and reliability guidelines, Disadvantaged Communities that rely on LNG, and LNG reliability benefits. These sessions provided Stakeholders an opportunity to receive information about LNG and Greenpoint and ask clarifying questions.

February 12, 2025

PA's Preliminary Findings Report Technical Conference

PA presented its key observations and recommendations related to its Supply, CapEx, Demand Forecast, Environmental and Economic assessment workstreams. The presentation covered PA's observations from our review of the Company's RLT Plan, our assessment of filed comments and the results of its latest analyses. PA discussed its Preliminary Findings Report recommendations, including instances where PA confirmed and/or clarified, added new recommendations, or removed prior recommendations that have been addressed by the Company.

[62] Note that the methodology for developing bill impacts in the RLT Plan was similar to the ILT Plan.

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February 27, 2025

Thermal Energy Network and District Geothermal Technical Conference

A Technical Conference was facilitated by SANE Energy and co-hosted with Staff to discuss general information about UTENs and district geothermal energy. Topics covered in the Technical Conference included: geothermal energy potential, thermal energy network legislation, UTEN pilot projects, opportunities for thermal energy networks in NY, wastewater energy transfer, and resource efficient decarbonization. This session provided Stakeholders an opportunity to receive information about UTENs and district geothermal energy and ask clarifying questions.

3.5 Public Statement Hearings

Department of Public Service staff hosted six public statement hearings wherein members of the public were allowed to submit their comments for the public record. During the public comment statement hearings, several speakers voiced their concerns related to National Grid's GLTP and the Greenpoint LNG facility. The public comments generally coalesced around themes related to the following:

- Frustrations with high bills.
- A general desire to have the Greenpoint LNG facility shut down and the site remediated.
- Concerns for the health and environmental impacts from the Greenpoint LNG facility.
- General opposition to any incremental natural gas infrastructure and concerns over how incremental gas infrastructure might impact rates.
- A preference to convert to utilizing ground-and-air-source heat pumps to serve heating demand instead of natural gas.
- Distrust in National Grid's demand forecast.
- Support for the New York Heat Act and frustration that - in many of the commenters' view - the GLTP is contrary to the CLCPA.

Only one commenter expressed a preference for retaining gas infrastructure – citing skepticism in both hydrogen and the ability to significantly electrify space heating. Several of the commenters claimed that PA's report concluded that the Greenpoint LNG facility could be retired by 2034-35. This is a misinterpretation of PA's findings. PA did observe that, under some scenarios, the design day demand did decline sufficiently such that the Greenpoint LNG facility might be able to be decommissioned from a gas supply standpoint, but PA also noted in Section 5.1.3 of the report that the facility offers significant reliability benefits and that, under the Reference scenario, the facility is necessary to meet design day demand for the full study period.

3.6 Data Requests

Both PA and the Stakeholders identified questions for National Grid, which PA then submitted to the Company via email. The Company notified PA once the responses have been posted to the Company’s file sharing website known as DREAM and shares them via email. PA then informed the Stakeholders once their responses have been uploaded to DREAM. National Grid has answered almost all of PA’s data requests in a timely manner. A few data requests have required extensions, which have been appropriately communicated via email.

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4 Supply Portfolio

PA has undertaken its review of several supply and supply-related aspects of the NMPC and DSNY[63] systems, based on information presented in the FLT Plan, the Company's responses to numerous data requests, and SME discussions. Our observations are summarized within the sub-sections below. We first highlight and discuss components of the supply stack for both the NMPC and DSNY regions, then discuss hydraulic models of the Company's' systems. We conclude with an analysis of the potential gaps between supply and Design Day demand based for each of the three scenarios in the FLT Plan. Our analysis incorporates the Company's demand forecast adjusted to reflect PA's observations, as illustrated by "Reference Case – PA Adj."

For winter peaking needs, the Company relies on a diverse portfolio of natural gas delivered through different sources and modes of delivery, namely: firm pipeline and storage, LNG, CNG, cogen peaking contracts, city gate peaking, and RNG. In the FLT Plan, the Company indicates Design Day demand will exceed available gas supply capacity in National Grid's Downstate service area as early as 2028-29 and Upstate service areas as early as 2030-31, due to increasing Design Day demand and relatively little spare supply.[64] However, the Company bases these conclusions on its Reference Case, which is largely a business-as-usual approach to forecasting demand. The Company indicates that more clarity on public policy is required to adjust its approach. However, National Grid does present two alternative scenarios – CEV and AE – that incorporate policy and technology driven changes that collectively decrease demand significantly. Under both these scenarios, the Company concludes that adequate supply exists to meet demand.

In PA's view of the demand forecast scenarios, supply-demand shortfalls are either pushed back or eliminated altogether depending on the supply scenario in question.

4.1 Assessment of Existing Supply

National Grid's NMPC territory is interconnected to several interstate pipelines but is distinct in that NMPC does not operate a high-pressure delivery system and instead relies on interstate pipeline facilities for high-pressure delivery and uses its own lower pressure systems for ultimate delivery. NMPC receives gas primarily from Eastern Gas Transmission and Storage (EGTS), Empire Pipeline (Empire), Iroquois Gas Transmission (Iroquois), and Tennessee Gas Pipeline (TGP). Unlike the DSNY systems, which are both served by a combination of interconnects, some segments of the NMPC system are served by individual interconnects as shown in Figure 4-1.

[63] Given the interconnected design of the NYFS that allows certain supply resources to be shared by KEDNY and KEDLI (and even portions of ConEd's LDC system), the DSNY supply stack is assessed in the aggregate and not by LDC.
[64] Source: FLT Plan, Section 5.14.2.

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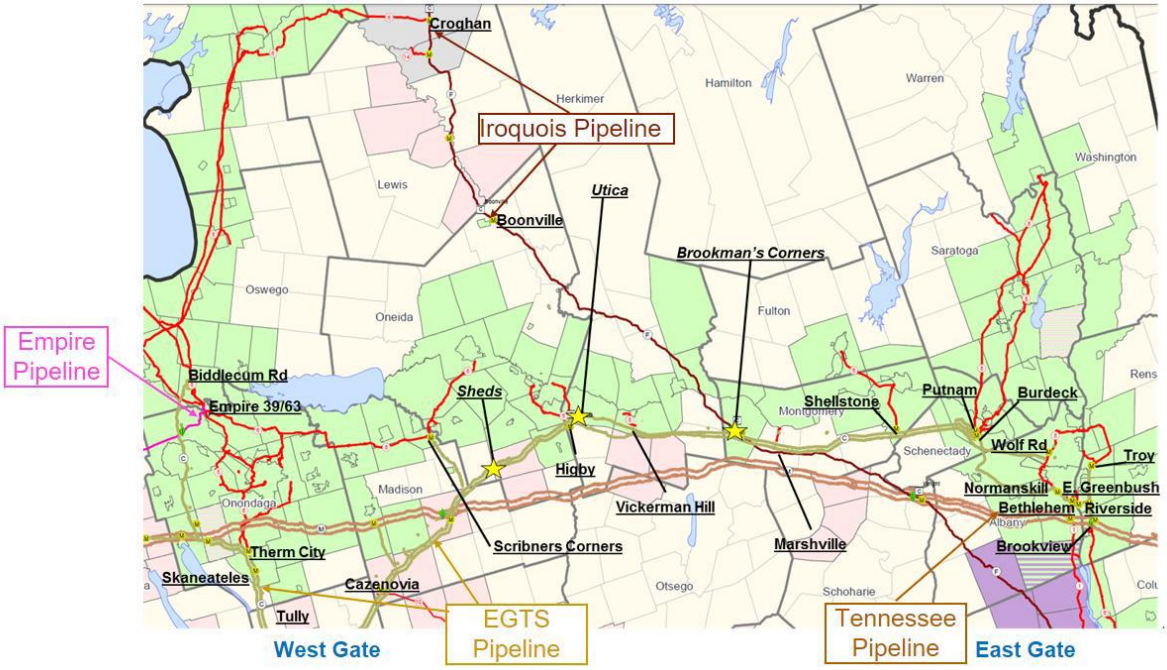
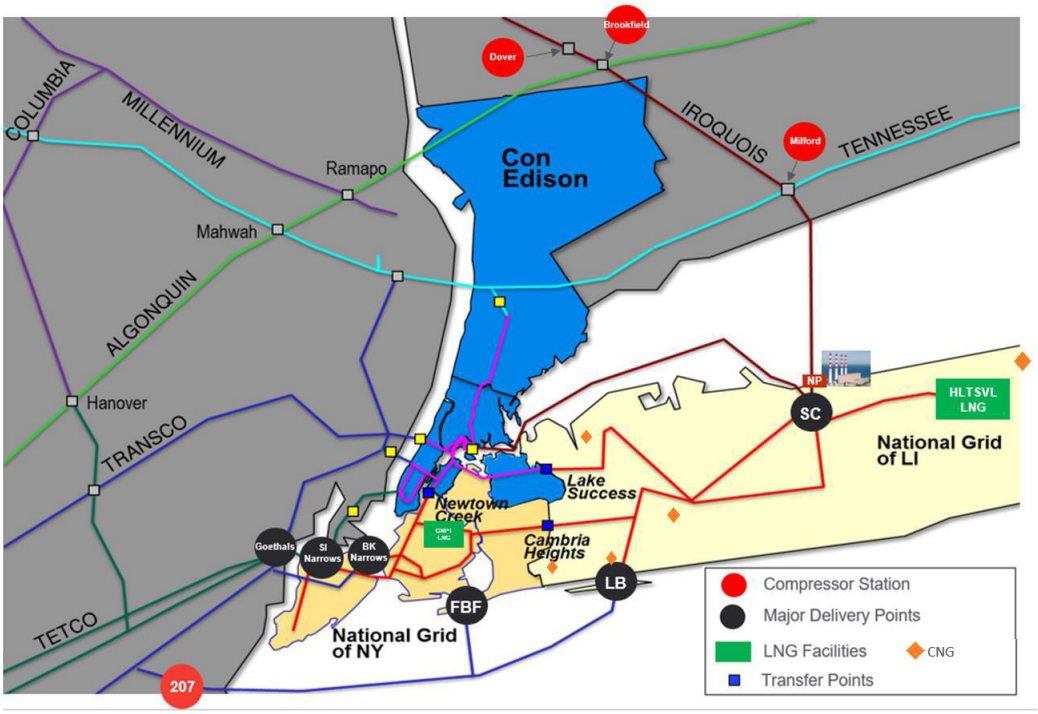
Figure 4-1: National Grid NMPC Map[65]



National Grid's DSNY territory, comprised of KEDNY and KEDLI, is served by four interstate pipelines: Transcontinental Gas Pipeline (Transco), Iroquois, Texas Eastern Transmission Pipeline (TETCO), and TGP. These pipelines interconnect either directly through city gates connected to the Company's delivery systems or indirectly to city gates on Con Edison's distribution system and delivering gas through severally owned and operated infrastructure subject to the New York Facilities System (NYFS) Agreement as shown in Figure 4-2.

Figure 4-2: National Grid DSNY Map[66]



[65] Source: FLT Plan, Section 2.2.2.
[66] Source: FLT Plan, Section 2.2.2.

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4.1.1 Considerations for Recent Pipeline Infrastructure News

In mid-February 2025, President Trump signaled support for reviving the Constitution Pipeline – which was cancelled in early 2020. While Trump and Governor Hochul met in mid-March and discussed the project, the two did not agree on tangible next steps for the project, though the pipeline's developer, Williams, also expressed interest in renewing development of the pipeline.[67]. In its analysis, PA did not incorporate the impacts of the potential revival of the Constitution Pipeline or any other currently cancelled infrastructure development project that would bring incremental natural gas to New York.

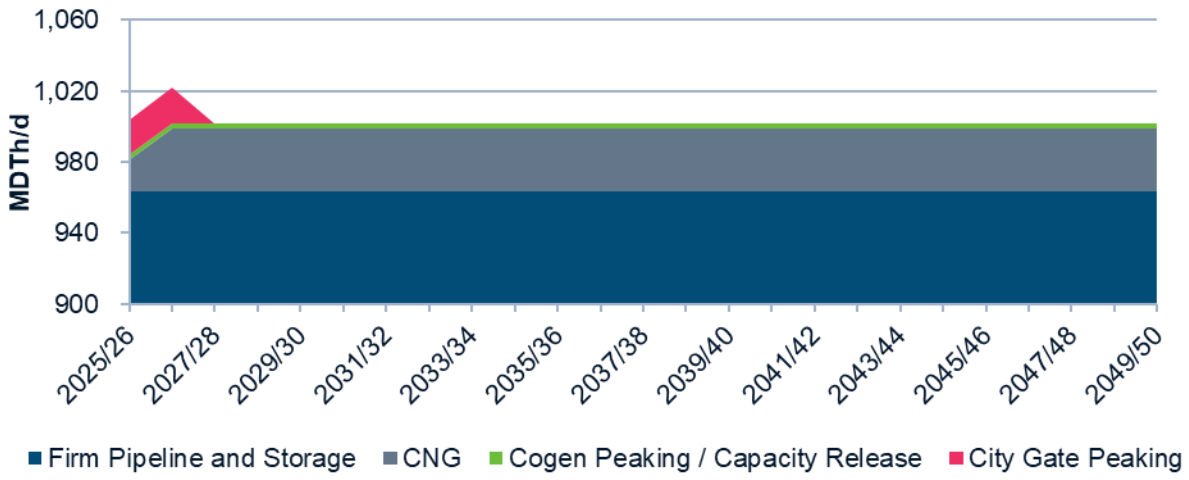
4.2 Supply Stack

PA evaluated the various supply categories contributing to National Grid's existing NMPC and DSNY supply stacks. For both territories, PA first verified the supply stack as it currently exists, and the extent to which supply stack components may be relied upon in the next 20-year study period. The total contracted supply stack for the upcoming 2025-26 winter season stands at just over 2,992 MDth/d of Design Day capacity in DSNY and just under 1,015 MDth/d of Design Day capacity in NMPC.[68] This volume includes all existing long-term contracted capacity, storage, existing LNG capacity at Greenpoint and Holtsville, peaking and released capacity from contracts with other entities, city gate peaking contracts, existing and planned CNG facilities, and RNG. Figure 4-3 and Figure 4-4 show the existing supply stacks.

Across the forecast period, there are a few notable changes to the contracted supply stack. These changes include:

- The expiration of cogen peaking contracts,
- Incremental capacity from new CNG injection facilities,
- The reversion of cogen peaking contracts to long-term contracted volumes, and
- The expiration and addition of city gate peaking volumes.

Figure 4-3: Upstate Design Day Supply Stack[69]



In Figure 4-3, above, notable changes include the expiration of a Cogen Peaking contract before the 2025-26 season, the expiration of City Gate Peaking contracts by 2026-27, and the addition of incremental CNG capacity beginning in 2026-27. The discussion in Section 4.2.1, below, provides more detail.

[67] Source: Reuter's article "Williams says it welcomes Trump's support for Constitution gas pipeline" https://www.reuters.com/world/us/williams-says-it-welcomes-trumps-support-constitution-gas-pipeline-2025-03-14/ March 14, 2025.
[68] Source: Company's response to PA-232.
[69] For its scenario analysis, PA Consulting has assumed that the NMPC cogen peaking volumes set to expire prior to the 2025-26 season are renewed for the study period.

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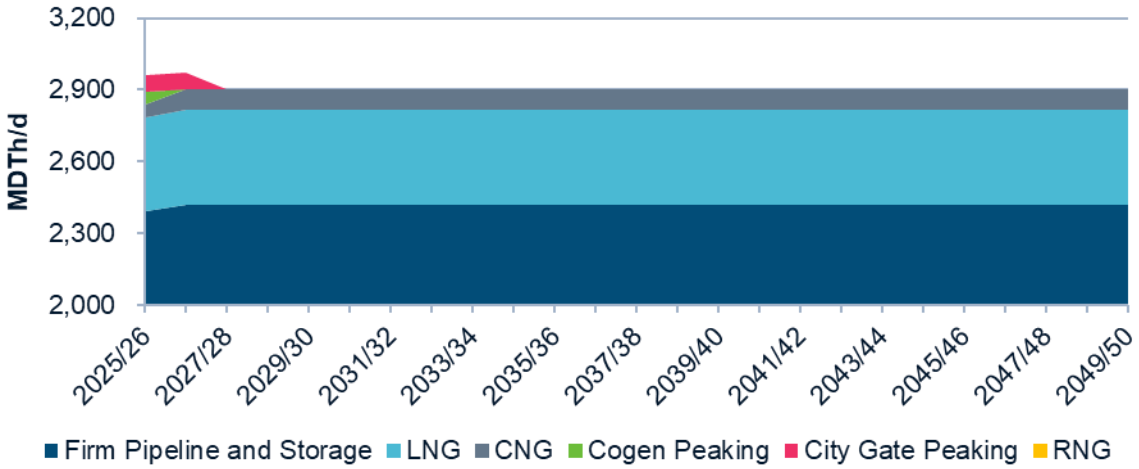
Figure 4-4: Downstate Design Day Supply Stack[70]



In Figure 4-4, above, notable changes to the supply portfolio include the expiration of City Gate Peaking contracts through 2027-28, the expiration of various Cogen Peaking contracts through 2025-26, the addition of more CNG capacity through 2026-27, and the reversion of released supply to the Company's Firm Pipeline and Storage category in 2026-27. More detailed explanation of each component of the supply is visible in Section 4.2.2, below.

In the following sections we discuss our observations on each component of the supply stack.

4.2.1 Upstate

In the FLT Plan, the Company's Reference Case projects that a supply-demand gap will emerge in the NMPC area beginning in 2030-31.[71] It appears that the potential addition of 60 MDth/d of capacity from Empire in the western part of the Company's service territory would push this shortfall out to 2040-41 (but would not benefit the eastern part of its service territory). In Section 4.3.1, we further discuss the potential shortfalls in the context of PA's analysis of the Company's demand forecast scenarios. But first, we describe each component of the NMPC supply portfolio.

Long-term Contracts Assessment

The largest component of the NMPC supply portfolio is long-term pipeline capacity and storage contracts which, in this report, will be referred to collectively as "long-term contracts." This component of the supply stack is expected to remain relatively static over the course of the study period at a Design Day level just below 964 MDth/d.[72] These contracts are held primarily on EGTS, TGP, and Iroquois.

In the FLT Plan, the Company noted that an incremental 60 MDth/d of capacity is available on the Empire Pipeline for delivery at NMPC's West Gate[73] and that the incremental volume could partially alleviate an overall supply gap in this area.[74] The Company indicated that the incremental capacity would not be able to alleviate constraints at the East Gate.[75] While the Company states that it is able to receive incremental volumes from Empire, it appears that the Company has not provided hydraulic models that reflect the incremental 60 MDth/d. The Company did note that it is seeking approval for the East Gate Reliability Assessment to identify methods to alleviate constraints in that region.

In addition to the 60 MDth/d of incremental capacity on Empire Pipeline, the Company indicated that some capacity could be acquired from TGP, but that the NMPC system would require additional infrastructure – in the form of approximately 10 miles of 16-inch pipe on the East Gate[76] – to accept new gas from TGP. This infrastructure is reflected in the Company's CapEx forecast in the form of a generic project for FY2029 –

[70] Source: Company's response to PA-232.
[71] Source: FLT Plan, Section 5.14.2.
[72] Source: Company's response to PA-232.
[73] Source: FLT Plan, Section 5.14.3.1.
[74] Source: Company's response to PA-090.
[75] Source: FLT Plan, Section 5.14.3.1.
[76] Source: Company's response to PA-090.

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FY2031.[77] The Company has not identified other opportunities to increase their portfolio of long-term contracts for NMPC, which PA observes to be reasonable given the relatively tight supply market in the Northeast.

Delivered Services and City Gate Peaking Supplies

The NMPC supply portfolio contains 20 MDth/d of city gate peaking contracts,[78] also frequently referred to as "delivered services" – volumes that the Company can call on during set seasonal periods, usually the standard heating season when demand is expected to be at its highest. The contracts also tend to be shorter lived, expiring after a couple of years or less, and typically do not include renewal provisions, though the offtaker (in this case the Company) could negotiate a renewal. In the FLT Plan, the Company indicates that these contracts are currently expected to run through 2026-27. On a dollar-per-therm basis, securing these contracts tends to be expensive relative to long-term contracts. PA observes that in gas markets that are relatively tight, it can also be difficult to guarantee that delivered services will be available for purchase on a going forward basis. The third parties that hold the contracts are not obligated to release them or respond to requests for proposals (RFPs) for supply – so these types of contracts can represent a higher degree of risk if the Company intends to rely on them to meet Design Day demand. For these reasons, these contracts are best utilized as a peaking resource. In the FLT Plan, the Company has outlined the risks associated with relying on these supplies.[79]

CNG

The NMPC supply portfolio currently contains 17.6 MDth/d of CNG capacity which represents the full capacity of the Moreau site. An additional 17.6 MDth/d of CNG capacity is slated to be added to the NMPC portfolio in 2026-27 with the completion of the ETS2.[80] The Company has indicated that they have no intent to build additional CNG injection sites in NMPC after ETS2 is complete. See further discussion of CNG in Section 4.2.2.

Cogen / Counterparty Peaking Contracts

The NMPC portfolio includes 13.225 MDth/d of peaking capacity from two separate entities upon which NMPC can call. These supply sources are similar to those (referred to as "cogen peaking contracts") that are held by the DSNY utilities. One of the two contracts represents 10.225 MDth/d of peaking capacity that expires after 2024-25 and may not be available for 2025-26. The Company has indicated that it has been successful in renewing this contract previously[81]. The other contract represents the remaining 3 MDth/d and is subject to an evergreen renewal agreement.

Company's De-Contracting / Re-Contracting Approach

As gas demand evolves and eventually begins to trend down, it may become necessary for the Company to implement a methodology for de-contracting to reduce the costs passed on to ratepayers. See further discussion in Section 4.2.2.

4.2.2 Downstate

DSNY is unique in that there are two separate utilities that share a portfolio of natural gas supply resources. The DSNY area is also unique in that there is shared infrastructure – the NYFS – severally owned and managed by both National Grid and Consolidated Edison. The NYFS Agreement governs how the severally owned pipeline system will operate and, among other things, specifies each utility's allocated share of interstate pipeline capacity entitlements at each city gate (e.g., each interconnection with an upstream transmission pipeline) as well as maximum hourly volumes of gas that are permitted to flow from one utility to the other. While gas flow is bidirectional at the pipeline interconnections known as Lake Success and Newtown Creek, on a design day gas flows from Con Edison to National Grid.

The Company has projected a design day supply-demand shortfall in 2028-29 (where it previously projected a shortfall in 2027-28 in the RLT Plan).[82] This projected supply-demand shortfall is in the context of the

[77] Source: FLT Plan, Section 15.4.3.1
[78] Source: Company's response to PA-232.
[79] Source: FLT Plan, Section 5.2.4.
[80] Source: FLT Plan, Section 5.4.2.
[81] Source: Company's response to PA-147
[82] Source: FLT Plan, Section 5.14.2.

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Company's Reference Case only and does not consider how the timing and magnitude of these shortfalls may change in other scenarios. For DSNY, in its discussion of a potential supply-demand shortfall, the Company has not included some of the supply sources available in prior years and the impacts the availability of these sources may have on the timing and magnitude of the Design Day supply-demand shortfall. These impacts are discussed further in the sections below.

Long-term Contracts Assessment

Like NMPC, the largest component of the DSNY supply portfolio is the capacity represented by long-term pipeline and storage contracts or, collectively "long-term contracts" in this report. KEDLI and KEDNY's supply nomination occurs from the same joint supply portfolio instead of separately. DSNY's long-term contracts are delivered on Iroquois, TETCO, Transco, and TGP. The Company's DSNY long-term contracted capacity currently stands at about 2,390 MDth/d with an expected increase of 12.5 MDth/d with the acquisition of incremental capacity in 2025-26, and a separate increase of just over 30 MDth/d in 2026-27 when a capacity release contract between KEDLI and a cogen offtaker expires and the released capacity returns to the Company (See "Cogen Peaking Contracts" discussion below)..[83] Thereafter, DSNY long-term contracted capacity is expected to remain static due to a lack of contractable capacity and limitations for the company to accept new supply on the DSNY system.

Delivered Services and City Gate Peaking Supplies

Delivered services and city gate peaking supplies are components of the supply stack that the Company purchases from 3rd party gas market participants who hold natural gas capacity. These volumes are generally contracted to be delivered only during specified seasons and may only remain contracted for the prompt winter season or up to a few years. Delivered services and city gate peaking supplies are also frequently more expensive on a dollar-per-dekatherm basis and are relied upon to bridge the gap between supply and demand. The DSNY Company retains 98 MDth/d of city gate peaking capacity in their supply portfolio. This volume will grow to nearly 111 MDth/d through 2027-28 with the addition of incremental contracts.

LNG (Greenpoint and Holtsville)

The DSNY portfolio includes 394.5 MDth/d of capacity from two distinct LNG facilities: the Greenpoint facility, representing a Design Day capacity of 291.2 MDth/d, and the Holtsville facility, representing a Design Day capacity of 103.3 MDth/d. The facilities typically are used for reliability and peaking purposes during the winter season and during other seasons the Company must purchase and liquefy natural gas for storage.

The Company has identified a project that involves installing two new vaporizers (Vaporizers 13/14) to the existing Greenpoint LNG facility. The addition of Vaporizers 13/14 would bring the Greenpoint LNG facility's Design Day capacity from 291.2 MDth/d to 350 MDth/d – representing incremental capacity of 58.8 MDth/d. It is important to note that the addition of these vaporizers does not increase the capacity of LNG that the Greenpoint facility can store – the new vaporizers simply increase the rate at which the facility can vaporize and inject LNG into the Company's delivery systems and enhance the reliability of the facility. LNG and Greenpoint are discussed in more detail in Section 5.

CNG

The DSNY portfolio includes five CNG sites; the Company contracted for a total of 61.6 MDth/d of CNG supply during winter 2024-25. Table 4-1 describes the characteristics of each CNG facility in the DSNY footprint.

[83] Source: Company's response to PA-232

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Table 4-1: DSNY CNG Facility Summary

Facility Name	Design Day Capacity (MDth/d)	Contracted in Winter 2024-25?	Notes
Riverhead	8.8	Yes	Upgrade scheduled for 2025-26 will increase capacity to 17.6 MDth/d
Inwood	17.6	Yes	
Glenwood	17.6	Yes	
Barrett	17.6	Yes	
Farmingdale	17.6	No	Facility is built and available for dispatch but was not contracted for CNG delivery in 2024-25.

As noted in Table 4-1, when the Riverhead facility has been upgraded and at such time as all facilities are fully contracted, the total achievable Design Day output for all CNG facilities will stand at 88 MDth/d.

PA finds that the FLT Plan appropriately addresses key aspects of overreliance on CNG including:

- Reliance on long-distance trucking during adverse weather,
- Skilled labor availability,
- Logistical challenges related to CNG trailer availability, and
- The benefits and limitations of on-site storage.

The Company has indicated that it is not viable to continue expansion or construction of incremental CNG capacity, given the risks noted above.[84]

Cogen Peaking Contracts

The DSNY utilities have just under 56 MDth/d of peaking capacity with a cogen facility counterparty and is slated to expire.[85] In this report, we identify this capacity as "cogen peaking contracts." The Company has acquired incremental long-term pipeline capacity and city gate peaking capacity to mitigate the impact of expiring cogen peaking contracts and to push an expected supply-demand gap out one more year to 2028-29.

Iroquois Enhancement by Compression

The Iroquois Enhancement by Compression (Iroquois ExC or ExC) project is under development by Iroquois to enable 125 MDth/d of additional natural gas capacity which would be equally divided between Con Edison (at the Hunts Point gate) and National Grid (at the South Commack gate). Iroquois ExC entails no new pipeline construction; rather, the project consists only of upgrades at four existing compressor sites along the Iroquois pipeline. On March 25, 2022, Iroquois ExC received a Certificate of Public Convenience and Necessity from FERC and on February 24, 2024, DPS published an assessment concluding that the project is necessary to ensure safe, adequate, and reliable gas service in DSNY.[86] The NYDEC issued permits for the facility in February 2025 and now the project is only awaiting an air permit from the Connecticut Department of Energy and Environmental Protection (CT-DEEP). FERC's approval to begin construction is also required. The FLT Plan indicates that the DSNY utilities are dependent on this project's completion to be capable of meeting Design Day demand in the coming years and delay or avoid a moratorium in DSNY. The FLT Plan also indicates that there is a two-year minimum construction lead time between project approval and when Iroquois ExC would be in-service – longer than the construction period indicated on Iroquois ExC's project website (as little as nine months, as of the publishing of this report) which cites that construction could be completed by January 1, 2027, if all necessary permits are available by fall 2025/spring 2026.[87] Given the lead-time

[84] Source: FLT Plan, Sections 2.2.5 and 5.4.2.
[85] Source: RLT Plan, Section 4.14.2.
[86] Response Letter to DEC 02.26.2024 Re: Iroquois Enhancement by Compression (ExC) Project.
[87] Iroquois ExC Project Website.

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required to complete the addition of the Greenpoint Vaporizers 13 & 14, the ExC project is – in the Company's view – the project best positioned to address the Company's projected Design Day supply-demand gap in 2028-29. The Company has acknowledged that it has identified no other supply alternatives that can help alleviate the supply-demand gap projected in 2028-29, especially given "concerns shared by National Grid and DPS Staff about over-reliance on CNG to meet Design Day conditions following Winter Storm Elliott.[88]" The Company did note that newly acquired city gate peaking capacity alleviated the supply-demand gap for an additional year (where it was previously forecast to occur in 2027-28) but also acknowledged that there were risks to relying on this type of supply as a bridge solution.[89]

The potential for a supply-demand gap will also be impacted by the demand forecast. As discussed in Section 7, PA has completed an analysis of the latest Company demand forecast and recommended several adjustments to that forecast that could impact the timing of any potential supply-demand gap. In addition, PA notes that the Company's supply-demand gap assessment is based solely on the Reference Case. In Section 4.3 PA presents an assessment of the supply-demand gap that reflects recommended adjustments to the Company's demand forecast as discussed in Section 7.

While the timing of a supply-demand gap is heavily dependent upon the assumptions that inform the demand forecasts, it must be noted that incorporating incremental firm pipeline capacity (like that provided by Iroquois ExC) in the Company's supply portfolio contributes reliability benefits that are not fully expressed in high level evaluations of supply-demand shortfall timing (like those discussed in Section 4.3). The firm pipeline capacity that would be made available by placing Iroquois ExC in-service provides reliability benefits that cannot be provided by other incremental supply options such as CNG or delivered services – both of which pose unique reliability (and potentially economic) challenges. Incremental firm pipeline capacity lacks the re-contracting and increased cost risks that come with delivered services. Firm pipeline capacity also lacks the operational risks associated with CNG; namely, delivery risks during Design Day conditions, logistical risks associated with trailer availability, and the execution risks associated with calling on CNG capacity when necessary to supplement the design day portfolio. Installing additional CNG injection capacity in lieu of Iroquois ExC could require 4 additional injection sites and approximately 170 CNG trucks to match the daily delivery capacity of Iroquois ExC. Risks associated with CNG are discussed more fully in the CNG section within Section 4.2.2. Incremental firm pipeline capacity such as ExC would come with renewal provisions, can be called upon readily during Design Day conditions, is relatively de-risked from a delivery standpoint, and can be retained in the Company's supply portfolio until Design Day demand subsides sufficiently for the Company to consider a measured de-contracting approach. Section 4.3.2 discusses our perspective that it may be several years before Iroquois ExC is necessary to close the supply-demand gap. That timing does not, however, diminish the reliability benefits of long-term contracted supply. Finally, given that the capacity of the ExC Project is to be split equally between the Company and Con Edison, there are overall benefits ExC would provide to the NYFS which further ensure Design Day reliability in downstate New York. For example, as indicated in our Final Long-Term Gas Planning Report related to the Long-Term Plans of Con Edison and Orange and Rockland, if ExC is placed in service additional capacity will be available to National Grid via a transfer point on the NYFS, resulting in improved reliability for both Con Edison and National Grid customers.[90]

Company's De-Contracting / Re-Contracting Approach

If or when demand is expected to decrease, the Company intends to de-contract in a manner that allows them to right-size their portfolios and still meet demand. The Company has indicated that they will seek to de-contract to the extent doing so does not have an adverse impact on the "reliability and economics of the portfolio." The Company acknowledged the need to evaluate the following items when de-contracting becomes necessary:[91]

- Renewal rights associated with the contracts (yearly renewal, rollover agreements, negotiation, etc.),
- Cost and savings to customer,
- Flexibility for future demand variation,

[88] FLT Plan, Section 5.4.2.
[89] FLT Plan, Section 5.2.4.
[90] Final Report on Con Edison and Orange and Rockland Utilities Long-Term Plan filed on December 12, 2023, in Case No. 23-G-0147, page 42.
[91] Sources: FLT Plan Section 5.13 and Company's Response to PA-016.

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- Capacity volume reduction possibilities, and
- Discussion with and buy-in from the Commission.

Each of these considerations will be key in appropriately evaluating how to effectively de-contract when demand begins to decrease. In PA's view, the Company appropriately noted that it may be important to maintain extra supply during the de-contracting process, should there be any fluctuation in demand growth that establishes a new need for capacity – though they did not express a preference for a specific type of supply to satisfy potential transient demand growth. The Company did not explain if de-contracting methodologies and considerations vary between the NMPC and DSNY portfolios. To improve future versions of the GSLTPs, it would be helpful for the Company to explain if a particular category of supply would be favorable for maintaining flexibility in the event of demand growth during the de-contracting period. Further, it would be valuable for the Company to note if their approach to de-contracting would vary between the NMPC and DSNY portfolios and if so, why the approach might vary.

4.3 Supply Stack Scenarios

To better understand and visualize the potential range of when a supply-demand shortfall could occur, PA compared the supply portfolios for both USNY and DSNY against the following demand curves:

- National Grid's FLT Plan Design Day demand forecasts for the Reference, CEV and AE scenarios
- PA's evaluation of potential design day demand forecast ranges for two of the three scenarios, reflecting adjustments to a number of assumptions discussed more fully in Section 7.

The results of this assessment are further described below.

4.3.1 Upstate Scenarios

PA finds the number of supply-demand scenarios for USNY is relatively limited given NMPC's simpler portfolio (as compared to KEDLI/KEDNY) and relatively static nature of its existing contracts and sources of supply. In order to capture the impacts of the most meaningful and most fluid components of USNY's supply stack. PA has assumed:

- Firm Pipeline and Storage volumes remain at approximately 964 MDth/d for the study period.
- 20 MDth/d of city gate peaking volumes expire after 2026-27 and are not renewed. We assume this because city gate peaking volumes are frequently only contracted either a prompt year or a few years into the future and counterparties are willing to re-market those supplies readily after expiration. This change to capacity is included implicitly in the "Existing Portfolio" category in the following figures.
- 13.225 MDth/d of cogen peaking contracts are renewed through the study period. This capacity is included implicitly in the "Existing Portfolio" category in the following figures.
- 17.6 MDth/d of incremental CNG capacity will be available beginning in 2026-27 in the form of the ETS2 CNG facility. This excess capacity will be shown explicitly in the following figures.
- Next, PA evaluated the impact the incremental 60 MDth/d of capacity on Empire for delivery at the West Gate by comparing each design day forecast scenario with and without this incremental Empire capacity.

ETS2 In-Service – No Incremental Empire Capacity

In this scenario, ETS2 is brought online and contracted for CNG delivery and NMPC is unable to acquire the incremental 60 MDth/d of capacity available on Empire for delivery at the West Gate.

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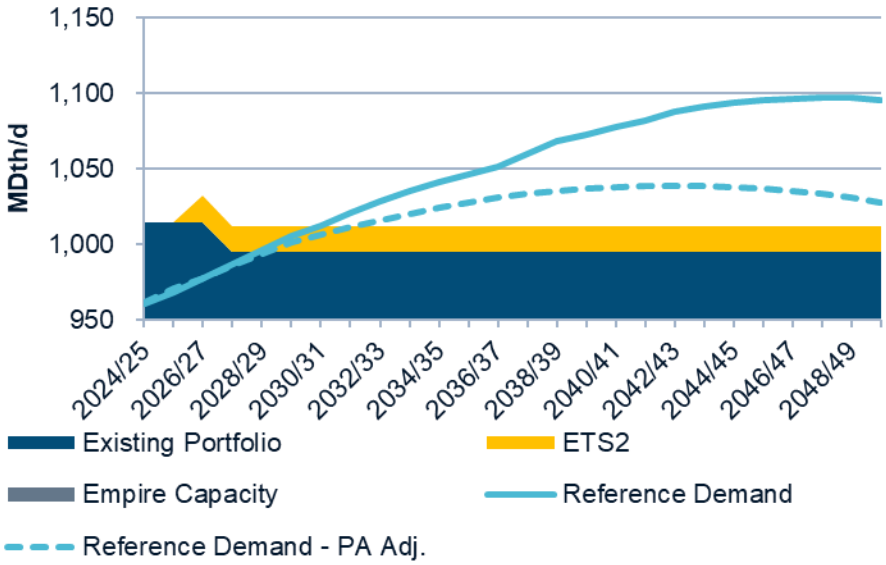
Figure 4-5: Reference Case - NMPC Design Day Supply-Demand - ETS2 In-Service, No Incr. Empire Capacity



When compared to the FLT Plan Company Reference Case Design Day demand forecast, NMPC can expect a very slight supply-demand shortfall of nearly 0.10 MDth/d beginning in 2030-31, expanding to a shortfall of 83.4 MDth/d by 2049-50.[92] However, when PA's proposed adjustments to NMPC's Reference Case Design Day demand forecast are considered, NMPC can expect a supply-demand shortfall of nearly 4 MDth/d beginning in 2032-33, expanding to a shortfall of just over 15 MDth/d by 2049-50 as shown in Figure 4-5 above.

As shown in Figure 46 and Figure 47, under both the Company's FLT Plan CEV and AE Design Day demand forecasts, no shortfall exists at any point in the study period. During the winter season where a shortfall is initially seen under the Reference Case (2030-31), there is a supply overage of approximately 121 MDth/d and 244 MDth/d, respectively, under the CEV and AE cases which continues to expand further into the future.

As is visible in Figure 4-6, when considering PA's proposed adjustments to Design Day demand for the CEV scenario, the oversupply expands slightly to just over 126 MDth/d in the winter when we initially saw a shortfall under the Company's Reference Case (2030-31) and continues to expand into the future. PA does not propose adjustments to the AE demand curve.

[92] Supply-demand deltas vary slightly from those quoted in the Final LT because the Design Day demand data provided in PA-150 did not include Non-Firm Demand Response load.

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Figure 4-6: CEV Case - NMPC Design Day Supply-Demand - ETS2 In-Service, No Incr. Empire Capacity

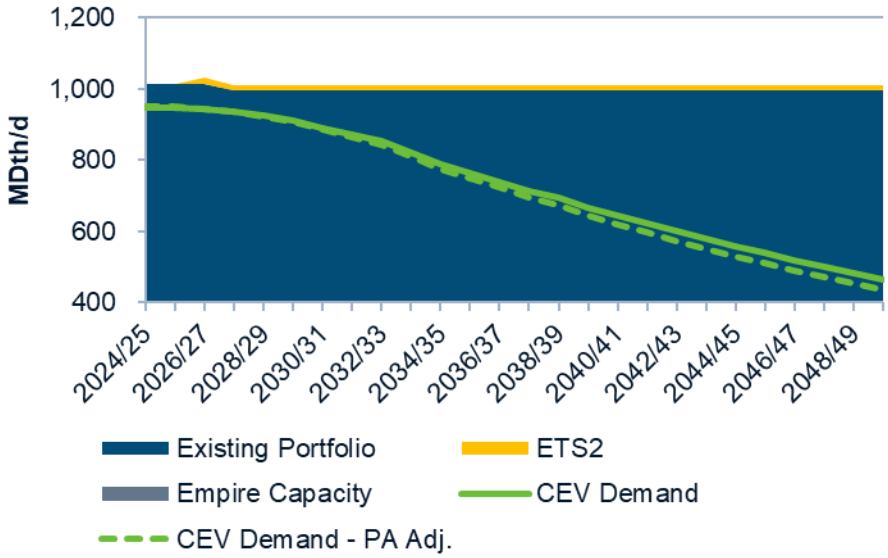
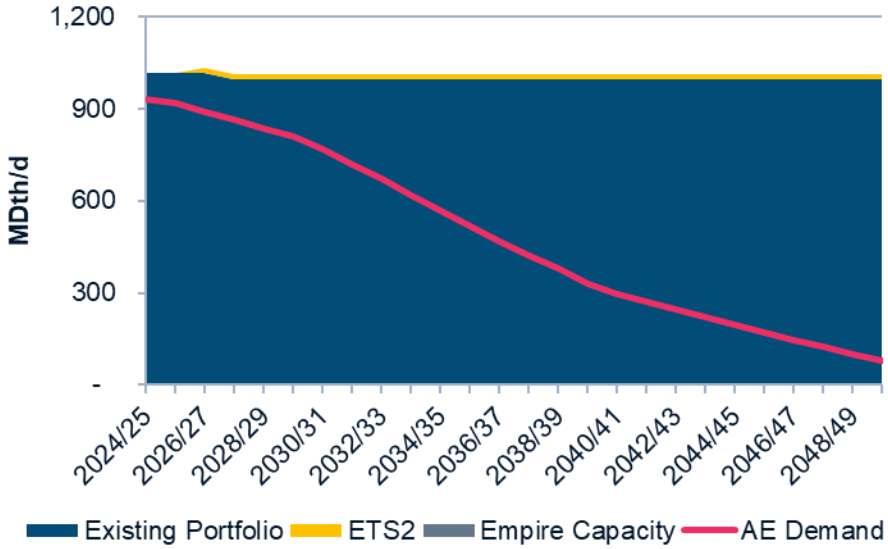


Figure 4-7: AE Case - NMPC Design Day Supply-Demand - ETS2 In-Service, No Incr. Empire Capacity



ETS2 and Incremental Empire Capacity in Service

In this scenario, ETS2 is brought online and contracted for CNG delivery and NMPC is able to acquire the incremental 60 MDth/d of capacity available on Empire for delivery at the West Gate. The Company has indicated that Empire flows are hydraulically limited to the West Gate and may not be able to alleviate needs in the East Gate region. The Company has proposed the East Gate Reliability Assessment as a means to identify potential solutions to hydraulic limitations in the East Gate area. For the purpose of this analysis, we are evaluating only the overall supply-demand outlook and assume that a hydraulic solution will be found to allow these incremental volumes to flow.

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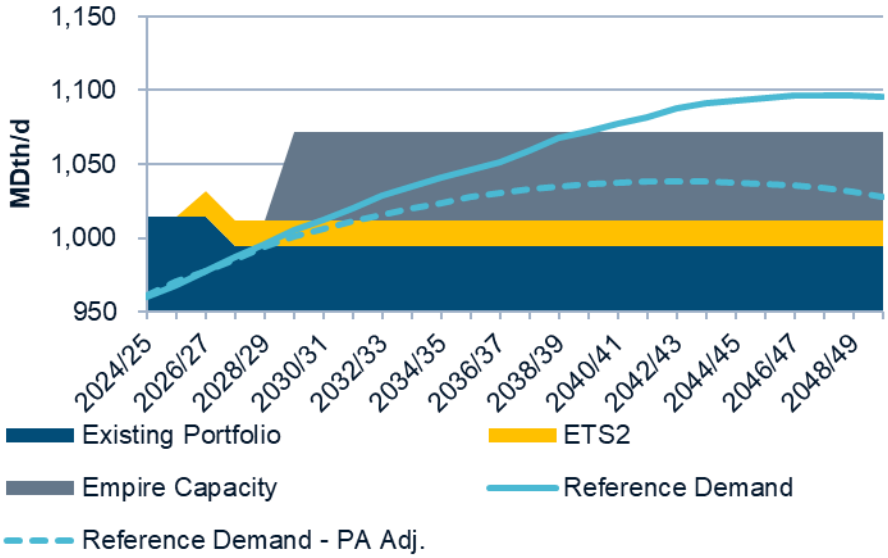
Figure 4-8: Reference Case - NMPC Design Day Supply-Demand - ETS2, Incr. Empire Capacity In-Service



When compared with the Company's Reference Case Design Day demand forecast, NMPC can expect a supply-demand shortfall of approximately 5 MDth/d beginning in 2040-41, expanding to a shortfall of 23.4 MDth/d by 2049-50.[93] However, under the same scenario but instead considering PA's proposed adjustments to NMPC's Design Day demand forecast, NMPC does not encounter a supply-demand shortfall through the study period. Instead, NMPC has an oversupply of nearly 35 MDth/d in 2040-41, expanding to an oversupply of nearly 45 MDth/d by 2049-50 as shown in Figure 4-8 above.

Once again, under the CEV and AE design day forecast no supply-demand shortfall is evident for the entirety of the study period, basically obviating the need to acquire incremental Empire capacity. During the same winter season wherein a shortfall is present in the Reference Case (2040-41), there is an oversupply of 428 MDth/d and 777 MDth/d, respectively, under the CEV and AE cases as shown in Figure 4-9 and Figure 4-10, below. Considering PA's proposed adjustments to the Design Day demand forecast for the CEV case, an oversupply of 451 MDth/d is evident in the winter when we saw an initial shortfall under the Company's Reference Case (2040-41). This oversupply grows to just over 637 MDth/d by 2049-50. PA does not propose adjustments to the Company's AE Case.

[93] Supply-demand deltas vary slightly from those found in the FLT Plan because the Design Day demand data provided in PA-150 did not include Non-Firm Demand Response load.

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Figure 4-9: CEV Case – NMPC Design Day Supply-Demand - ETS2 In-Service, Incr. Empire Capacity In-Service

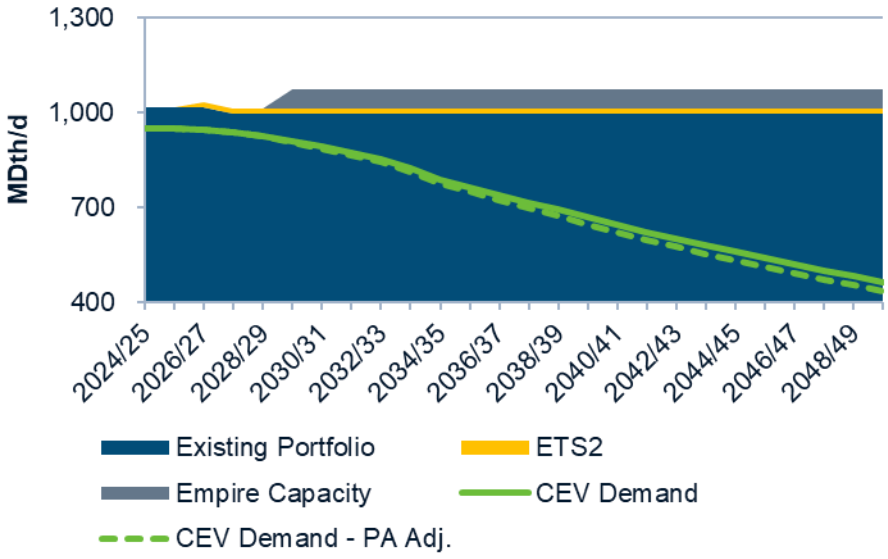
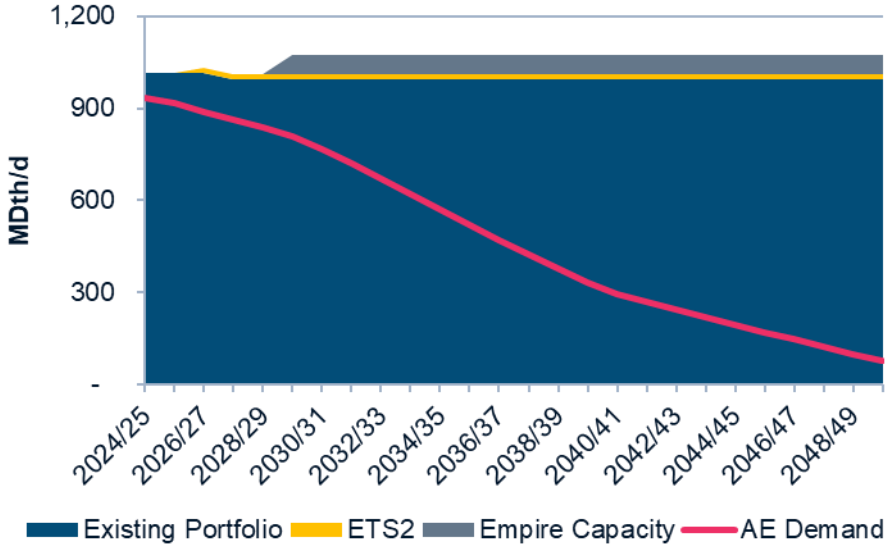


Figure 4-10: AE Case - NMPC Design Day Supply-Demand - ETS2 In-Service, Incr. Empire Capacity In-Service



4.3.2 Downstate Scenarios

The makeup of the DSNY portfolio has the potential to evolve in a variable manner that could drastically alter the timing and magnitude of a supply-demand gap. PA has made some assumptions to 1) limit the number of scenarios it considers to reasonable alternatives and 2) capture the impacts of the most meaningful and most fluid components of DSNY's supply stack. PA has assumed:

- The supply provided by the existing LNG infrastructure at Greenpoint is included in the supply stack for each of the following scenarios. We find that continued use of existing Greenpoint LNG supply is necessary and appropriate for the foreseeable future, under the Company's Design Day forecast both with and without PA's suggested adjustments discussed in detail in Section 7.

Iroquois ExC and Greenpoint Vaporizers 13 & 14 Not In-Service

In this scenario, neither Iroquois ExC nor Greenpoint Vaporizers 13 &14 are placed in service.

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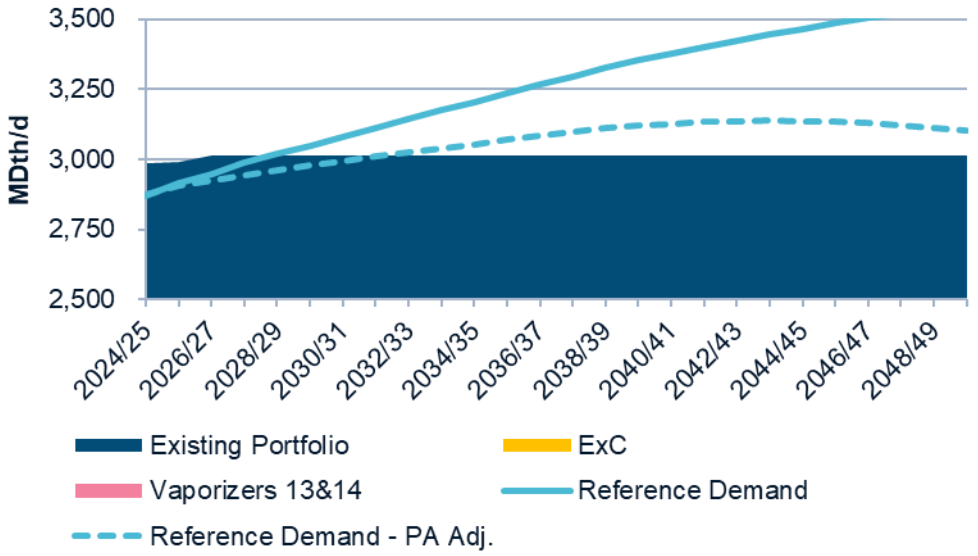
Figure 4-11: Reference Case - KEDLI/KEDNY Design Day Supply-Demand – Iroquois ExC and Greenpoint 13&14 Not In-Service



Under this scenario and considering the Company's Reference Case Design Day demand forecast, DSNY can expect a supply-demand shortfall of approximately 4.5 MDth/d beginning in 2028-29, expanding to a shortfall of 536.6 MDth/d by 2049-50.[94] However, under the same scenario but instead considering PA's proposed adjustments to the DSNY Design Day demand forecast, the shortfall is instead nearly 12 MDth/d beginning in 2032-33. This projected shortfall grows to just above 87 MDth/d by 2049-50. See Figure 4-11 above.

Carrying forward the proposed PA adjustments to the Reference Case Design Day demand forecast, for the CEV and AE Design Day demand scenarios, no supply-demand shortfall is evident throughout the study period. During the same winter season when a shortfall occurs in the Reference Case (2028-29), an oversupply of 156 MDth/d and 461 MDth/d, respectively, occurs in the CEV and AE cases as shown in Figure 4-12 and Figure 4-13 below. Applying the PA proposed adjustments to the CEV case, an oversupply of close to 189 MDth/d, is evident in 2028-29. This oversupply grows to just over 1341 MDth/d in 2049-50. PA does not propose any adjustments to the Company's AE Case.

[94] Supply-demand deltas vary slightly from those quoted in the FLT Plan because the Design Day demand data provided in PA-150 did not include Non-Firm Demand Response load.

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Figure 4-12: CEV Case - KEDLI/KEDNY Design Day Supply-Demand – Iroquois ExC and Greenpoint 13&14 Not In-Service

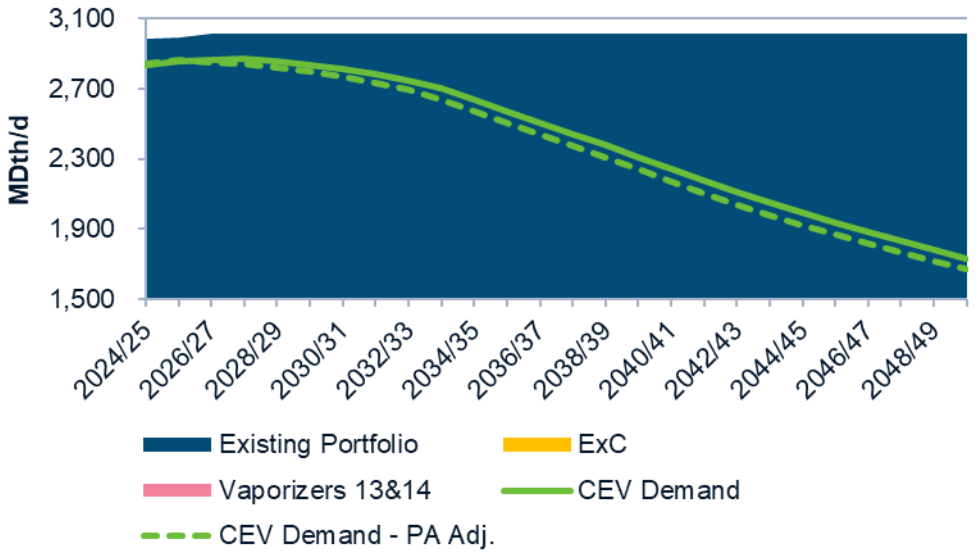
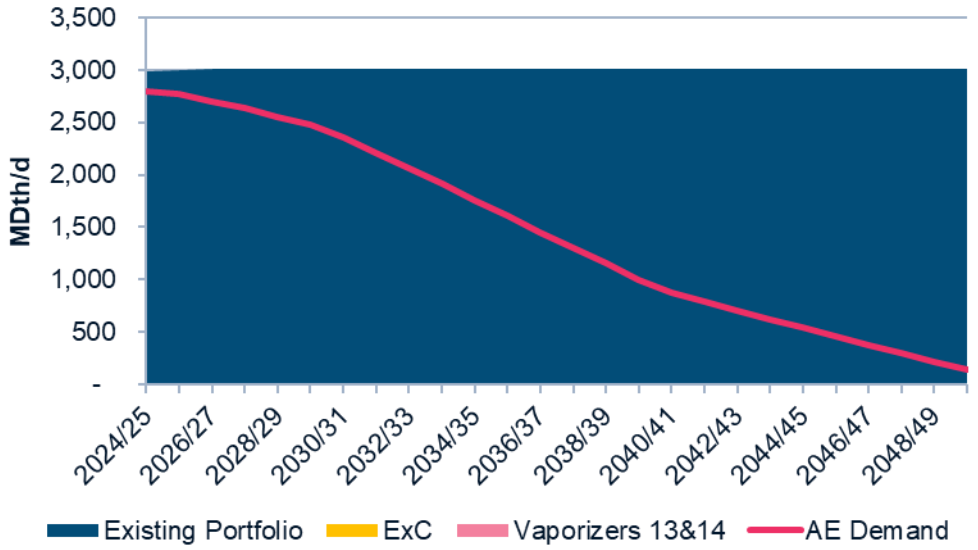


Figure 4-13: AE Case - KEDLI/KEDNY Design Day Supply-Demand – Iroquois ExC and Greenpoint 13&14 Not In-Service



Iroquois ExC is In-Service – Greenpoint Vaporizers 13 & 14 are Not In-Service

In this scenario, Iroquois ExC is placed in service in time for the 2027-28 winter season and Greenpoint Vaporizers 13 &14 are not placed in service.

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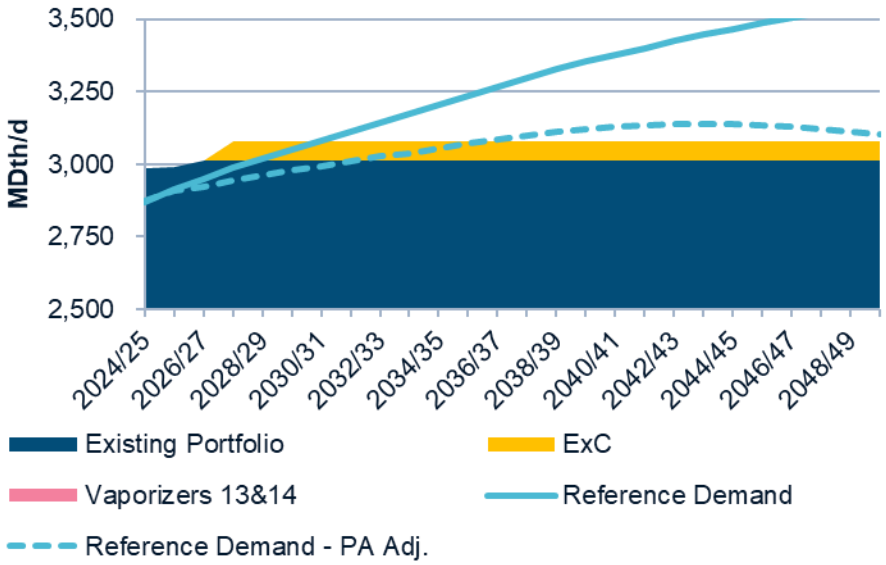
Figure 4-14: Reference Case - KEDLI/KEDNY Design Day Supply-Demand – Iroquois ExC In-Service, Greenpoint 13&14 Not In-Service



Under this scenario and considering National Grid's Reference Case Design Day demand forecast, DSNY can expect a supply-demand shortfall of approximately 4 MDth/d beginning in 2030-31, expanding to a shortfall of 574 MDth/d by 2049-50.[95] Under the same scenario but instead considering PA's proposed adjustments to the Company's DSNY's Reference Case Design Day demand forecast, the shortfall is instead 10 MDth/d beginning in 2036/37. This shortfall hits a maximum of just over 60 MDth/d in 2043/44 and descends to close to 25 MDth/d by 2049-50, as shown in Figure 4-14 above. In the above scenario, placing Iroquois ExC in-service affords the Company sufficient leeway to focus more heavily on efforts to reduce gas demand before the newly projected shortfall date. The shortfall volume is small enough in this case (just over 1% of the projected Design Day demand) that there will likely be multiple avenues for the Company to either reduce demand via electrification, DSM, NPAs, or EE initiatives or to acquire incremental supply, potentially in the form of delivered services, to satisfy demand.

Similar to the scenario wherein neither Iroquois ExC or Greenpoint Vaporizers 13 & 14 are placed in-service, under the CEV and AE Design Day demand forecasts, no supply-demand shortfall is anticipated throughout the remainder of the study period. In the same winter season when a shortfall is visible in the Reference Case (2030-31), there is an oversupply of nearly 265 MDth/d and 604 MDth/d, respectively, under the CEV and AE cases. Applying PA's proposed adjustments to the CEV case, oversupply of just over 310 MDth/d is evident in 2030-31, growing to nearly 1404 MDth/d by 2049-50 as shown in Figure 4-15 and Figure 4-16 below. PA does not propose any adjustments to the AE Case.

[95] Supply-demand deltas vary slightly from those quoted in the Final LT because the Design Day demand data provided in PA-150 did not include Non-Firm Demand Response load.

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Figure 4-15: CEV Case - KEDLI/KEDNY Design Day Supply-Demand – Iroquois ExC In-Service, Greenpoint 13&14 Not In-Service

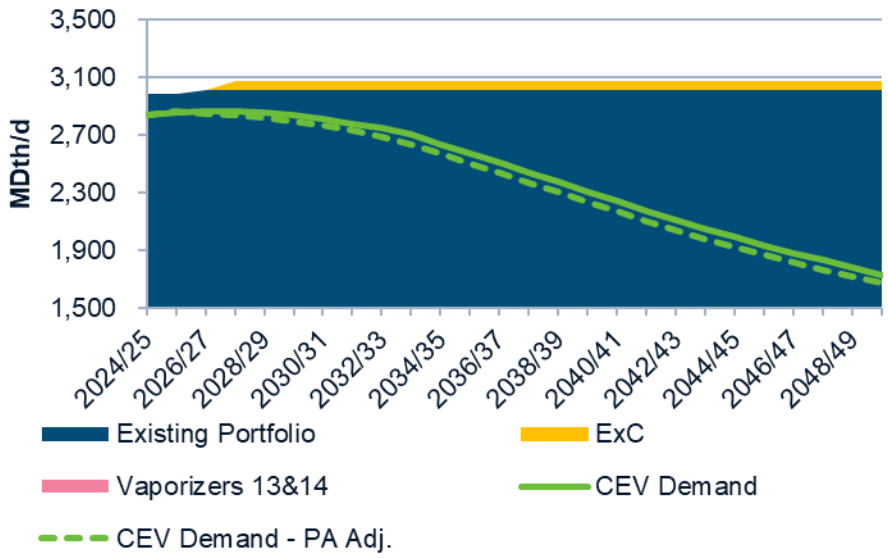
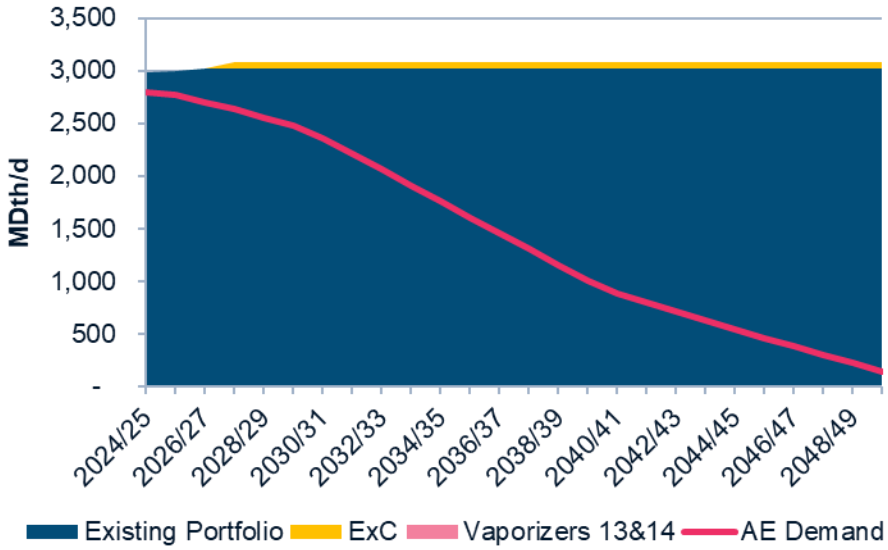


Figure 4-16: AE Case - KEDLI/KEDNY Supply-Demand – Iroquois ExC In-Service, Greenpoint 13&14 Not In-Service



Iroquois ExC and Greenpoint Vaporizers 13 & 14 are In Service

In this scenario, Iroquois ExC is placed in service in time for the 2027-28 winter season and Greenpoint Vaporizers 13 &14 are placed in service in time for the 2029-30 winter season.

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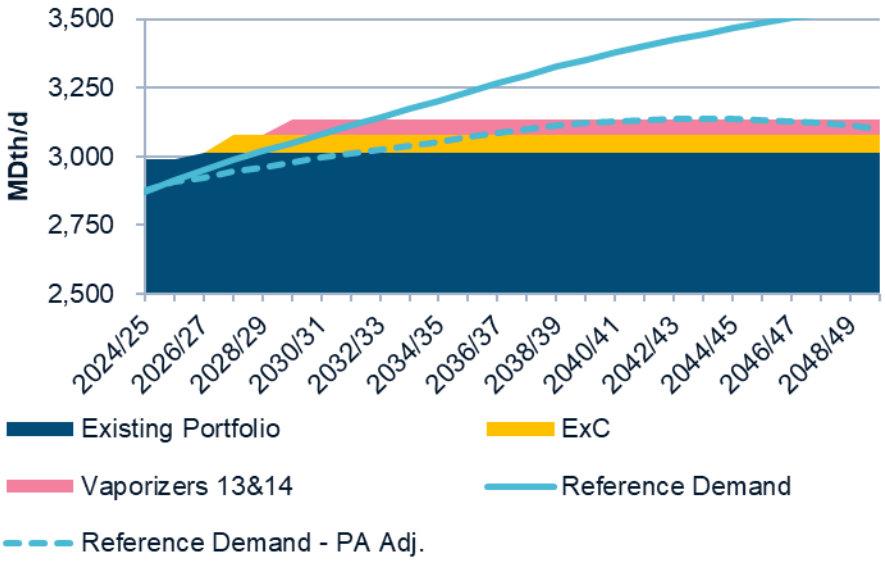
Figure 4-17: Reference Case - KEDLI/KEDNY Design Day Supply-Demand – Iroquois ExC and Greenpoint 13&14 In-Service



Under this scenario and considering the Company's Reference Case Design Day demand forecast, DSNY can expect a supply-demand shortfall of approximately 8.1 MDth/d beginning in 2032-33, expanding to a shortfall of just under 415 MDth/d by 2049-50.[96] Under the same scenario but instead considering PA's proposed adjustments to the DSNY Reference Case Design Day demand forecast, a supply-demand shortfall of 0.6 MDth/d is projected in 2042-43. This shortfall grows to just below 2 MDth/d in 2043/44, before disappearing again in 2044-45. By 2049-50, there is an oversupply of just over 34 MDth/d as shown in Figure 4-17 above.

Like the previous two scenarios, under the CEV and AE Design Day demand cases, incremental supply infrastructure is not necessary because no supply-demand shortfall is forecast. In the same winter season when a shortfall is evident under the Company's Reference Case (2032-33), an oversupply of 322 MDth/d and 893 MDth/d, respectively, is evident in the CEV and AE cases as shown in Figure 4-18 and Figure 4-19. Considering PA's proposed adjustments to the CEV Case, an oversupply of close to 384 is evident in 2032-33 as shown in Figure 4-18. This oversupply grows to nearly 1402 MDth/d by 2049-50. PA does not propose adjustments to the AE Case.

[96] Supply-demand deltas vary slightly from those quoted in the Final LT because the Design Day demand data provided in PA-150 did not include Non-Firm Demand Response load.

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Figure 4-18: CEV Case - KEDLI/KEDNY Design Day Supply-Demand – Iroquois ExC and Greenpoint 13&14 In-Service

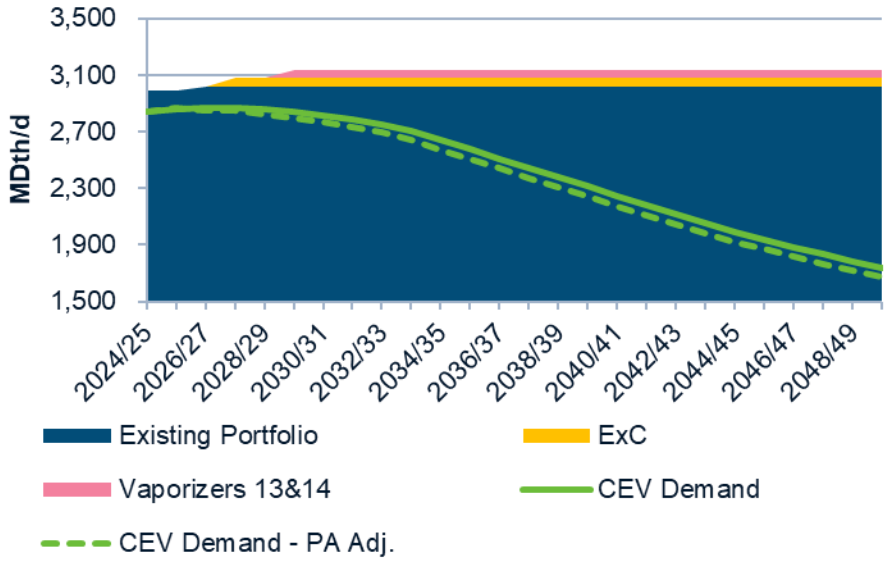
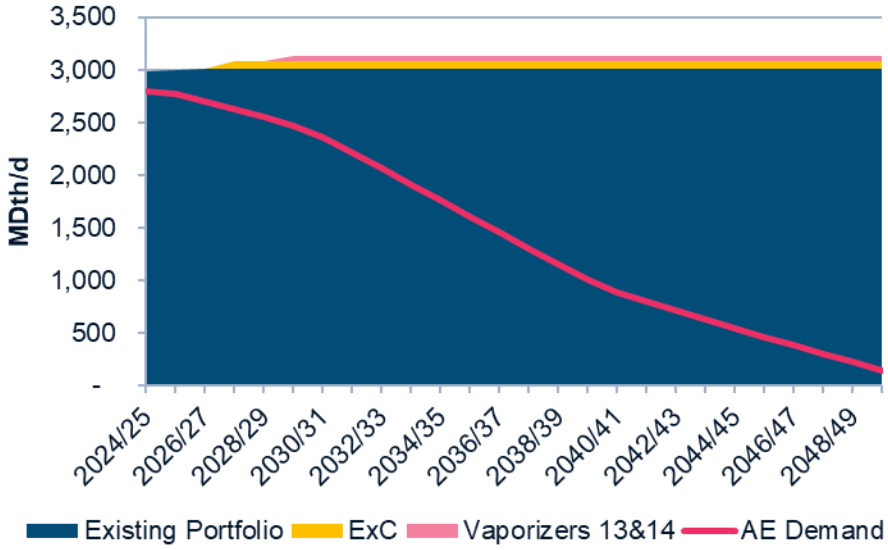


Figure 4-19: AE Case - KEDLI/KEDNY Design Day Supply-Demand – Iroquois ExC and Greenpoint 13&14 In-Service



4.4 Hydraulic Modeling

A key part of PA's assessment of the GSLTP is a review of hydraulic modeling scenarios that depict how the distribution system is expected to operate under Design Day conditions. The Design Day demand forecast for a given winter season is an important component of the process. PA requested and has received a number of hydraulic modeling scenarios of the National Grid pipeline systems.[97] We have also had opportunities to discuss the modeling results with the Company's SMEs. Our analysis and observations below are related to the Company's Reference Case Design Day demand forecast prepared in June 2024.

4.4.1 Upstate

NMPC's distribution system receives gas supplies from 24 interconnections with four interstate pipelines. 19 of those interconnections are with EGTS. Pipeline supply is supplemented by CNG peaking supply. These

[97] Source: Company's response to PA-02 (original and supplemental responses).

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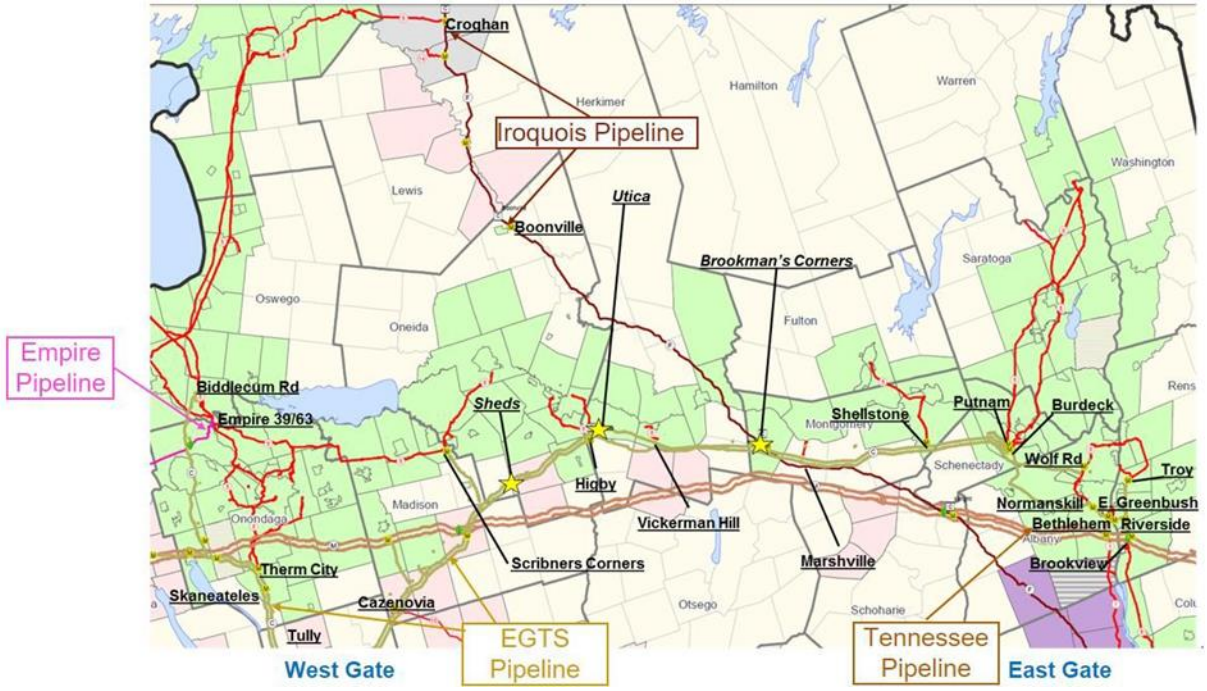
resources, collectively, make up the NMPC supply portfolio. Hourly volumes (as modeled) from each supply point vary with the demand forecast for a given winter season

The NMPC gas system is divided into an eastern division, often referred to as the East Gate, serving the Albany, Troy, and Schenectady areas; and a central division, often referred to as the West Gate, serving the Syracuse and Utica areas. Figure 4-20 shows the general areas served by the East Gate and West Gate.

The East Gate is divided into two primary distribution systems plus additional smaller systems. The Albany Loop pipeline in the eastern portion of the East Gate system serves significant customer demand in the Albany and Troy areas. The Albany Loop receives gas from EGTS and TGP. Gas is received in the southern part of the system and delivered north to the Albany local distribution system and around the loop to Troy. The western portion of the East Gate system services areas from Schenectady north towards Moreau. The eastern and western transmission laterals within the East Gate are not connected by pipe owned by the Company; gas cannot be moved between the two distribution systems.

The West Gate is similarly divided into two primary distribution systems plus additional smaller systems. The first forms a "horseshoe" around Utica, and the second serves the area from the northeastern part of the Finger Lakes to Syracuse and Rome to the east, and Watertown and Croghan to the north. The West Gate receives gas from EGTS, Empire and IGTS.

Figure 4-20: National Grid Upstate NY Transmission System[98]



Planned reinforcements to the East Gate System supporting the Albany Loop include addition of the ETS2 CNG facility near Troy. Addition of ETS2 will reduce stress on three of the EGTS citygates (Wolf Rd, Normanskill and Troy) while providing adequate pressure throughout the Albany Loop on a Design Day based on the hydraulic models provided to PA through the 2029-30 winter season. Based on the Company's Design Day demand forecast, without the completion of ETS2 by the 2027-28 winter season, the Albany Loop will not be able to provide adequate gas deliveries to the various distribution regulator stations in the system. We note that the models for winter 2026-27 reflect declining system pressures, further supporting the need for ETS2 based on the forecast of continuing demand growth. The Company's Design Day forecast for winter 2027-28 is approximately 1% higher than for winter 2026-27.

PA's review and proposed adjustments to the underlying components of the Company's Design Day forecast results in a modestly lower forecast than the Company's Reference Case in the near term (through 2025-26), as discussed in Section 7. However, while PA's analysis suggests the Company's Design Day forecast could

[98] Source: RLT Plan, Figure 2-2.

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be reduced, especially in the outer years, PA's analysis still supports the need for ETS2, and the associated timing.

Albany Loop

All models of the Upstate system through winter 2026-27 indicate the Albany Loop is experiencing declining delivery pressures from the Cohoes/Green Island area to the east and south to Troy. Gas delivery pressures along the northern section of the loop drop after winter 2026-27 such that gas deliveries to downstream regulator stations are insufficient. Absent reinforcement, the Albany Loop may not be able to deliver adequate gas supplies on a Design Day. PA notes that NMPC requested funding for an East Gate Reliability Assessment to address its forecasted supply shortfall in its pending rate case, and also in this planning proceeding. [99]

With the addition of ETS2, Design Day pressures on the Albany Loop increase which reduces demand on the Wolf Rd, Normanskill, and Troy citygates. The ETS2 facility provides sufficient pressure support in the models provided through winter 2029-30.

East Gate Pipeline PLE-E18 [100]

PLE-18 consists of approximately 3 miles of 20-inch steel main and approximately 24 miles of 16-inch steel main with a MAOP of 490 psig. CNG supply from the Moreau, NY facility also supplements Design Hour supply to serve these customers.

The absence of adequate records related to PLE-18 has led the Company to forecast replacement of certain portions of the pipeline. PA explored whether alternatives to replacement exist.

Derating the MAOP of the affected pipe in accordance with 49 CFR Part 192.624(c) requires reducing the MAOP from 490 psig to 263 psig. At that pressure the pipeline would operate at 19% Specified Minimum Yield Strength (SMYS), [101] at which point PHMSA would no longer consider PLE-18 a transmission main (thus negating the need to replace the applicable pipe segments). [102] Based on models provided by the Company, derating the MAOP to that level will result in inadequate operating pressures such that NMPC will not be able to deliver adequate volumes of gas to the existing customer base on a design day.

Derating the MAOP of PLE-18 to 263 psig would require the implementation of NPAs that would offset the Design Day equivalent demand of approximately 71,000 residential heating customers in the East Gate that receive gas via PLE-18, with no additional capacity to accommodate any future growth. There is no indication that this level of NPAs could be achieved within the allowed compliance timeframe, especially given the potential for demand growth as a result of the GlobalFoundries expansion discussed in Section 7.3.5.

West Gate Pipeline PL-16

Pipeline PL-16 consists of approximately 41 miles of 24-inch steel main with a MAOP of 473 psig. Compliance with 16 NYCRR sections 255.609 and 266.611 are driving the need for the proposed replacement. Using models based on the June 2024 design day forecast for the 2024-25 winter, it is estimated that approximately 95,230 customers receive at least 5 percent of their gas from PL-16 under design day conditions. [103]

PA explored whether there are alternatives to pipeline replacement. Derating the pipeline pressure to 437 psig reduces the hoop stress in the pipe to 39% SMYS, at which point 16 NYCRR sections 255.609 and 266.611 would no longer apply. An estimated 500 Dth/hr of demand (the equivalent of approximately 10,000 residential customers) in portions of Onondaga, Madison, and Oneida counties would have to leave the portion of the West Gate served by PL-16 in order that derating the pipeline would be feasible. Onondaga County may also experience demand growth in the computer chip manufacturing industry, as noted in Section 7.3.5.

Derating the pipeline pressure to 207 psig reduces the hoop stress in the pipe to 19% SMYS, at which point PHMSA would no longer consider PL-16 a transmission main; however, this situation results in an infeasible

[99] Source: Case No. 24-G-0323 indicates that $7.7 million has been requested in NMPC's pending rate case. The Company also requests approval in Section 5.14.3.1 of its FLT Plan. The Joint Proposal in NMPC's pending rate case (Case 24-G-0323) also makes reference to the East Gate Reliability Assessment.
[100] Source: Company's response to PA 132.
[101] SMYS is a mechanical property of steel pipe that measures the amount of stress it can withstand before permanently deforming. PHMSA considers pipelines with an MAOP greater than or equal to 20% of the SMYS to be transmission mains and thus subject to pipeline safety regulations that differ from those that apply to distribution mains.
[102] Source: Company response to PA-0132.
[103] Source: Company response to PA-0133.

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hydraulic modeling scenario. The equivalent of approximately 116,000 residential heating customers served by PL-16 would need to leave the system and no future growth could be supported in the area that is served by PL-16.

NPAs to reduce demand on PL16 would incrementally help reduce any additional pressure losses on the pipeline. NPAs may also help to preserve existing capacity and avoid the need for future pipeline projects. NPAs will not, however result in avoidance of the CapEx investment since the capacity of PL-16 specifically and the overall transmission system generally depend on pipeline pressures as designed to ensure sufficient capacity and reliability for customers – not only on a design day, but throughout the year.

4.4.2 Downstate

The KEDLI and KEDNY distribution systems are served by the NYFS, a regional network of pipelines severally owned and operated by KEDLI, KEDNY and Con Edison. The New York Facilities Agreement provides a framework through which the three LDCs coordinate planning and operation of the NYFS pipeline network. Each utility benefits from the ability to rely on each of the other two LDCs, resulting in enhanced reliability that likely could not be achieved without the Agreement. The NYFS is interconnected with four interstate gas pipelines – Transco, TETCO, TGP and Iroquois. NYFS member utilities may receive gas from all four pipelines and transfer supplies among and between the utilities. Supply from Con Edison on a Design Day plays a key role in overall system reliability. These resources, along with supply from the KEDLI and KEDNY LNG and CNG assets, collectively make up most of the DSNY supply portfolio. Hourly volumes (as modeled) from each supply point vary with the demand forecast for a given winter season.

Pipeline supply to the downstate system serving KEDNY and KEDLI customers is supplemented by both CNG and LNG assets. CNG is considered a short-term peaking solution since a CNG depressurization facility can only deliver a limited volume of gas being delivered onto the system from high pressure tanker trucks over an eight-hour period. Depressurization of the CNG is typically split into two four-hour periods. The first four-hour period is during morning peak usage and the second four-hour period is during evening peak usage. A typical CNG facility may require as many as 28 trucks connected to the site for depressurization, depending on the size of the individual CNG facility. These facilities provide additional volumes of gas when the distribution pipeline system is unable to keep up with demand due to the pipeline supply constraints in the Company's service territories. The Company cannot rely on filling or refilling trailers with CNG during peak periods from its own gas system, as the incremental gas volume is not available. The trailers must be returned to an offsite CNG compression facility for refilling, and then return to the decompression site, between peak demand periods. Scheduling CNG deliveries typically requires between 24-to-48-hours' notice.[104]

LNG is considered a more reliable peaking solution since it is available 24 hours a day, for multiple days, throughout the winter heating season. LNG facilities are strategically located on the Company's system, and the system has been designed with those facilities in mind as both supply and reliability resources. The storage tanks can be refilled by liquefying natural gas from the Company's pipeline system in periods of low demand. Trucking the LNG product to the site is not required, and in any event is not allowed within New York City without a waiver under 6 NYCRR Part 570.

Decreases in the Company's projections of demand that will allow the distribution system to support customers on a design day without peaking facilities is not anticipated until well after the timeframe associated with the hydraulic modeling scenarios provided to PA. However, it is PA's understanding these scenarios were developed based on the Company's Reference Case Design Day demand. As discussed in Section 7 of this report, PA's analysis of the Company's Reference Case suggests that Design Day demand could be lower.

Supply constraints in downstate New York create choke points or bottlenecks for deliveries of natural gas onto Long Island. These constraints include (but are not limited to) inadequate pipeline capacity onto Long Island, limitations on gas volumes received from the Con Edison system, and some limitations on how gas volumes can be delivered to the NYFS from Iroquois.

Pipeline capacity limitations exist at the Narrows crossing from Staten Island into Brooklyn. The existing 30" trunk line is at capacity. Additional gas cannot be pushed through the Narrows due to the increased pressure drop required to move the gas. The additional pressure drop would result in delivery pressures in Queens that are inadequate to support the downstream distribution system.

[104] Source: Final LTP, Section 5.2.1.

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Limitations on gas volumes delivered to National Grid also exist at transfer points with the Con Edison system to the Company's points of receipt. These gas volumes cannot be increased to the Company on a design day without jeopardizing the integrity of the Con Edison system. The Company's allocated share of interstate pipeline capacity entitlements at each citygate is governed by the NYFS Agreement and defines the maximum hourly volumes of gas that are permitted to flow from one utility to the other.

Reliability issues with interstate pipeline transmission systems can occur (and have occurred) causing reduced natural gas deliveries onto the downstate distribution systems. Common reliability issues can include transmission line compressor stations tripping, issues with pipelines forming hydrates and freezing, damage to a pipeline requiring immediate maintenance, and a variety of other types of equipment failures. Challenges have arisen in the recent past with transmission lines not being able to provide contracted pressure/volumes of gas due to compression problems. The Company's LNG facilities can help mitigate the impacts of supply interruptions on the interstate pipeline system.

The NYFS receives gas at the IGTS-Hunts Point gate and the IGTS-South Commack gate. Some flexibility exists to move the total volumes contracted with IGTS between the two citygates based on the needs of the downstream utility distribution systems. Circumstances exist in which moving gas from Hunts Point to South Commack is the reason the model solves successfully.

Hydraulic analysis based on the Company's Reference Case Design Day demand demonstrates that winter 2027-28 is the last season that the system is viable on a Design Day without incremental supply from either ExC or Greenpoint 13 & 14. Even in this scenario, pressures in Queens are approaching Design Day minimums.

If either Greenpoint 13 &14 or ExC are not operational by 2028-29, under the Company's Reference Case a Design Day supply shortfall occurs. If ExC is in-service for the 2028-29 winter and updated demand forecasts are in line with or lower than the June 2024 forecast, a moratorium may be delayed.

However, if ExC is not operational by 2028-29, and if Greenpoint 13 &14 are not ready for testing during the 2029-30 winter and ready for full use in 2030-31, under the Company's Reference Case a supply shortfall results. As with any modeling results, the assumption is that there are no disruptions to gas deliveries from the upstream transmission pipelines delivering gas to the NYFS.

When considering PA's proposed adjustments to the Company's Design Day demand forecast as discussed in Section 7, we can draw different conclusions from the hydraulic modeling scenarios. As noted above, based on the Company's Reference Case the distribution system can operate reliably on a Design Day in winter 2026-27 without supply from ExC or Greenpoint 13&14. The Design Day demand associated with that model is 2,949 MDth. If the adjustments to the Design Day demand forecast proposed by PA are made by the Company, Design Day demand may not reach that level until at least winter 2027-28 which leads to a conclusion that, from a supply perspective, neither ExC nor Greenpoint 13/14 would be required through that time period. However, the Company's LNG facilities would continue to serve as an important reliability resource. If the ExC project is ultimately approved and placed in service, that capacity would help to mitigate risks of other upstream pipeline disruptions and push the supply shortfall date far enough back to afford the Company time to pursue initiatives to reduce demand such that Greenpoint Vaporizers 13&14 may not be required as a Design Day supply resource. As noted in Section 5.1.2, we acknowledge the additional reliability benefits associated with installing Greenpoint 13&14. If ExC is not approved, those new vaporizers (if installed by the time of the supply shortfall in 2032/33) would provide the same incremental reliability while also providing resiliency in the event of unexpected supply disruptions. Based on PA's proposed adjustments to the Company's Reference Case Design Day demand forecast, having ExC in service would postpone the need for Greenpoint 13&14 (from a supply perspective) until at least winter 2034-35, providing even more time for the Company to pursue and implement demand reduction, additional supply resources and/or other reliability initiatives.

4.5 Moratorium Considerations

National Grid has indicated that based on its demand forecasts, the Company may need to implement a moratorium on any new connections to the natural gas system for one or more of its LDC entities to ensure continuation of reliable service. In May 2022, the NYPSC issued an order[105] recommending that New York

[105] Case 20-G-0131 – Order Adopting Moratorium Management Procedures.

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LDCs craft a moratorium communications plan in order to properly inform customers and Stakeholders of the context, timing, and intricacies of a moratorium. NYPSC recommended that the moratorium management procedures include, among other things:

- Metrics that indicate the necessity of a moratorium;
- A prioritization schedule for customers before, during, and after a moratorium is called;
- Rules for determining if, when, and how to lift a moratorium; and
- Communications plans for each stage of the moratorium process.

4.5.1 Description of National Grid's steps leading to a Moratorium

The moratorium management procedures also mandate that LDCs take the following actions prior to implementing a moratorium:

- LDCs must make a filing with the Commission and give all Stakeholders notice at least 2-years prior to the potential implementation date of a moratorium. This notice must include a history of actions taken to avoid a moratorium;
- Within 60 days of filing notice of a potential moratorium, the LDC should issue an RFP for NPAs that can help to mitigate the impact of a moratorium;
- Within 120 days of the issuance of the above RFP, the LDC must determine which NPAs would be effective and have a reasonable benefit-cost ratio; and
- Within 120 days of the implementation of a moratorium, the LDC must provide a Notice of Moratorium to the Commission.

In the FLT Plan the Company has acknowledged a potential need to begin taking action on pre-moratorium procedures by 2026 for DSNY and 2028 for USNY, depending on the outcome of the Iroquois ExC project and the resolution of a potential 2028-29 supply-demand gap in USNY. We understand the Company aims to avoid a Moratorium; however, we also acknowledge the impacts a two-year Moratorium notice could have on the demand forecast and as a result, supply, and Capex requirements. Therefore, careful scenario planning for a Moratorium is important.

4.5.2 Status of Vulnerable Locations Prior to Moratorium Notice

In the NMPC service territory, the Company has identified vulnerable locations in both the West Gate and East Gate. In the West Gate, the Company has indicated that it intends to explore a mix of locationally targeted DSM techniques, large-customer specific options to reduce flows, and the potential for incremental contracted pipeline capacity to address vulnerabilities. In the East Gate, the Company has requested cost recovery in its current rate case for an East Gate Reliability Assessment that will include an analysis of targeted electrification, DSM, and NPA options available as well as a review of on-system projects and pipeline enhancements to address vulnerabilities.

In DSNY the Company has identified vulnerabilities specifically in the Brooklyn and Queens regions and has pointed to the Iroquois ExC and Greenpoint Vaporizers 13 & 14 projects as the primary options for addressing moratorium risk in these areas but did not expand on any analysis to identify incremental electrification, DSM, or NPA options that may help to mitigate moratorium risks here.

4.5.3 Moratorium Analysis Framework

Having evaluated the Company's FLT Plan from multiple perspectives, PA believes that if indeed a moratorium on new gas connections may be needed in either DSNY or USNY, the Company should develop a comprehensive alternative planning scenario (similar to the three scenarios outlined in the FLT Plan) wherein a moratorium is implemented in DSNY in January 2028 and in USNY in January 2031 (or whatever other date is appropriate based on the most current Design Day demand forecast). In DSNY, the premise for this scenario is that design day supply from both the Iroquois ExC project and the Greenpoint Vaporizers 13 & 14 project is not available. While there are less distinct capital projects the absence of which could prohibit NMPC from meeting Design Day demand, it would be valuable to build an analysis for a scenario wherein a moratorium is implemented in January 2031, when there is a potential supply-demand shortfall. These scenarios should include:

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- Identification of the specific area(s) of each service territory to which the moratorium would apply, to be defined as “Participating Customers.”
- Revised customer counts and Design Day demand forecast which recognize that, upon receiving the moratorium notice, both prospective new and fuel conversion customers may accelerate their plans to connect to the natural gas system in the short term, but the rate of new connections would then decline after implementation of the moratorium.
- A CapEx forecast, that clearly demonstrates the impacts on the various categories of capital investment through 2050. Explanations of those changes (for example, why the forecast for a given category is greater or less than the forecast for the same category in the Reference Case, CEV and AE Scenarios) should be included as well.
- (For the DSNY portion of the analysis) Revised hydraulic models of the New York Facilities System for (at a minimum) winters 2025-26, 2026-27, and 2027-28 reflecting the revised Design Day demand forecast.
- Emissions impacts related, but not limited, to:
  - Near-term acceleration of customer conversions from fuel oil to natural gas.
  - Accelerated electrification of heating and non-heating load from conversions after January 2028, given that natural gas is not an option for energy consumers at that point in time.
  - Near-term acceleration of electrification and its impact on the electric grid, given that natural gas is not an option at that point in time.
- Bill impacts for a typical customer following a moratorium.
  - Include details and explain changes to the total volume of gas in the denominator of gas rates and changes to CapEx and OpEx in the numerator of gas rates.
- A description of what portfolio of NPA, EE, DSM, and electrification measures would need to be deployed annually by year starting in 2025 to avoid issuing a moratorium notice, and a discussion of the incremental annual CapEx associated with such a portfolio.
  - An analysis and discussion of the circumstances under which the moratorium may be lifted, and when it may be lifted (considering ExC, Greenpoint vaporizers 13/14, other new supply resources and other components of the existing supply stack that may be at risk). This would include identification and (if possible) quantification of any potential sources of supply (other than ExC and Greenpoint Vaporizers 13/14) that may allow the moratorium to be lifted.
  - Engagement with Stakeholders so that they can provide input for the execution and format of the analysis. An acknowledgement and discussion of how the Company has incorporated Stakeholder feedback into the analysis should be included.
- Engagement with Stakeholders prior to the analysis to review and discuss assumptions for electrification, DSM, and NPA efforts that could be implemented in the event of a moratorium.
  - In the analysis, include a description of how the Company interfaced with Stakeholders to incorporate their feedback and recommendations into the analysis.
- An acknowledgement of where and how the Company incorporated Stakeholder feedback and, in instances where feedback is not considered or incorporated, a justification for why that is the case.

4.6 Recommendations to Improve the Future GLTPs

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

1. The presence of supply-demand shortfalls is heavily dependent upon demand forecasts that are substantially variable. Under the Company’s Reference Case, supply shortfalls are projected in 2030-31 and 2028-29 for NMPC and DSNY respectively, whereas in the CEV and AE scenarios, no projected shortfalls are projected. The Company should identify a realistic planning scenario based on a demand forecast that does not simply show heavily divergent scenarios – but instead a practical, pursuable demand forecast that incorporates expected changes to the technological and regulatory

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environment. Heavily variable demand forecasts and – by extension – variable expectations for when supply shortfalls can be predicted, serves only to muddy the waters for supply planning. Reliance on the Reference case enhances the risk that the Company will invest in resources that could ultimately become stranded or, in the alternative, the Company may declare a moratorium on new connections for some period of time.

2. Formulate an analysis that discusses the impacts of a moratorium implementation in both USNY and DSNY which includes:
    a. Identification of areas where a moratorium would apply;
    b. Revised customer counts and Design Day demand forecasts;
    c. Revised CapEx forecasts;
    d. Revised hydraulic models;
    e. Emissions impacts;
    f. Bill impacts;
    g. Potential portfolios of NPAs, EE, DSM, and Electrification that could be deployed to address the moratorium;
    h. An analysis of circumstances under which a moratorium could be lifted;
    i. Engagement with Stakeholders in designing the analysis, including discussion of if, how, and why Stakeholders' recommendations were incorporated in the analysis.
3. PA recommends that the Company provide an update regarding reliability metrics in the East Gate in its annual updates to this long-term plan and in its next long-term plan filing, including the implications of load growth impacting the East Gate and the results of hydraulic modeling that may demonstrate the need for additional supply and pipeline capacity.

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5 LNG

PA has reviewed elements of the FLT Plan related to the Company's LNG infrastructure at Greenpoint (KEDNY) and Holtsville (KEDLI), along with associated CapEx forecasts based on information presented in the FLT Plan, the Company's responses to several data requests, and SME discussions. In the sections below we provide an overview of each of the LNG facilities. We also address the requirements related to Greenpoint that are outlined in the Joint Proposal approved by the Commission on August 15, 2024, in KEDNY's most recent rate case (Case No. 23-G-0225). We also include key observations about the CapEx forecast associated with LNG facilities and comment on recent historical CapEx at each LNG facility. We conclude with a discussion on the role the Company's LNG assets played during Winter Storm Elliott in December 2022, as described within the Company's FLT Plan.

5.1 Greenpoint Energy Center

The Greenpoint LNG plant, the primary component of the Greenpoint Energy Center in Brooklyn, has been in service since 1968 to supplement gas supply on the coldest days of the winter. Greenpoint LNG's primary purpose is to serve as a "peak shaving" facility operated during short, infrequent periods of significant demand on the distribution system. The Greenpoint LNG facility occupies 50 acres, including approximately 1/4 mile of waterfront along Newtown Creek in Brooklyn. The plant has two single containment LNG storage tanks with a total storage capacity of 1.6 billion standard cubic feet (Bcf). It is currently capable of providing up to 291 MDth/day of supply. Supply from LNG operations delivers gas to a major regulator station located within the boundaries of the Greenpoint Energy Center for further distribution to customers.

Refilling the tanks is accomplished through liquefaction during periods when natural gas demand is low. The liquefaction system can refill the storage tanks at a rate of approximately 7 to 8.5 million cubic feet of gas per day; it can take between 60 and 200 days to refill both tanks depending on the inventory levels at the beginning of the refill process.[106] See Figure 5-1 for a visual of the Greenpoint Energy Center.

Figure 5-1: Aerial View of Greenpoint Energy Center

[106] Direct Testimony of Gas Infrastructure and Operations Panel, Case No. 23-G-0225.

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5.1.1 Greenpoint LNG CapEx Investments

Based upon PA's analysis of the Company's response to PA-0109, KEDNY invested more than $230 million of capital at Greenpoint during fiscal years 2018-24 and is forecasting additional investments of more than $600 million through fiscal year 2033. Table 5-1 summarizes the more significant completed and ongoing projects as well as the forecasted CapEx between fiscal years 2025 through 2033.[107] PA recognizes the Company's project forecast changes month to month; Table 5-1 reflects the most recent information available.

Table 5-1: Greenpoint LNG CapEx (FY 2018-24 and FY 2025-33)

Project	Capital Expenditures ($ million)		
	Historical (FY 2018-24)	Forecasted (FY 2025-33)	Total
Vaporizer 3 & 4 Replacement	$55	--	$55
Truck Load / Unload Station	$33	$1	$33
Saltwater Pump House Upgrade	$23	$50	$73
Tank 2 Foundation Heaters	$19	$48	$67
Vaporizer 9 & 10 Replacement		$45	$45
Relocate Maint. Area & New Control Building		$41	$41
Tank 2 Upgrade		$38	$38
Vaporizer 7 & 8 Replacement		$34	$34
Tail Gas Compressor Upgrade		$33	$33
Hydrant & Deluge Piping Upgrade		$29	$29
Controls System Upgrade		$30	$30
Other Projects	$55	$200	$256
Sub-Total CapEx	$185	$549	$734
LNG – Vaporizers 13 & 14[108]	$52	$54	$106
Total CapEx	$237	$603	$840

With the possible exception of Vaporizers 13 & 14, these investments, including completed, ongoing projects, and future investments, represent significant upgrades to the Greenpoint LNG facility. As most of the core components were originally installed over 50 years ago, the need for replacement or refurbishment is to be expected. While many components of the LNG system have been upgraded or replaced, the projects that are underway and those that have not yet started represent significant reinvestment in critical infrastructure that

[107] Source: Company's October 4, 2024, response to PA-0109, and supplemental responses received March 21, 2025.
[108] It is PA's understanding that no Greenpoint 13/14 investments are currently included in KEDNY's rates. The Commission denied KEDNY's request for cost recovery associated with Greenpoint 13/14 in its March 16, 2023, order in Case No. 19-G-0309.

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is nearing the end of its useful life.[109] Our additional observations of the major investments in the Greenpoint LNG facility follow:

- *Salt Water Pumphouse Upgrade* – The saltwater pumps and their enclosure, an integral part of the fire protection system at the Greenpoint facility, were originally installed in the 1920s.[110] This system, although updated several times, was compromised during Superstorm Sandy. Elevation of the structure and updates to the control and communications systems will help to ensure fire water availability at the site during a fire event. The reliable and functional fire protection system is vital to the operation of the Greenpoint site due to FDNY permitting and oversight.
- *Tank 2 Foundation Heaters* – This project is necessary due to deterioration of the LNG Storage Tank #2 foundation heating elements. Refurbishment of the original foundation heaters for this storage tank will ensure reliable preservation of ambient ground temperatures. While LNG storage tanks are well insulated, the cryogenic temperatures will, over time, freeze the soil beneath the tank, causing frost heave due to the soil's water content. This can result in extensive damage to the LNG storage tank itself, as well as releases of LNG or natural gas. Foundation heaters prevent frost heave by keeping the soil directly beneath the tank above freezing temperatures, an essential part of safe operation of an LNG facility.
- *Vaporizers 9 & 10 Replacement* – This set of vaporizers was installed in 1985. The components in this type of equipment become worn and weathered after many years of service. Maintenance activities can extend the lifetime of vaporizers, but problematic and unreliable behaviors increase as the units age. Replacement also provides the opportunity to upgrade the vaporizers' control and communications systems to be compatible with existing codes and regulations; modern technology will further enhance the reliability, efficiency and availability of these vaporizers when called into service.

The Company's existing and forecasted CapEx projects cover a significant portion of the LNG system assets. Nearly all of the major pieces of equipment within the Greenpoint LNG system will have been refurbished, upgraded, or replaced by 2034. These projects are indicative of the challenges of operating and maintaining decades-old equipment. The Company's CapEx forecast addresses the need for work on the Greenpoint LNG facility to ensure that the facility is available and reliable when needed to support system supply as well as better ensure reliable natural gas delivery. The importance of ensuring availability and reliability of LNG was made evident in the Company's response to PA-0215 in which National Grid outlines a number of problems that have led to delays in liquefaction activities at Greenpoint. Not all of the problems were directly related to the liquefaction unit, emphasizing the interconnected nature of the systems at the facility. While these particular challenges have been overcome, and none resulted in a lack of ability to supply natural gas to the distribution system when called upon, they do highlight the need for constant maintenance and periodic equipment updates.[111]

5.1.2 Approved Joint Proposal

The Signatory Parties to the Joint Proposal acknowledged that National Grid's long-term plan "necessarily must consider the role, if any, for the Greenpoint LNG plant through 2044, including how long it must be or is expected to be operated to support gas system reliability."[112] National Grid further committed to include in its Long-Term Plan a specific chapter addressing Greenpoint LNG including, but not limited to, a comprehensive list of information that justifies the ongoing need for the facility, gas supply benefits and costs of the facility, a portfolio of non-pipe alternatives (NPAs) that could serve as alternatives to the facility, and a number of safety- and risk-based analyses.[113] The Joint Proposal further indicates that the Signatory Parties expect each of our reports related to the Long-Term Plan will include a specific chapter regarding the Greenpoint LNG plant that

[109] Source: Company's response to PA-0159.
[110] Source: Company's response to PA-109.
[111] Source: Company's response to PA -0215.
[112] Joint Proposal, p. 27.
[113] Generally, and as stated in National Grid's May 2024 Report entitled "Non-Pipeline Alternatives: Emerging Opportunities in Planning for US. Gas System Decarbonization" prepared in conjunction with RMI (formerly Rocky Mountain Institute), NPAs are projects or initiatives intended to simultaneously reduce GHG emissions and defer, reduce, or avoid the need to construct or upgrade components of the natural gas system.

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will include, but not be limited to, an evaluation of the Company's analyses required by the Joint Proposal.[114] In its recent order in KEDNY's rate case, the Commission indicated that the GLT Plan "provides the information required under the Joint Proposal."[115] PA has evaluated the FLT Plan related to the requirements of the approved Joint Proposal. Table 5-2 below provides references to our observations included in this report. This report includes information on a number of these requirements, and we continue to explore some of these items in more detail.

Table 5-2: Joint Proposal Requirements

Joint Proposal Requirement	PA Final Findings Report Reference
Demand and Supply forecasts justifying the need for the Greenpoint LNG Plant	Section 4.3.2; Section 7
Identification and analysis of the gas supply benefits and costs associated with the continued use of the Greenpoint LNG Plant	Section 5.1.4
A specific Non-Pipe Alternative ("NPA"), or portfolio of NPAs, that could serve as alternatives, as compared to the costs of continued operation of the Greenpoint LNG plant, to facilitate the benefit-cost analysis (BCA)	Section 5.1.4
Estimated reduction in customers that could be served on a design day by the distribution system in general if the Greenpoint LNG plant were taken out of service.	Section 5.1.3
Additional quantitative and qualitative analysis of continued operation of the Greenpoint LNG facility and viable alternatives found that includes health impacts, economic impacts, land use impacts, and environmental impacts	Section 5.1.5
Safety and Reliability analyses that consider the reasonable expected life of the LNG infrastructure, the benefits, and costs of the Company's access to a self-controlled source of gas supply, and various risk assessments	Section 1.3.2; Section 5.3
Comparison of the Greenpoint LNG plant to potential alternatives	Throughout Section 5

In our prior review of Vaporizers 13&14, we concluded that the project would increase the reliability of the Greenpoint facility by adding vaporization capacity, as well as a backup vaporizer which does not currently exist, for the downstream low-pressure distribution system.[116] This situation remains true today, and the Company's Reference Case Design Day demand forecast indicates the need for either increased pipeline supply to the downstate New York system, increased vaporization capacity, significant reductions in demand, or some combination thereof within the next few years. Moreover, projected Design Day demand even in the Company's CEV and AE scenarios does not indicate that there will be an opportunity to consider decommissioning the Greenpoint LNG facility - from a supply perspective – until approximately 2032-33 and 2027-28, respectively (assuming Iroquois ExC is placed in service). However, PA understands Greenpoint LNG supply is delivered to some customers directly as well as to multiple regulator stations for further distribution to customers. Therefore, any consideration of decommissioning the Greenpoint LNG facility would need to entail detailed hydraulic analysis of how the distribution system operates under a variety of conditions.

[114] Joint Proposal, p. 30.
[115] August 15, 2024, Order in Case No. 23-G-0225 et. al, p. 76.
[116] PA Consulting's Review of National Grid's Greenpoint Vaporizer 13 & 14 Report, filed October 27, 2022, in Case No. 19-G-0309 and 19-G-0310.

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In our judgement, the Company cannot delay making the forecasted capital investments in the current assets at the facility given near-term projections of demand. Further, even in a scenario where Greenpoint LNG is not needed from a supply perspective, much consideration must be given to the reliability benefits this on-system asset provides to customers. Detailed hydraulic modeling analysis would also be required to ensure the full distribution system could operate reliably without LNG supply entering the system at Greenpoint. While this conclusion is materially dependent upon the assumptions built into the Design Day demand forecasts, including the potential contribution of NPAs and other demand side initiatives, it is difficult to envision the Company being able to reliably meet Design Day demand without some or all of the current Greenpoint LNG assets for years to come.

PA's current analysis of the Design Day demand forecasts indicates that the Greenpoint LNG facility, at least at its current level of capacity, will continue to be required for supply purposes for the foreseeable future under the Company's Reference Case forecast. Under the Company's CEV and AE forecasts, Greenpoint LNG will remain a necessary component of the supply stack through 2031-32 and 2026-27, respectively, assuming Iroquois ExC is successful. Under PA's view of the CEV scenario, Greenpoint LNG appears to remain a necessary component of the supply stack through 2030-31. Because PA does not have its own distinct view of the AE Case demand forecast, the potential to decommission the Greenpoint LNG facility as a supply asset remains in approximately 2026-27 under the Company's AE scenario forecast. Moreover, while consideration could be given to retiring the Greenpoint LNG facility based solely on whether it is required as a supply resource under some design day demand scenarios, we recommend consideration be given to the reliability benefits the facility provides (such as those demonstrated most recently during Winter Storm Elliott as further discussed below) before abandoning those on-system benefits. In our opinion, the benefits of the existing Greenpoint LNG assets outweigh the risks associated with retiring the facility in this instance.

5.1.3 Impacts of Shutting Down Greenpoint LNG

Considering the current system design, natural gas supplies and the corresponding demands in the KEDNY territory, the presence of Greenpoint LNG is crucial for meeting the existing Design Day demands. While there may be winter seasons where LNG supplies are used very little (if not at all), due to temperate winter weather conditions, the potential for high natural gas demand still exists, as evidenced when reviewing the events surrounding Winter Storm Elliott and the corresponding lessons learned.[117] The need for LNG's capacity to maintain distribution system pressures was demonstrated in scenarios in which the Company was faced with both extreme weather conditions and/or unplanned supply disruptions.

From a cost and benefit perspective, it is important to note the LNG assets are in place to provide natural gas when demand peaks during extreme cold weather. Assets primarily intended for reliability purposes represent a challenging exercise in how to assess the benefits. All winter peaking assets bring an associated (high, relative to other seasons) cost to having these assets in place and reliably ready to operate, when needed. For example, LNG benefits are best construed as the costs associated with not having the LNG assets, or not having LNG available when needed. Under this example if an extreme winter event occurs, and LNG is not available to meet peak demand (and no alternative supply sources exist or are available) customers will lose gas service. This could lead to human fatalities, extensive property damage (due to frozen water pipes), and several weeks of efforts by the Company to safely restore service to customers whose service was lost. In order to minimize the scope and scale of customer outages, LDCs monitor distribution system pressures and, as a matter of last resort, make decisions to shut down certain segments of the system in order that pressures elsewhere will remain at levels that allow reliable service to continue. Once the events leading to the losses of pressure have passed, there are a number of steps that must be taken to re-energize the segments in which service was discontinued. For example, valves to customer homes and buildings must be closed. Gas is then reintroduced to the distribution system. Once normal operating pressures have been re-established, service restoration to individual customer premises commences.[118] This is a time-consuming process where much care must be taken to ensure service is restored safely. We observe the costs of such a scenario cannot

[117] Source: FLT Plan, Section 5.2.1.

[118] The service restoration steps described here are not intended to be all-inclusive, or indicative of the Company's operating procedures. Rather, they are meant as examples of the kinds of activities that must be completed to restore service following an outage.

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be estimated, as they will vary based on (among other things) the number of customers who lose service. In any event the Company is unlikely to have the capacity to respond promptly.

The Company has estimated that a KEDNY residential heating customer uses 1 Dth of gas on a Design Day. Given the existing LNG capacity at Greenpoint, that translates to a need to remove from the system the demand associated with 291,200 equivalent residential customers. The 1 Dth/day appears to be within the range of reasonableness;[119] even if the Company's assumption is, for example, off by 20%, that would mean demand of nearly 233,000 Dth would need to leave the system. Achieving even that level of demand reduction in the near term seems infeasible.

We observe that in the FLT Plan, the Company recognizes the potential retirement of all LNG assets by 2050 due to the New York decarbonization objectives. The Company's natural gas demand forecasts consistently indicate growing demand for several years, demonstrating the necessity for LNG assets to ensure system reliability in peak demand and emergency scenarios. PA's analysis of the demand forecasts confirms that at least in the near-term, current LNG assets will be a critical component of supply on a Design Day. As electrification and, potentially, alternate fuel capacities are integrated into the system, the demand for natural gas is expected to decline. However, unless natural gas is more significantly phased out as a heating fuel, or the potential supply significantly exceeds the demand, LNG will most likely be needed for peak shaving purposes. Thus, the potential for shutting down Greenpoint LNG for the foreseeable future is unlikely due to the latent demand for natural gas and the Company's obligation to provide service without interruption. PA's analysis of the Company's demand forecasts under all three scenarios confirms that the Greenpoint LNG assets will continue to be required for peaking supply purposes on a Design Day for the foreseeable future.

5.1.4 Feasibility of Alternatives to Greenpoint LNG

The Company's responses to PA's data requests for feasible alternatives to the vaporization capacity of the Greenpoint LNG plant have not resulted in any reasonable substitutes for the LNG supply, especially for the short term. Supply-side alternatives such as CNG could provide a buffer to the use of Greenpoint LNG but cannot function as a full replacement. As indicated in the FLT Plan, the Company estimates the cost of building a CNG injection site replacing the peaking capacity of Greenpoint LNG with CNG at $850,000,000, to meet the Design Day demand.[120] This alternative is clearly not feasible.

With regard to DSM programs replacing (or offsetting the need for) Greenpoint LNG, the historical trend would indicate that these measures are also non-feasible. While DSM programs continue, many are outside of the direct control of the Company, and likely will not be able to offset the Design Day demand growth that is occurring within the KEDNY service area in the near (or even medium) term.

We also find that the Company should, in future GLTPs, better quantify the costs associated with the continued use of the current Greenpoint LNG assets, especially such that those costs can be compared against alternative sources of supply on a $/Dth of capacity basis. While quantifying the Greenpoint LNG costs on this basis may help Stakeholders to understand if Greenpoint LNG is expensive relative to other options, it is important to note that replacing Greenpoint LNG with other supply alternatives like delivered services or firm pipeline capacity is unlikely to be feasible, especially in the near term, due to a combination of market constraints, gas receipt limitations, and on-system flow limitations.

5.1.5 Greenpoint LNG's Economic, Health, Environment, and Land Use, Impacts

In its discussion of the health impacts associated with Greenpoint LNG and in response to PA's request for an evaluation of impacts on Disadvantaged Communities of an alternative to Greenpoint LNG as well as the impacts should Greenpoint LNG be decommissioned,[121] it appears that the Company evaluated health impacts purely from the standpoint of a loss of reliability as well as loss of service during a cold weather

[119] To test the reasonableness of the 1 Dth per residential heating customer assumption, PA estimated the monthly weather normalized UPC for residential heating customers of KEDNY and KEDLI. During the most recent five years the average "normal" UPC in January is approximately 19.6 Dth, or 0.63 Dth per day. An assumption that an average residential heating customer may use as much as 150% of the normal daily use on a Design Day is not unreasonable, given that gas furnaces would be operating for longer periods of time under Design Day conditions. Therefore, average use of 1 Dth per day is a reasonable approximation for planning purposes.

[120] Source: FLT Plan, Section 7.5.1.2.

[121] Source: Company's response to PA 11-166.

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event.[122] The Company did not discuss health impacts from a number of perspectives that appear to be of importance to Stakeholders as we understand it from our participation in numerous technical conferences.

In terms of environmental impacts, in the FLT Plan the Company did indicate that decommissioning the Greenpoint LNG plant would reduce localized pollutants but did not elaborate on how localized pollutants impact the health and environment in the area surrounding Greenpoint.[123]

The Company discusses land use impacts of Greenpoint LNG within a hypothetical CNG alternative in the FLT Plan. While this is a useful comparison and discussion, it would be beneficial for the Company to further explain in future GLTPs how the current operation of Greenpoint LNG impacts nearby communities from a land use perspective.

Within its discussion of hypothetical alternatives to Greenpoint LNG, the Company outlined bill impacts based on a hypothetical heat pump scenario which is useful for understanding such a scenario; however, the Company stopped short of quantifying Greenpoint LNG's existing bill amounts and how they compare to the relative bill impacts of other scenarios. The hypothetical heat pump scenario represents only one extreme outcome among a list of potential alternatives. Understanding the baseline impact that the Greenpoint LNG facility has on bills (including the impacts of the incremental CapEx investments described in the FLT Plan and in Section 5.1.1 above) is important in order that Stakeholders may fully understand how Greenpoint LNG contributes to overall customer bills. We therefore recommend that, in future GLTPs, National Grid discuss how current and continued operation of Greenpoint LNG impacts an average customer's bill and compare that against other types of supply including CNG, firm pipeline contracts, and delivered services.

5.2 Holtsville

The Holtsville LNG plant provides KEDLI and its customers with as much as 103 MDth/day of on-system supply. The facility has been in service since 1971 and includes one single containment LNG storage tank with a total storage capacity of 600 million standard cubic feet. Refilling the tank is accomplished through liquefaction during periods of low natural gas demand ; the liquefaction system can refill the storage tank at a rate of about 6 million cubic feet of gas per day which translates to up to 100 days to refill the tank, if empty.[124]

5.2.1 Holtsville LNG CapEx Investments

KEDLI invested more than $61 million of capital at Holtsville during fiscal years 2018-24 and is forecasting additional investments of more than $330 million through fiscal year 2033. Table 5-3 summarizes the more significant completed and ongoing projects as well as the forecasted CapEx between fiscal years 2025 through 2033.[125] PA recognizes the Company's project forecast changes month to month; the data in Table 5-3 represents the most recent information provided to PA.

[122] Source: FLT Plan, Section 7.7.5.
[123] Source: FLT Plan, Section 7.4.2.
[124] Direct Testimony of Gas Infrastructure and Operations Panel, Case No. 23-G-0226.
[125] Source: Company's October 4, 2024, response to PA-0109, and its March 21, 2025, supplemental response.

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Table 5-3: KEDLI LNG CapEx (FY 2018-24 and FY 2025-33)

Project	Capital Expenditures ($ million)		
	Historical (FY 2018-24)	Forecasted (FY 2025-33)	Total
LNG – Controls System Upgrade	$14	$0	$14
Holtsville Plant Modernization	$10	$205	$215
LNG – AESD System	$8	$0	$8
LNG – Storage Building	$7	$0	$7
LNG – Holtsville – LNG	$6	$0	$6
Vaporizer Replacement	$0	$47	$47
Hydrant System Piping Refurbishment	$0	$13	$13
Liquefaction System Refurbishment	$0	$8	$8
Dry Powder System Replacement	$0	$7	$7
Control Room Upgrade	$0	$7	$7
Other Projects	$17	$48	$65
Total CapEx	$62	$335	$397

These CapEx investments, as with the Greenpoint LNG facility at KEDNY, represent significant upgrades to the Holtsville LNG plant. While many parts of the over 50-year-old LNG system have been upgraded in recent years, there are major efforts underway to continue the modernization of assets.[126] The major projects include:

- *Holtsville Plant Modernization* – This extensive project includes updates to modern technology for the LNG storage tank and many of its associated systems. Work on the LNG Tank includes temporarily removing it from service for an internal inspection, installation of an internal shut-off valve, replacement of the tank's external stairs, refurbishment of the tank foundation heating system (see description for the KEDNY Greenpoint Tank #2 tank foundation heaters), among other miscellaneous updates. The associated boiloff compressor system is also being replaced, and the electric power center is being upgraded. These upgrades to the tank and associated systems are necessary to align the facility with modern codes and standards, provide modern control and operations systems, and rehabilitate decades-old equipment. These projects are typical (major) maintenance activities that are required periodically to ensure the continued safe and reliable operation of an LNG facility.
- *Vaporizer Replacement* – The three vaporizers at Holtsville replaced the original 1971 equipment in 2007 and 2009. While maintenance activities help to extend the lifetime of these vaporizers, problems due to older components and control systems persist. The replacement project provides the opportunity to assess the vaporizers and define a scope for upgrading primary components, control and communications systems, and support systems associated with the vaporizers. These efforts will

[126] Source: Company's response to PA-0159.

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help to ensure compatibility with modern technology, and to assure the continued reliability and availability of these units.

In summary, the Company's existing and forecasted CapEx projects cover a significant portion of the Greenpoint and Holtsville LNG systems, with the major future item being the Holtsville Plant Modernization Project. Other refurbishments or replacements are consistent with the need to replace decades-old equipment to avoid potential problems with the interconnected systems that have the capacity to delay or disrupt liquefaction activities. Regardless of whether the new Vaporizers 13 and 14 in the KEDNY system are added, constant maintenance and periodic equipment updates are an integral part of ensuring reliable operation and provision of natural gas to the network.

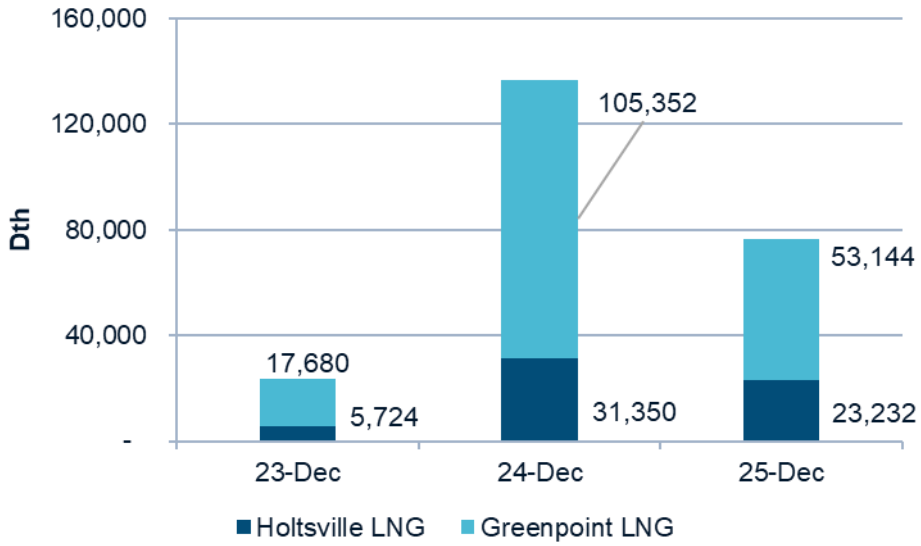
5.3 Winter Storm Elliott[127]

The FLT Plan highlights the important role National Grid's on-system LNG assets played in maintaining reliable gas service during Winter Storm Elliott in December 2022. The LNG facilities at Greenpoint and Holtsville were critical in helping to maintain adequate system pressures as well as providing supply over a three-day period. In its report entitled "Inquiry into Bulk-Power System Operations During December 2022 Winter Storm Elliott" dated October 2023, FERC cited the use of LNG as helping to avoid large scale customer outages.

Supply losses occurred on three of the four major interstate pipelines serving DSNY as a result of weather forecast errors, extreme and rapid temperature drops coupled with wind, rain and snow, pipeline compressor issues resulting in reduced delivery pressures at the KEDLI and KEDNY city gates, and producer under performance caused by equipment freeze-offs. The use of on-system LNG during this period allowed time for pipeline pressures to recover from the compressor outages so that normal service levels could resume.

As noted above, if LNG supply is not available during extreme winter events (and no alternative supply sources exist or are available), the Company may implement systematic isolation of segments of the distribution system resulting in customers losing gas service. This could lead to human fatalities, extensive property damage (due to frozen water pipes); restoration of service could take several weeks as the Company implements appropriate procedures to restore service. Figure 5-2 below summarizes the level of supply provided by the LNG assets in late December 2022.

Figure 5-2: LNG Output during Winter Storm Elliott (Dth/day)[128]



5.4 Recommendations to Improve Future GSLTPs

[127] Source: FLT Plan, Section 5.2.1.
[128] Source: FLT Plan, Figure 5-1.

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1. Include discussion of if or how operating the Greenpoint facility impacts the health and environment of nearby communities in addition to its existing discussion of how removing the facility would enhance risks associated with interrupting natural gas service.
2. Provide more detail on how the operation of Greenpoint LNG impacts the environment in nearby communities.
3. Discuss how the operation of Greenpoint LNG impacts an average customer's bill and compare that against other types of supply including CNG, firm pipeline contracts, and delivered services. Include Greenpoint LNG's bill impact both as the facility currently exists and with the incremental CapEx that has been identified.

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6 CapEx Considerations

In our Preliminary Findings Report, PA discussed the Company's CapEx forecasts under each planning scenario in detail. As is not uncommon, such long-term forecasts tend to evolve and change over time as gas utilities continue to evaluate trends in customer behavior and the needs of their distribution systems. While the CapEx forecasts presented by National Grid in its FLT Plan differ from those discussed in our Preliminary Findings Report, those overall differences are not considered material given the magnitude of planned investments overall as well as the long-term nature (in this case, 25 years) of those forecasts. In this Final Report, we will identify and comment on the primary differences we observed.

In response to PA's recommendation that additional CapEx forecast detail be provided in the Company's FLT Plan, National Grid included Table 8-1 which provides, by planning scenario, CapEx forecast detail at the investment category level. Additionally, in response to PA's request for updated data request responses supporting the FLT Plan, the Company provided applicable updates to data requests PA-027 and PA-054.

PA observes that the updated CapEx forecasts included in Table 8-1 in the FLT Plan reflect modest reductions in the overall National Grid forecast for each planning scenario. For many investment categories, there are minor differences between the CapEx forecasts supporting the FLT Plan and the forecasts upon which our Preliminary Findings Report (hereinafter referred to as the "Preliminary" Forecast) was based. Table 6-1 summarizes the amounts reflected in the respective forecasts.

Table 6-1 and Figure 6-1, Figure 6-2, and Figure 6-3 below reflect the differences between the CapEx forecast supporting the Company's FLT Plan and the forecasts previously provided to PA and discussed in our Preliminary Findings Report.7

Table 6-1: FY 2025-50 CapEx (billions) [129]

Scenario	Reference		CEV		AE	
	Preliminary	**Final Plan**	**Preliminary**	**Final Plan**	**Preliminary**	**Final Plan**
KEDLI	$20.6	$21.3	$20.2	$20.3	$14.3	$14.2
KEDNY	$36.3	$35.1	$38.3	$36.2	$25.3	$22.8
NMPC	$9.4	$8.4	$12.7	$12.4	$7.7	$7.6
Total	**$66.3**	**$64.7**	**$71.1**	**$68.8**	**$47.2**	**$44.4**

[129] Source: Company's response to PA-027, Supplemental Attachment 2, PA-054, Supplemental Attachment 1, PA-027, Supplemental Attachment 1 3-21-25, PA-054, Supplemental Attachment 1 3-21-25, and FLT Plan, Table 8-1; amounts may vary slightly due to rounding.

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Figure 6-1: Reference Case Total CapEx Comparison129

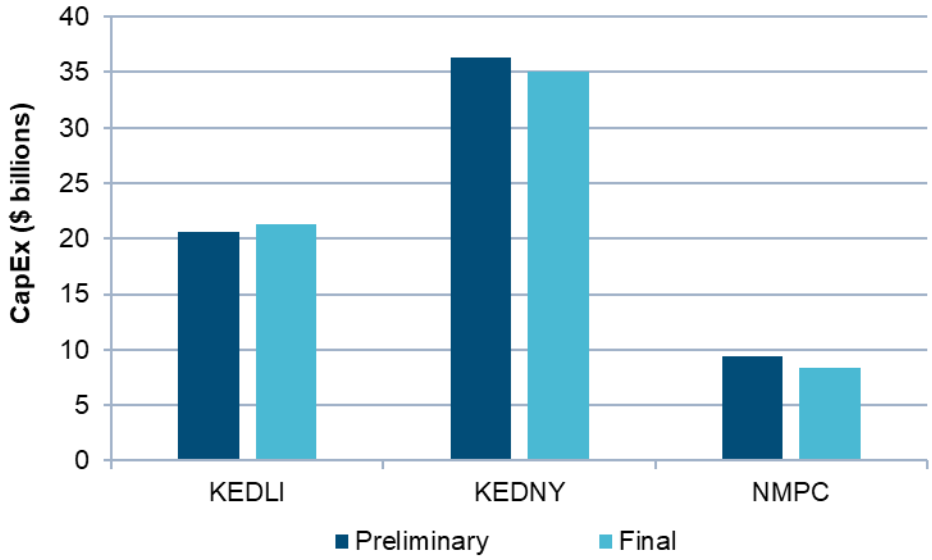

Figure 6-2: CEV Scenario Total CapEx Comparison129

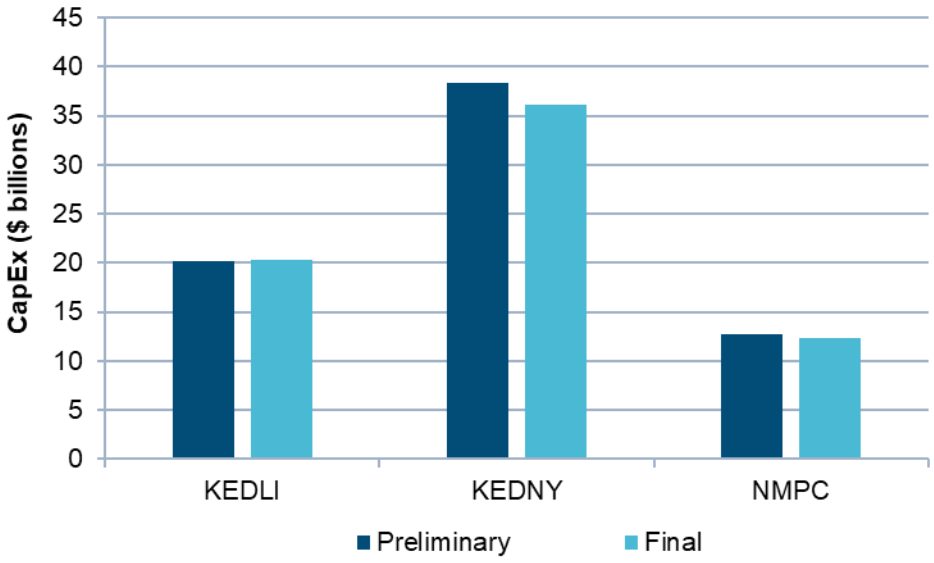

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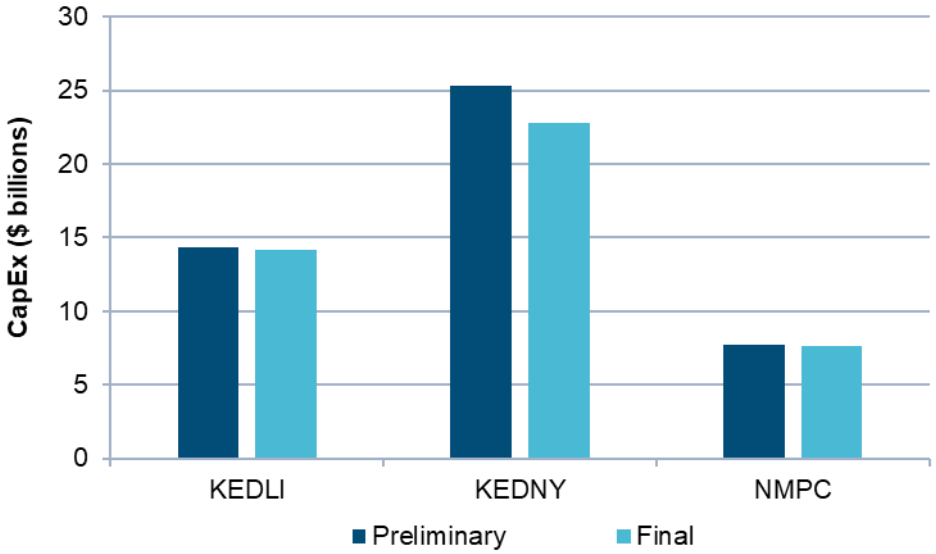
Figure 6-3: AE Scenario Total CapEx Comparison[129]



National Grid has organized its CapEx forecasts under twelve categories of investment. We provide a brief description[130] of those categories here to establish a foundational understanding of the types of projects that are included in each category. See Table 6-2.

Table 6-2: CapEx Forecast Categories of Investment

Category	Description
Business as Usual (BAU) On-System Supply Project	A project constructed within the utility pipeline delivery system that provides additional supply required to serve customer demand. A new CNG facility would be an example. Such projects are reflected only in the Reference Case forecasts for KEDLI and NMPC.
CNG / LNG	Investments in new or existing CNG or LNG assets.
Customer Connections	Investments in new mains and service lines to provide gas service to new customers.
Future of Heat	Investments such as network geothermal systems, hydrogen networks, RNG interconnections, and Non-Pipe Alternatives.[131]
Gas Transmission Asset Programs	Investments related to the Company's transmission mains and related infrastructure.
Gas Distribution Engineering (GDE) Leak Prone Pipe (LPP) Program	Proactive program to eliminate pipe from the distribution system that has demonstrated the greatest propensity to develop leaks. Mains and associated leak-prone service lines are included.
GDE Other Programs	Other proactive programs targeting specific asset types and their related risks as identified by the utility's Distribution Integrity Management Program (DIMP).
Meters	Purchases of meters to either serve new customers or replace existing meters, including installation costs.

[130] The descriptions here are generic in nature and are not necessarily intended to describe any project or program that National Grid has included in any CapEx forecast.
[131] Sources: FLT Plan, Table 8-1.

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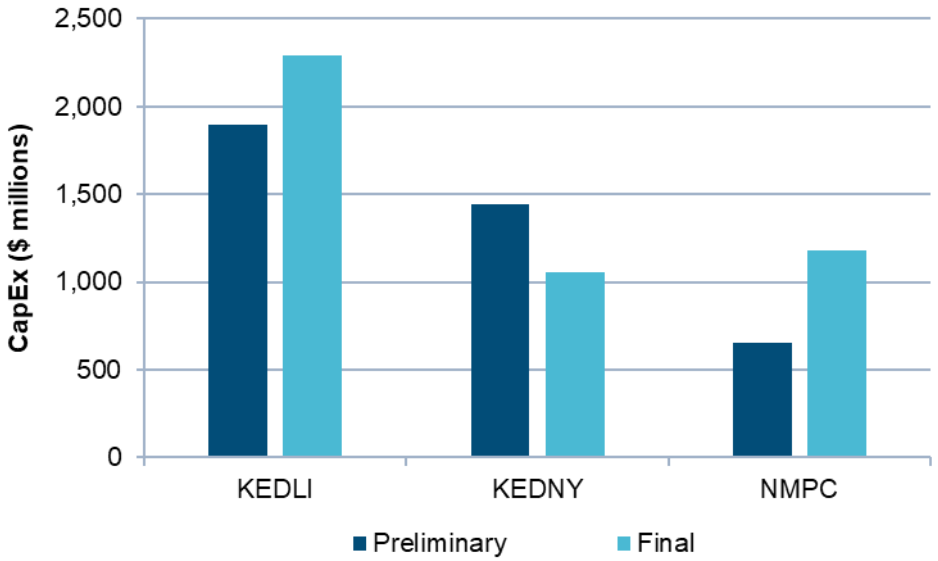
Pressure Regulating Assets	Investments in gas regulator stations to ensure continued safe, reliable operation of the distribution system. Integrity management-related investments in those assets are included.
Public Works and City State Construction	Investments required to relocate the Company's pipelines and other infrastructure that is in conflict with road work or other construction by public entities.
Reinforcement and Reliability	Investments to upgrade the gas network to ensure reliable service is maintained under all operating conditions.
Other	Consists of all other investments not included in another category (represents 5% or less of National Grid's Reference Case forecasts for the period 2025-2051).

As reflected in Table 6-1 above, the Company's Reference Case CapEx forecast supporting the FLT Plan is $1.6 billion less than the Preliminary Forecast. The primary differences, along with our observations, are summarized below:

- The Growth portion of the forecast increased by approximately $0.5 billion. We would not have expected a more recent Growth CapEx forecast to be higher than prior forecasts in any planning scenario, given the legislative and policy environment in New York. However, the Company has indicated to PA that correction of a formula error in the preliminary forecast provided to PA resulted in the increase. Further, to the extent the Company adopts any of PA's observations about the design day demand forecast, we would expect Growth CapEx investments to be reduced.

Figure 6-4: Reference Case CapEx Growth Comparison[132]



- The Meters forecast dropped by approximately $3.0 billion – it appears that this reduction is not related to customer growth, since the Growth forecast supporting the FLT Plan has increased. The Company cites the declining demand forecast over time, and completion of the deployment of smart meters, as reasons for the decrease.

[132] Source: Company's response to PA-0231 using PA-027 Supplemental Attachment 1 3-21-25.

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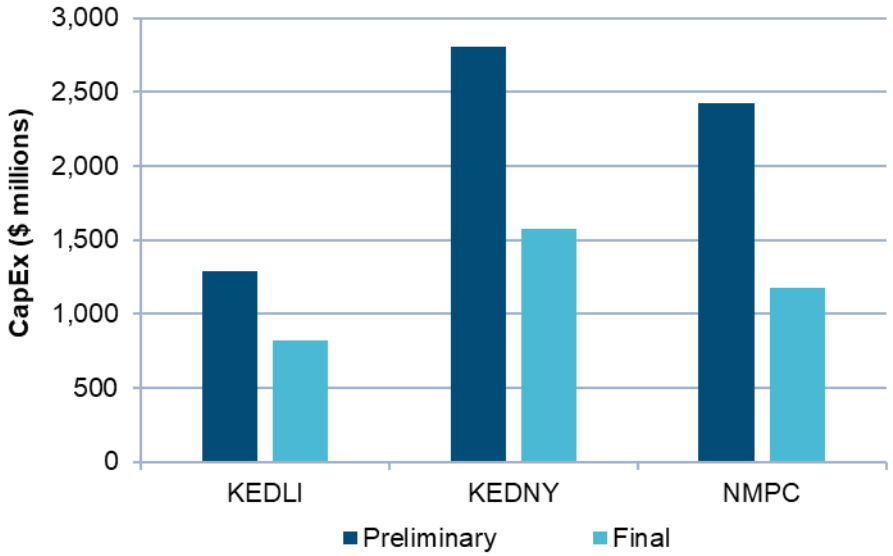
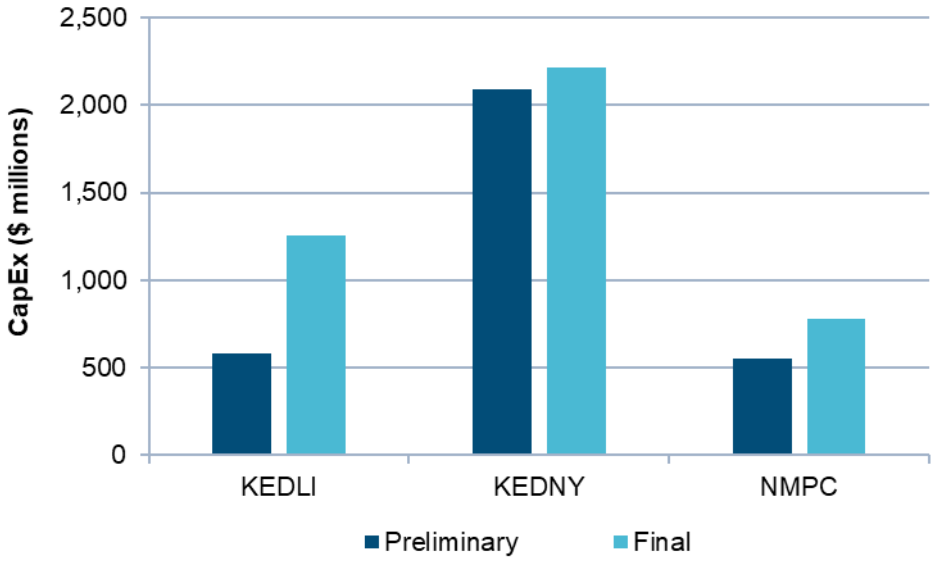
Figure 6-5: Reference Case CapEx Meters Comparison[133]



- The Reinforcement and Reliability forecast increased by approximately $1 billion – an increasing need to reinforce the system would be consistent with continued growth; as noted previously, we would not expect that to be the case in New York. The Company has explained it utilized a different forecasting methodology in its most recent forecast, as reflected in the FLT Plan, which resulted in the increases in the forecasts. More specifically, the Company's most recent forecast (supporting its Final LT Plan) is correlated with the anticipated number of customer meters and its forecast of design day demand. Figure 6-6 reflects the differences in the forecasts at the LDC level.

Figure 6-6: Reference Case CapEx Reinforcement & Reliability Comparison[134]



- The remaining $0.1 billion reduction is spread across the remaining investment categories; we would not consider those adjustments to be material

Table 6-1 further reflects that the Company's CEV CapEx forecast supporting the FLT Plan is approximately $2.3 billion less than the Preliminary Forecast. Our observations of the primary differences are:

[133] *Ibid*.
[134] *Ibid*.

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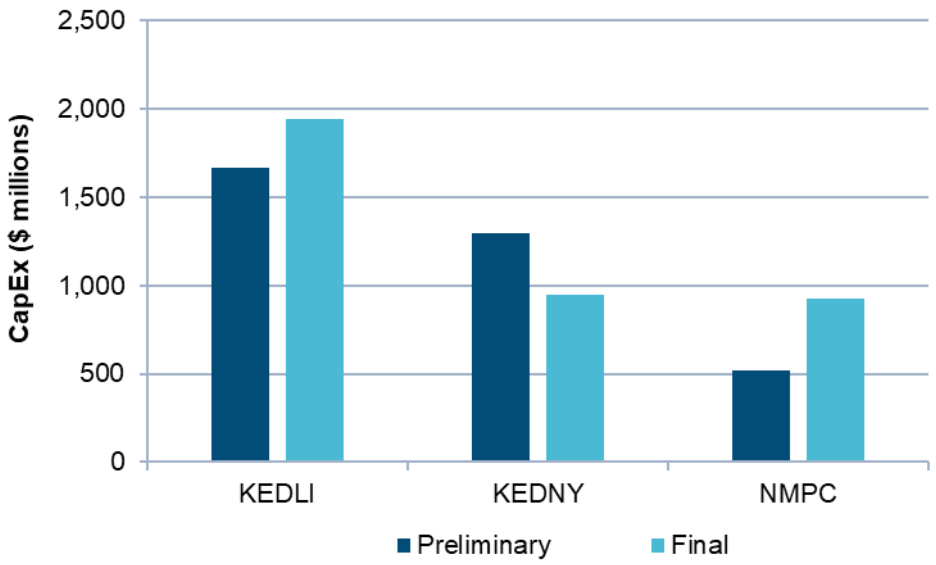
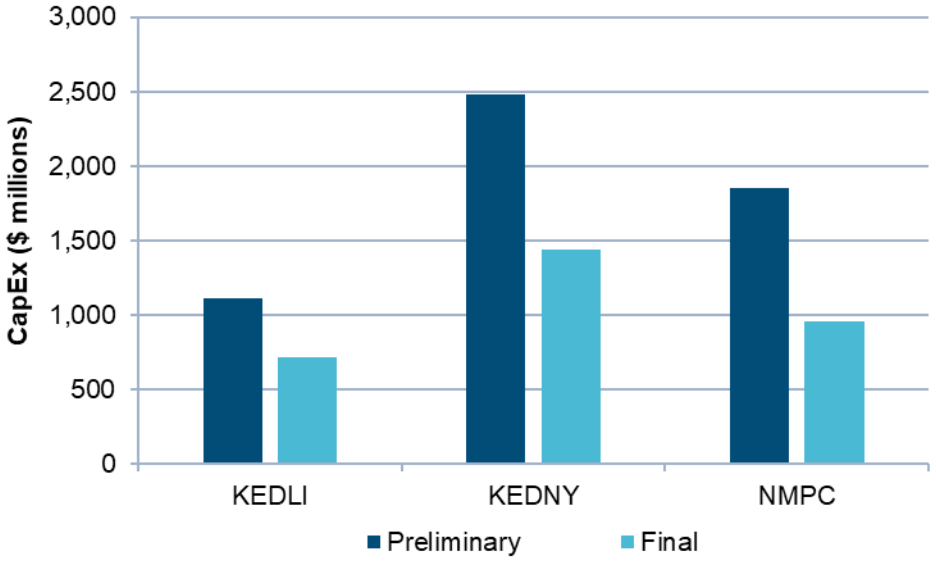
- The Growth forecast increased by approximately $0.3 billion – again, we would not have expected a more recent Growth forecast to be higher than prior forecasts in any planning scenario, given the legislative and policy environment in New York. However, it appears that correction of a forecasting formula error is driving the differences depicted in Figure 6-7.

Figure 6-7: CEV Scenario CapEx Growth Comparison[135]



- The Meters forecast dropped by more than $2.3 billion -- it appears that this reduction is not related to customer growth, since the Growth forecast supporting the FLT Plan has increased. The Company has explained that the CEV forecast for Meters is impacted proportionally by the reduction in the Reference Case forecast of meter counts.

Figure 6-8: CEV Scenario CapEx Meters Comparison[136]



- The Reinforcement and Reliability forecast increased by approximately $0.5 billion. An increasing need to reinforce the system would be consistent with continued growth; we would not expect that to be the case in New York. The Company has explained that the forecast in this investment category is based on the Reference Case forecast described above; the lower CEV forecast is proportional to the

[135] Source: Company's response to PA-0231 using PA-054 Supplemental Attachment 1 3-21-25.
[136] *Ibid*.

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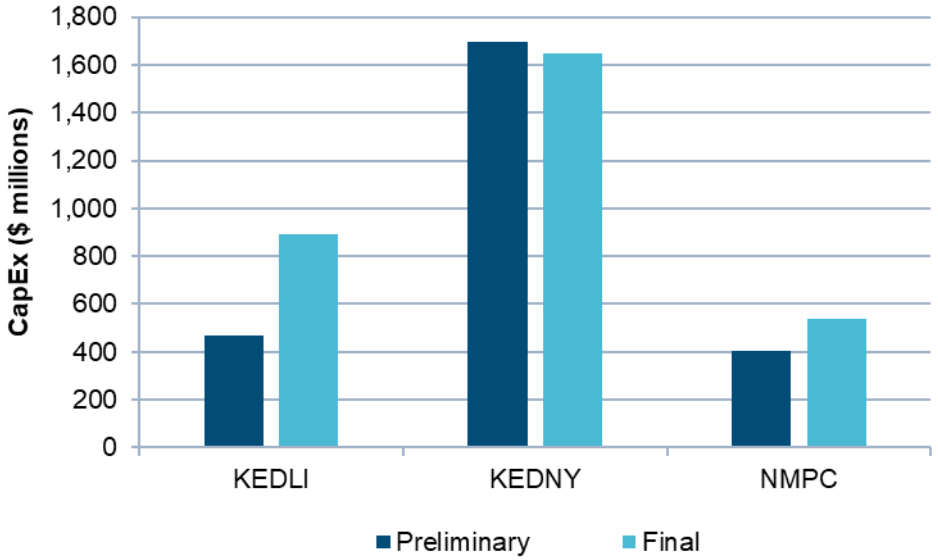
reductions in the Company's demand forecast under the CEV scenario compared to its Reference Case.

Figure 6-9: CEV Scenario CapEx Reliability & Reinforcement Comparison[137]

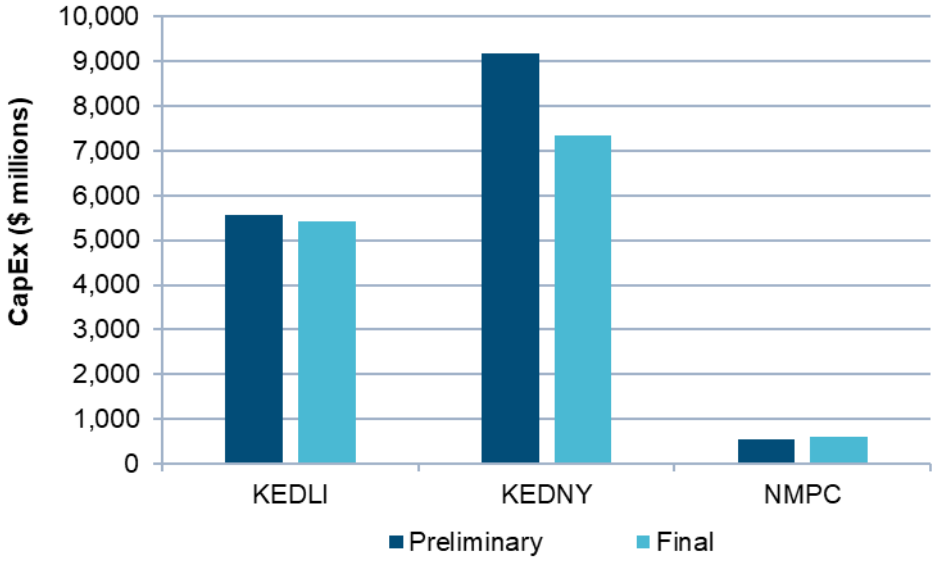


- With the exception of Future of Heat (which saw a modest increase), the CEV forecast in the FLT Plan reflects modest decreases in the remaining investment categories.

Finally, Table 6-1 further reflects that the Company's AE CapEx forecast supporting the FLT Plan is approximately $2.8 billion less than the Preliminary Forecast. Our observations of the primary differences are:

- The Leak-Prone Pipe forecast dropped by nearly $2.0 billion – this reduction appears to be associated with revised, more aggressive (or optimistic) assumptions about customer decisions to electrify as well as regulatory and policy changes that would facilitate decommissioning of leak-prone mains and service lines and allow replacement investments to be avoided. More than $1.8 billion of the difference is attributed to KEDNY.

Figure 6-10: AE Scenario CapEx LPP Comparison[138]



[137] *Ibid*.
[138] *Ibid*.

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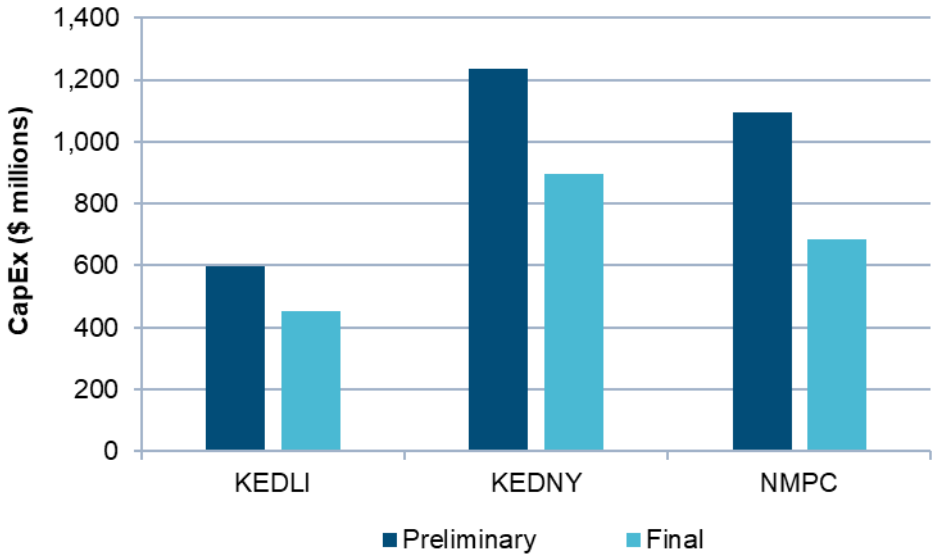
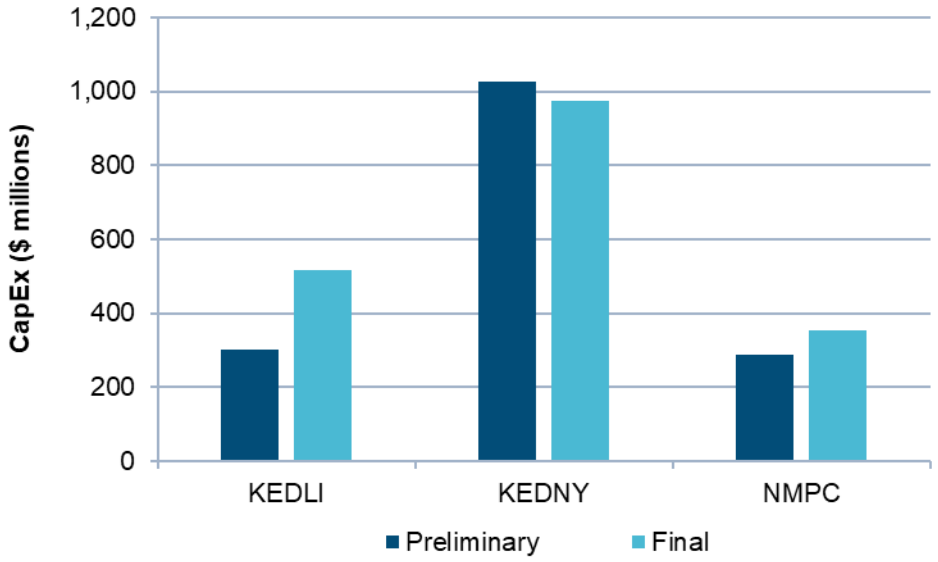
- The Meters forecast dropped by approximately $0.9 billion -- it appears that this reduction is not related to customer growth, Similar to the CEV forecast, the Company has explained that the AEV forecast for Meters is impacted proportionally by the reduction in the Reference Case forecast of meter counts.

Figure 6-11: AE Scenario CapEx Meters Comparison[139]



- The Reinforcement and Reliability forecast increased by approximately $0.2 billion – here the Company's modified forecasting methodology discussed previously is driving the increases.

Figure 6-12: AE Scenario CapEx Reinforcement & Reliability Comparison[140]



- The remaining $0.1 billion reduction is spread across the remaining investment categories; we would not consider those adjustments to be material

Long-term CapEx forecasts for natural gas utilities would be expected to change periodically given the many external factors that influence the need to invest in the distribution system. PA recommends that National Grid be transparent about changes to its forecasts, and the reasons therefore, as updates to this FLT Plan are completed as well as in future GSLTPs.

[139] *Ibid*.
[140] *Ibid*.

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6.1 Recommendations for Future GSLTPs

Recommendations for the Company to improve the investment components in future GSLTP are summarized below.

1. The Company should confirm whether decommissioning costs are included or excluded from the amounts included in its CapEx forecasts provided to PA.
2. The Company should include plans that aggressively pursue alternatives to adding customers to the gas system. A decision by a single consumer to not connect to the gas system will avoid (at a minimum) the installation of a service line as well as the purchase of a new meter (or other investments such as the purchase of an AMR device or a smart meter) for that customer. Targeted implementation of NPAs for specific parts of the distribution system could eliminate investment in multiple meters.

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7 Demand Forecast

It is PA's understanding that the Company has not adjusted its demand and load forecast or underlying assumptions in preparation of its Final Plan. Therefore, PA has reviewed the demand and load forecast as presented by the Company in support of the RLT Plan, requested significant supporting data from the Company and participated in technical conferences and SME discussions on this topic.[141] Our observations are summarized within the sub-sections below. PA observes several drivers that are expected to place downward pressure on customer counts and/or UPC driven by the following dynamics, that will influence the forecasted annual sales and Design Day demand, both for NMPC and DSNY:

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

In the following sections, we further discuss our analysis and initial observations, beginning with a summary of three critical state and local laws influencing future customer counts and/or UPCs, in Section 7.1. Next, we discuss macroeconomic indicators, followed by a discussion of heating fuel trends, the customer base composition and forecasted customer counts. This is followed by our observations on Annual Average UPCs for select customers. We next examine the annual volumes sales and peak day demand scenarios presented within the FLT Plan and conclude with an overview of the Clean Energy Programs, a large DSM portfolio, focused on EE, electrification of heating and other appliances, and NPAs.

In this section PA now includes the results of its Demand forecast analysis. In this effort, PA estimated high-level, reasonable outcomes to the Company's Reference Case, as opposed to preparation of a detailed bottom-up forecast. PA's analysis serves as an effective method to summarize several aspects of the Company's forecast that seemed inconsistent with our understanding of certain impactful meter count dynamics, recent trends, policy evolution and intrinsic market phenomena such as falling UPC due to improving appliance efficiency and other energy efficiency measures. The results of PA's analysis and the proposed changes for the Company to consider to its demand forecast are identified and discussed throughout this Report as "Reference Case – PA Adj." While this is a single-point forecast, Reference Case – PA Adj provides an illustration of the impact of PA's proposed adjustments for other potential design day forecast outcomes over the long-term. A comparison of the impact on demand based on PA's analysis of the Company's Reference Case and CEV and AE scenarios is discussed above in Section 4.3.

7.1 State and Local Policy

In the FLT Plan, National Grid anticipates a key driver of customer base growth from customers exempt from state and local laws requiring electrification or limiting the installation of fossil fuel energy sources. The Company acknowledges the importance of variability of influence these policies will have across different regions of their service territory, including:

1. All-Electric Building Act limits the installation of fossil fuel systems or equipment in new construction up to seven stories tall starting in 2026, and in all new buildings from 2029 onwards. This does not restrict or limit oil-to-gas conversions.
2. Local Law 154 limits the installation of natural gas systems or equipment in newly constructed buildings under seven stories in NYC starting in 2024. This does not restrict or limit oil-to-gas conversions.

[141] PA requested the Company update any data submitted to PA in prior data requests and no additional or new information pertaining to the demand forecasts was provided. Therefore, PA's analysis, observations and recommendations regarding the demand and load forecast presented in this Final Report are largely the same as presented in PA's Preliminary Findings Report.

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3. Local Law 97 imposes GHG emission limits on large buildings in NYC.

All-Electric Building Act

Starting in 2026, New York will require new buildings to be zero-emission, effectively limiting natural-gas hookups. The state's building codes limit fossil fuel combustion (i.e., gas furnaces and stoves) in most new buildings under 7 stories with larger buildings covered in 2029. Instead, buildings will use heat pumps, geothermal systems, and electric appliances. This will only apply to new buildings, and therefore existing gas stoves or furnaces can remain in use. There are exceptions too, as new gas connections will be allowed for manufacturing facilities, commercial food establishments, laboratories, car washes, laundromats, hospitals, crematoriums, agricultural buildings, and critical infrastructure. New gas hookups are also allowed for generators that serve as backup power supplies. New York will be the first state to take this step through legislative action. California and Washington have similar measures but have done so through administratively adopted building codes. NYC, however, already has a limit on new gas hook ups in place – new buildings up to 7 stories will be zero-emission by 2024 and larger buildings will be zero-emission by 2027.

Local Law (LL) 97

LL97 was passed in April 2019 by the NYC Council as part of the Mayor's Climate Mobilization Act. The purpose of the law is to help achieve NYC's economy-wide GHG reduction goal, which is a 40% reduction of GHG emissions by 2030 and an 80% reduction by 2050 (relative to baseline year 2005).[142] The law applies to most buildings over 25,000 square feet and it is up to the building owners to meet compliance. Owners found to be non-compliant with the prescribed emissions limits face several penalties including fines per metric ton of Co2 equivalent in excess of the designated limit, failure to report results in fines of $0.50 per square foot of building (per month), and false reporting can result in fines up to $500,000.According to the LL97 definition of covered buildings, over 3.2 billion square feet of New York City buildings are covered under the law, which represents nearly 60% of NYC's total building area.[143]

The law seeks to achieve GHG emission reduction targets by setting GHG emissions limits on the building sector, the highest contributing sector to GHG emissions in NYC. GHG emission caps become more stringent over a series of compliance periods: 2024-2029, 2030-2034, 2035-2039, 2040-2049, and 2050 onwards. Limits are in metric tons of CO_2- equivalent and depend on building class type, with standards already established for years 2024-2029 and 2030-2034. NYC estimates that about 20-25% of buildings will exceed their emissions limits in 2024, if they take no action to improve their building's performance, while about 75% of buildings will exceed their emissions limit by 2030.[144]

Covered buildings have a variety of compliance options for meeting their GHG emission limits. By May 1, 2025 (and every year thereafter), building owners will be required to submit a GHG emission report showing they are in compliance with their respective emissions limits. NYC's Department of Buildings may impose a penalty of $268 per metric ton for LL97 covered building emissions that are above the GHG emissions limits specific to those building classes.

Local Law (LL) 154

LL154 was passed in December 2021 and aims to significantly limit fossil fuel service connections in new or gut renovated buildings in NYC. The law effectively bans most fossil fuel service connections for such buildings under seven stories beginning in 2024, and for such buildings greater than seven stories beginning in 2027. Buildings become covered under the law upon submission of an application either for new construction or gut renovation to the NYC Department of Buildings.

Specifically, and importantly, buildings covered under the law would be limited from emitting more than 25 kg of CO2 per MMBtu of energy generated within a building. Although the first compliance date under the law remains in the future and the language is subject to some interpretation, the emissions limit established specifically for combustion of fuels within a building potentially creates tailwinds for electrification.

FLT Plan Implications[145]

[142] Source: Local Law 97 of 2019 (nyc.gov).
[143] Source: Covered Buildings, NYC Sustainable Buildings.
[144] Source: Compliance, NYC Sustainable Buildings.
[145] Source: Company's response to PA-0183 Attachment 1.xlsx.

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Recent policies adopted at the State and New York City level have and are likely to continue impacting overall growth of gas demand. In our review of data request responses provided by the Company, we observe the following assumptions underlying the design day forecast presented in the FLT Plan. First, the Company does not account for any specific exemptions related to Local Law 97. Second, to account for the impact of LL154 and the AEB Act, the Company analyzed data on buildings obtained from the PLUTO database, maintained by the NYC Department of City Planning, for KEDNY and for the Rockaways portion of KEDLI. For the remaining portion of KEDLI and Upstate NY, data was obtained from property records originating from various sources and purchased through a contract between the Company and CoreLogic, a provider of data in the real estate sector. Using this data, the Company determined the historical percentage of new construction buildings that would be exempt from these laws based on building size and type. Then, given uncertainty surrounding the impact of these laws on hard-to-electrify projects, the Company reduced the impact of the gas limitations by derating the exemptions by a factor of 50 percent.[146] PA has considered these items in our analysis of customer counts and UPCs.

7.2 General Overview

PA finds it informative to examine the evolving macroeconomic forecasts pertaining to National Grid's NMPC and DSNY service territories to provide context for an assessment of its changing market conditions – especially as they relate to gas demand in general. Based on analysis of data from Moody's Analytics, PA describes the NMPC and Downstate macroeconomic and heating fuel trends influencing future customer counts and/or UPC. As described above, state, and local legislation limiting fossil gas fueled equipment and building systems will dampen the growth of gas heating customers. These trends present a unique challenge with respect to decarbonization goals and strategies. While macroeconomic and regulatory forces work to limit the growth of gas customers, limited growth in residential and commercial natural gas customers is expected as a portion of FO customers switch to natural gas. PA has developed a comprehensive (and separate) analysis of the connections and usage for the key customer classes at NMPC, KEDLI and KENDY based on the trends exhibited by this historical and forecasted data.

7.3 NMPC

The NMPC market region is composed of the West Gate (the Syracuse-Utica area) and the East Gate (the Capital district area) segments. As illustrated in Table 7-1 below, the total combined NMPC ~638,000 customer base is dominated by the Residential sector with an overall share of 92.4% for Residential customers in 2023.[147] Commercial customers represent 7.5%, followed by the Industrial and Other segments accounting for the rest. PA observes this mix of customers has been fairly stable over the last decade and notes a slight trend of a growing share of Residential heating customers – largely attributable to fuel conversions – has emerged recently. On the other hand, a slowing decline in Residential non-heating customer segment (RN) suggests that (a) a stasis with respect to the existing customer base continuing to rely on gas for cooking, water-heating etc. and (b) a growing share of the fuel-switching dynamics can be attributed to households formerly using fuel-oil, wood etc. for space heating.

Table 7-1: NMPC Historical Customer Base[148]

	Res. – Non-Htg	Res. – Htg	Commercial	Industrial	Other	Total
2015	29,196	529,935	46,114	176	304	605,725
2016	28,388	536,471	46,494	178	297	611,828
2017	27,470	543,030	46,722	182	288	617,692
2018	27,119	548,345	47,084	184	287	623,019
2019	26,224	552,235	47,296	182	286	626,223

[146] Source: Company's response to PA-0101.
[147] Roughly 4% - a little over 24k - of Residential customers are RN customers.
[148] Source: Company's response to PA-047, Attachment 2.xlsx.

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2020	25,623	557,115	47,427	178	278	630,621
2021	25,027	561,727	47,754	183	266	634,957
2022	24,496	564,471	47,887	188	272	637,314
2023	24,163	566,450	47,748	183	270	638,814

Macroeconomics

Based on PA's initial analysis of data from Moody's Analytics,[149] we observe the NMPC region's economy experienced a noticeable setback during the Covid pandemic. The region's real Gross Metro Product (GMP) and Total Employment (EMP) have since recovered and returned to trends consistent with recent history. Given the steady evolution of the local economy, especially in the eastern section of the territory (i.e., the Capital district), Moody's Analytics projects continued growth. As shown in Table 7-2 below, while there was a negative impact during 2019-20, the projection is for fairly steady strength in the region's GMP.

The dynamics with respect to Employment are somewhat distinct as they mirror those embodied in the region's demographic profile. The key feature of the NMPC territory, like almost the entire Upstate region, is that Population growth has established a negative pattern, and the projection is for a continuous decline owing to shrinking household size.[150] Household growth (the chief driver of both the Residential and Commercial customer bases) is expected to continue for the next few years before also adopting a falling trend in the late 2020s. This pattern is reflected in the region's workforce trends and Employment growth shadows Household growth – translating into a declining path with an average annual growth rate of -0.17% between 2025 and 2050.

Table 7-2: NMPC Region Macroeconomic Landscape: Average Annual Growth Rates

	Households	Population	Employment	Real GMP
2010-2015	0.42%	-0.08%	0.55%	1.33%
2015-2020	0.17%	0.19%	-1.12%	1.13%
2020-2025	0.29%	-0.18%	1.64%	1.39%
2025-2030	-0.04%	-0.20%	-0.02%	2.05%
2030-2035	-0.03%	-0.27%	-0.11%	1.74%
2035-2040	-0.21%	-0.31%	-0.18%	1.53%
2040-2045	-0.30%	-0.37%	-0.22%	1.37%
2045-2050	-0.31%	-0.42%	-0.32%	1.37%

Heating Fuels

PA analyzed data for *Selected Housing Characteristics* obtained from Census' American Community Survey (ACS).[151] A review of this data – as depicted in Figure 7-1 and Figure 7-2 – reveals several dynamics that are useful for understanding the evolving nature of the gas market and the following observations:

[149] PA's analysis is based on macroeconomic data from Moody's Analytics obtained in early July 2024. The underlying data is for the combination of following Metropolitan Statistical Areas: Albany-Schenectady-Troy, NY MSA, Glens Falls, NY MSA, Syracuse, NY MSA and Utica-Rome, NY MSA.

[150] Down from 2.68 persons per Household in 1990 to 2.54 by 2000 and 2.38 just before Covid. PA projects this factor will settle at around 2.33 by 2040.

[151] For this analysis, the NMPC territory is characterized by the following counties: Albany, Jefferson, Madison, Oneida, Onondaga, Oswego, Rensselaer, Saratoga, Schenectady, and Warren. This is because ACS does not provide county-level data for Fulton, Herkimer, and Montgomery counties.

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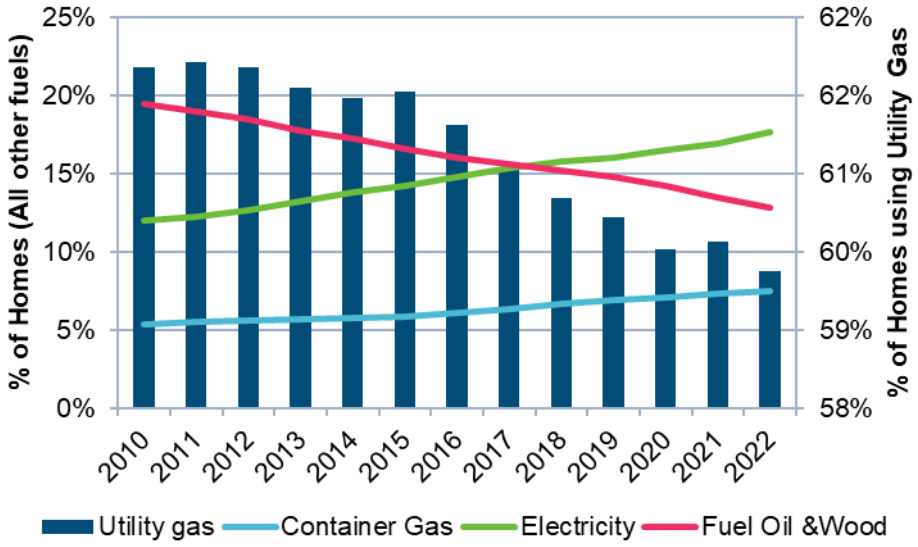
- Growth in housing stock with over 23,000 units being added since 2017 and a sharp rise in home occupancy during Covid.
- The multi-family segment exhibiting the fastest growth rate – especially in the 2018-22 period.
- A steady decline in the share of homes using FO and wood accompanied by growth in those using utility-gas, container gas (ostensibly Propane) and electricity (presumably all heat pumps) – see Figure 7-1.
- A close correlation between year-on-year changes in housing units and utility-gas customers – see Figure 7-2 below, suggesting that the vast majority of new construction receives gas connections. Natural gas remains the favored primary heating fuel; however, the share of homes on utility-gas has declined from 61.9% in 2010 to 59.8% in 2022 despite a temporary Covid-induced rise in occupancy in 2021.

Analysis of heating fuel types within the NMPC service territory finds that while natural gas remains the favored primary heating fuel – accounting for close to 60% of occupied homes in 2022, that share has been declining steadily over the past several years. Given that there were over 23,000 new housing units constructed since 2017,[152] one can deduce that while a major share of the housing units installed gas furnaces – as indicated by Figure 7-1 and Figure 7-2, a sizeable portion also chose to electrify space heating.

Figure 7-1: NMPC Territory Residential Space Heating Fuels % of Homes[153]



[152] According to ACS that number rose from ~851,000 in 2017 to ~874,000 in 2022.
[153] Source: American Community Survey.

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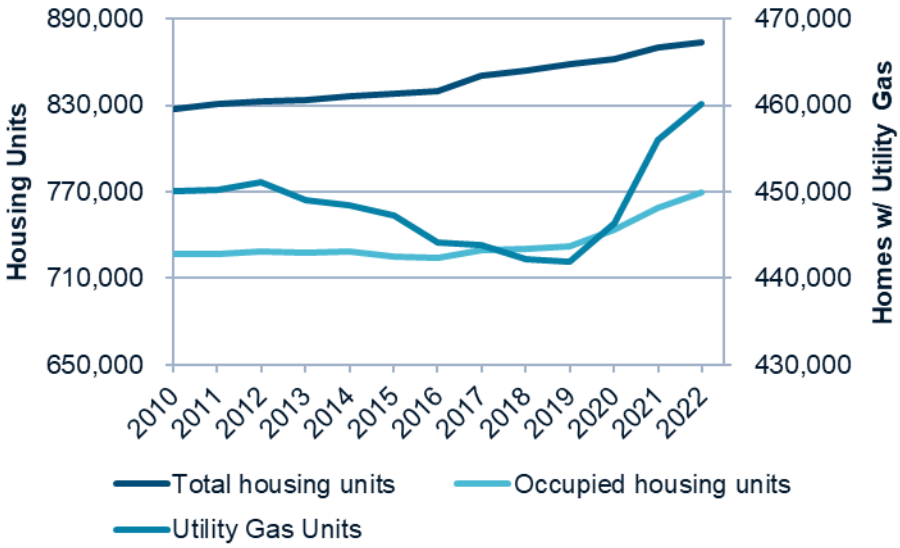
Figure 7-2: NMPC Territory Residential Base & Gas Heating Homes



A key dynamic here is homes that still rely on FO and wood. Not only does the NMPC territory still have a substantial number of such homes (roughly 100,000 or ~13% as of 2022), but their accelerating decline (an average of around 3,200 per year since 2018) is being absorbed by a combination of container gas, electricity (heat-pumps) and natural gas. As mentioned above, new construction does seem to favor natural gas, but with slowing demographic and employment trends, PA considers the dynamics of fuel-conversions and electrification critical phenomena with implications for how the Company navigates toward a more decarbonized future. Trends for the continued transition off FO along with forecasts of heat-pump penetration are important factors to consider in making an adequate assessment of the Company's load forecast.

As household growth halts in the next few years and turns negative by the late 2020s, new construction is expected to follow suit. We understand existing meters shall remain on the gas system despite vacancies (ACS reveals a historical average vacancy rate of 13%), but the impact will be manifest in the average UPC. These trends imply that gas customer gains due to new construction shall taper off. Furthermore, the effects of the AEB Act post-2029 will place another limitation on additions.

A closer assessment of the ACS data suggests that a shrinking fraction of those switching away from FO and wood are opting for natural gas. It is reasonable to assume that parts of the territory that are not served by the gas system are where container gas is gaining market share. However, it is the accelerating share of electricity (i.e. heat pumps) that leads us to posit that like in other Upstate utility markets a declining share of this fuel switching favors natural gas. As the economics of heat pumps improve, growing awareness together with the incentives being made available only points to a plateauing of the potential for gas customer gains due to fuel switching. One can extrapolate that legacy users of container gas will also drift toward electrification at some point as technological improvements lower costs and consumer preferences tilt.

NMPC Load Forecast Implications

PA's load analysis focuses on the volumetric forecast in the Company's Reference Case. We consider this approach useful as it forms the foundation for not only the Design Day peak forecasts but also the corresponding scenario forecasts. As described in the FLT Plan, the Reference Case reflects the impacts of existing customer programs and "… clean energy investments that the Commission has approved as well as existing legislation."[154] Based on this approach PA assumes the forecast captures ongoing electrification and decarbonization patterns – which has secular implications for both the gas usage and the customer-base, especially in the Residential sector.

NMPC Customer Count Forecast Implications

It is useful to set the stage for this discussion by (1) highlighting what we consider the key underlying macroeconomic forces shaping the Residential and Commercial customer bases and (2) conducting an

[154] See p. 17, FLT Plan.

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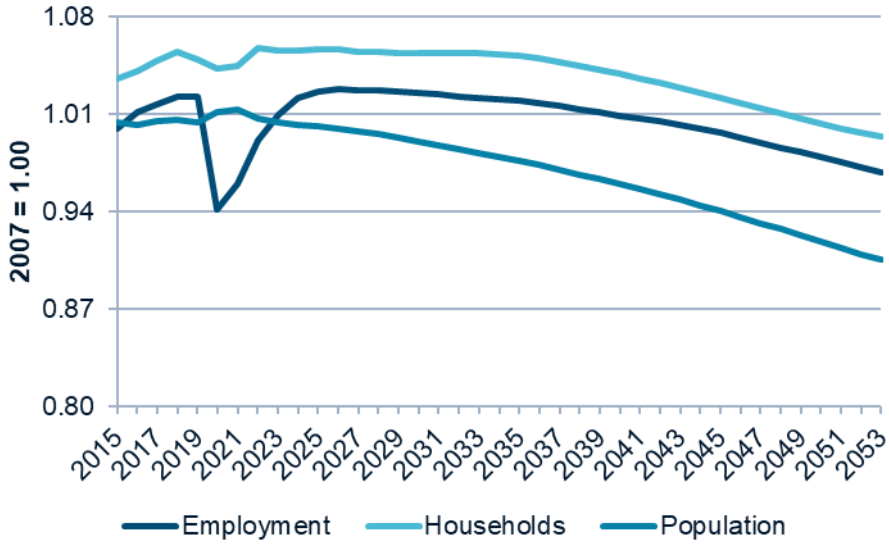
analysis of the Company's forecasts of heat-pump installations – that deduct from the customer count - and fuel conversions – that add to the customer count.

Macro-Economic Factors: Figure 7-3 shows the historical and forecasted data for Private Non-Farm Employment, Population and Households converted into indices – for graphic convenience – based on the respective 2007 levels as the base (i.e., showing the annual values as a ratio of the 2007 value). The key observation is that while Population is already in decline, Employment and Households are projected to peak in 2026/27 and then also begin falling. This dynamic suggests a negative tendency with respect to organic customer growth in both sectors. The implied decline in the typical household size (persons per household) does impact the UPC but only slightly as it does not affect space heating load – which accounts for over 80% of gas usage.

Figure 7-3: NMPC Territory Macroeconomic Indicators – Indices (2007=1.00)



Since PA considers electrification and fuel-switching dynamics central to its assessment of the Company's forecast, the following discussion combines insights drawn from the ACS data presented above, an analysis of the historical data from Clean Heat Program reports and an examination of the Company's Reference Case forecasts of heat-pump (HP) installations and oil-to-gas conversions.[155]

Heat-pump Installations and Oil-to-Gas Fuel Conversions: The Company provided its updated forecasts for both these categories.[156] To assess these forecasts and to develop a comprehensive understanding of how the space-heating landscape is evolving in the NMPC region, PA also analyzed the monthly reports summarizing the activity under the Clean Heat Program during December 2022 – September 2024 period.[157] Table 7-3 and Table 7-4 represent the key statistics based on these reports.[158]

Table 7-3: End of Year Totals of Heat Pumps Installed (Former Heating Fuels)

	Oil	Propane	Gas	Others	Totals
2022	736	497	1,350	775	3,358
2023	1,353	865	2,669	1,212	6,099
2024	2,016	1,405	3,400	1,462	8,282

[155] The latter being provided to PA as a data-request response in PA-0190.
[156] Source: Company's response to PA-0190, Attachment 2.
[157] Source: Company's responses to PA-087 and PA-0189.
[158] Since the data provided was through September 2024, PA extrapolated to estimate the 2024 year-end values.

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Table 7-4: Characteristics of Heat Pump Installations (Shares of Annual Totals)

	Partial Heat Pumps	Formerly Oil	Formerly Propane	Formerly Gas	New Construction	Decommission after Install	Commercial Installs
2022	28.6%	20.5%	13.3%	44.0%	12.0%	1.9%	2.2%
2023	25.6%	22.0%	14.5%	42.7%	10.2%	6.8%	2.4%
2024	22.8%	23.9%	16.0%	41.8%	9.2%	11.8%	2.5%

- In our review of this data, we observe the following: Partial-heat units are a minority of the HPs being installed and, correspondingly, the share of Full-heat HPs is growing. Given that the Company no longer provides incentives for the former, we can expect this trend to accelerate.[159]
- Off-system homes (i.e., non-gas customers) form the majority of the installs and their share is growing. This suggests that the potential pool of fuel-conversion driven customers is shrinking. This phenomenon – whereby homes that burn oil, wood etc. are increasingly likely to opt to electrify instead of adopting gas for heat - has been observed in other gas territories in New York. Based on ACS, there are approximately 120,000 homes in the NMPC markets that burn oil, wood, coal etc. (around 80% of them with oil)..
- After discussions with subject-matter experts from the Company, PA understands the Company's definition of a decommissioning reflects a drop in usage but not a customer fully disconnecting their gas service. In our assessment of the impact of residential electrification of space heating, PA had requested the Company provide information by end-use,[160] which they did not provide. Absent this data, we used corresponding data on the structure of Residential gas usage for other New York gas utility territories as a reasonable proxy. Commercial installs remain a small portion.

It is useful to juxtapose these summary findings against the Company's Reference Case forecast. Figure 7-4 shows the total number of HPs installed – the sum of Partial-heat units, Full-heat installations that do not lead to meter decommissioning and Full-heat installs accompanied by decommissioned meters, the number of Oil-to-Gas conversions, the share of Partial-heat HPs, the share of meters that get decommissioned and the implied penetration of HPs in the territory – a ratio of the number of HPs to the number of forecasted Residential customers.

[159] Partial-heat units continue to be available through retailers and it is plausible that given the relative affordability some customers will choose them. It is also reasonable to assume that with improving technology and economics, their share in the market will continue to dwindle.
[160] Source: Company's response to PA-059.

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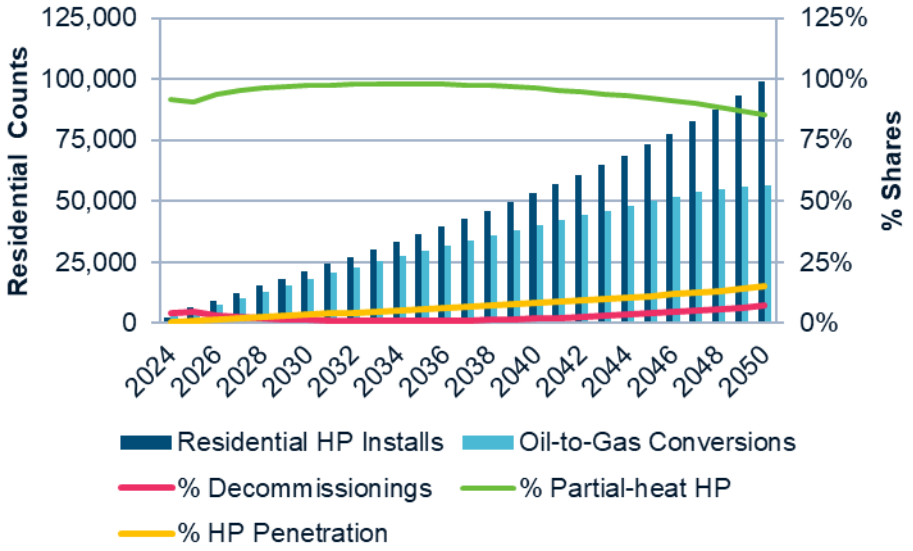
Figure 7-4: NMPC Reference Case: Heat Pumps & Oil-to-Gas Conversions



The salient observations based on the Reference Case data exhibited in Figure 7-4 are:

- Beyond 2023, the total number of HPs installed grows to just under 100,000 by 2050.
- For the next 15 years or so, the overwhelming bulk of installs are projected to be Partial-heat units with just 7.2% or roughly 7,100 meters being decommissioned by 2050. This assumption is in sharp contrast with Clean Heat Program statistics that indicate 11.8% of installs leading to decommissioning by the end of 2024. Projection is that over 500 Residential customers will disconnect in 2024[161]– considerably higher than figures in the Reference Case forecast that shows that level not being attained till 2037. Our projection is that over 72,000 customers will decommission by 2050.
- Furthermore, the forecast indicates that just 15% (dividing the number of HP installations by the customer count) of the customers have electrified by 2050. This is considerably out of step with NYISO's projection in its 2024 Gold Book[162] that 76% of homes (statewide) will use electricity by 2050 as the primary heating fuel and HPs shall comprise the vast majority of them. PA opines that even a very conservative projection ought to see at least 35% of homes in the territory having installed a HP by 2050 – implying a count of around 200,000.[163]
- As shown above in Table 7-4, the share of Partial Heat HPs dropped from 28.6% in 2022 to 22.6% in 2024 – reflecting a major deviation relative to the Reference Case forecast of 91%. PA's projection is that based on the recent trend the share could drop as low as 12% by 2050. This trend implies a substantially different glidepath of the implied UPC since a smaller (greater) fraction of Partial (Full) heat HPs implies lower levels of gas usage.
- The Reference Case forecasts that Oil-to-Gas conversions will grow to add around 57,000 customers by 2050 and seemingly reach a saturation level a few years subsequently. PA has a different view of fuel conversions. As the ACS reveals there are around 90,000 homes in the territory[164] that use FO and based on our analysis of fuel-switching dynamics, we think that potentially 33% of them would opt for gas by the end of the horizon. Furthermore, there is another 30,000 homes that use a combination of Wood and Coal, and they also represent a potential pool of new customers. So, while we think that

[161] This analysis is based on the monthly Clean Heat Program reports provided by the Company via PA-087 and PA-0189.
[162] See Slide 16, 2024 Building Electrification Assumptions, ESPWG, 3/21/2024 - https://www.nyiso.com/documents/20142/43675604/05_2024%20Building%20Electrification%20Assumptions%20ESPWG.pdf/c84c96a6-4bff-250b-ef35-18ced7f0e46c.
[163] 200,000 amounts to 35% of PA's forecast of Residential customers.
[164] The ACS does not have the pertinent county-level housing data for Fulton, Herkimer, and Montgomery counties. Based on population figures, PA imputed a 10% share of these counties relative to rest of the NMPC region and accordingly adjusted the counts.

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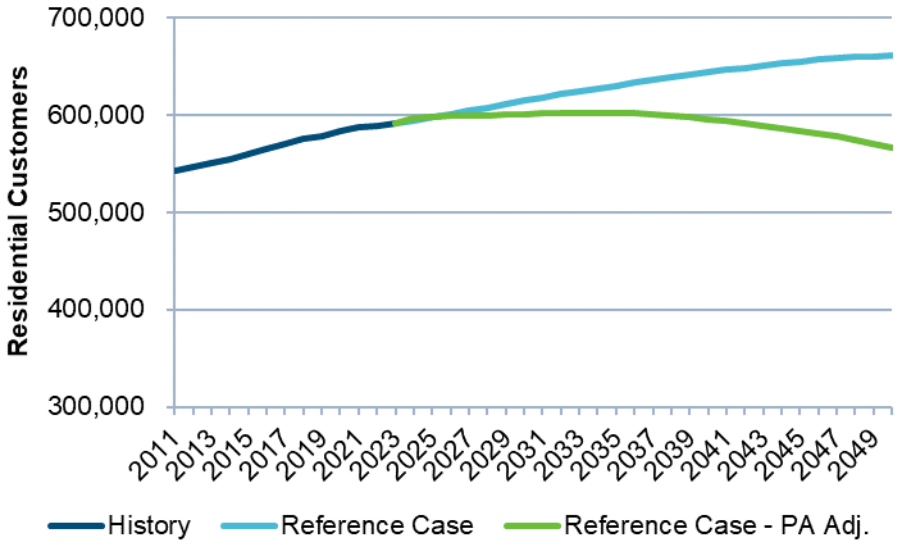
a number smaller than what the Company forecasts will make the switch from oil, there will be some additional natural gas customer gains based on migrations from other fuels too.

7.3.1 NMPC Residential Customer Sector Forecast

NMPC Residential Customers: We accept the Company's forecast of the RN, but we developed our own view of customer counts in the heating segment (RH). As Figure 7-5 shows, under the Company's Reference Case, the Residential customer-base continues to grow over the horizon with some tapering taking place toward the end of the 2040s. Based on the macroeconomic landscape painted by Moody's Analytics' data as discussed above, PA considers this a rather aggressive forecast. In order to develop our view, we began with an econometric projection based on Households – the chief driver of customer growth over history. While this projection reflects the view that future demographics and macroeconomic realities shall differ greatly from the past, it does not incorporate emerging phenomenon like accelerating electrification and fuel-switching.

Figure 7-5: NMPC Residential Customer Count Forecast[165]



In order to develop another perspective, PA developed proposed adjustments to the Company's Reference Forecast that incorporate our projections of

- Overall HP installations;
- Share of Partial-heat units;
- Decommissioning rates; and,
- Fuel conversions from homes formerly on oil, wood, or coal.

PA began with results of an econometric model that forecasts the RH segment based on Households that captures the projected adverse economic and demographic reality, leading to falling customer counts starting in a few years Figure 7-5. In order to incorporate the effect of electrification and fuel-switching, PA then layered on projections of meter loss due to decommissioned meters and gains attributed to fuel conversions to arrive at PA's proposed adjustments to the Company's Reference Case (Reference Case - PA Adj.) – green line in Figure 7-5.

While we acknowledge that PA's proposed adjustments to the Company's Reference Case reflect assumptions made regarding the speed of electrification and the evolving fuel-mix with respect to space-heating, the salient point is that PA thinks under business-as-usual or the Reference Case scenario, the residential customer count will end up noticeably lower than the Company's forecast in the territory. PA's analysis of electrification and heat pumps is discussed in more detail below and in Section 8.

[165] *Ibid*.

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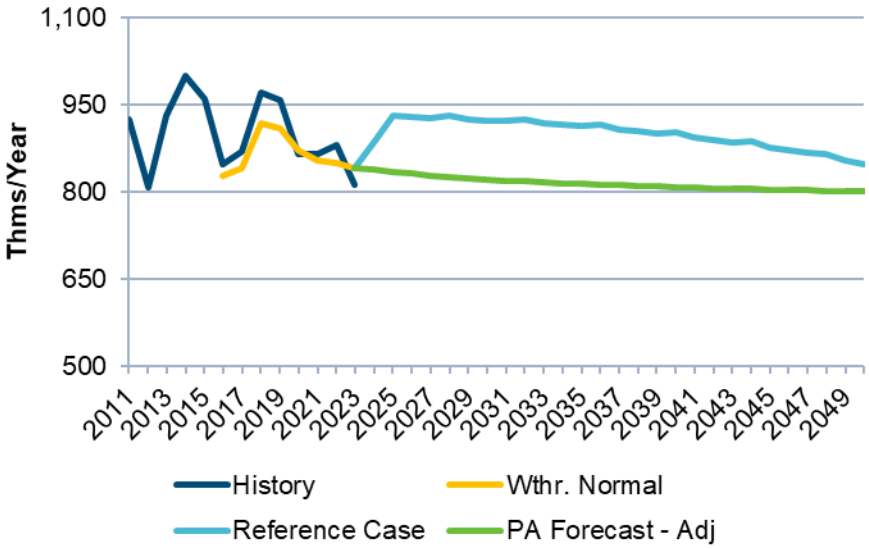
NMPC Residential Use-per-Customer (UPC): Figure 7-6 shows the historical and the implied Reference Case UPC for the RH and RN categories combined. In order to develop our assessment of recent trends and to develop a projection, PA weather normalized the monthly UPC data for the 2014-23 period.

Figure 7-6: NMPC Residential (RH and RN) UPC Forecast[166]



Historical data reveals that there was a structural shift in the RN data in 2016 and the resulting discontinuity is apparent in the difference in the pattern in the combined UPC shown. Beyond that, PA finds the step change between recent history and the 2025 level in the Reference Case difficult to explain.

PA began with a UPC projection based on its econometric result and then layered on the implied volumetric impacts of:

- The reduced usage due to Partial Heat HPs
- The reduced usage due to Full Heat HPs leading to decommissioning gas connections, and
- Higher usage due to homes switching out of oil, wood etc. and into natural gas.

The result is shown as Reference Case - PA Adj. – green line in Figure 7-6. We think that the proposed adjustments result in a conservative projection that is not only consistent with the observed trend but also embodies the expected downward impact of the combination of ongoing efficiency-related patterns as well as the expected impacts of electrification. Whereas the Company's Reference Case forecast has a declining trend, as would reasonably be expected due to ongoing impacts of energy efficiency and electrification, we find the step-change that occurs in 2025 hard to explain given historical patterns.

As Figure 7-7 shows, the step change in the Company's Reference Case UPC leads to a corresponding step change in the volumetric forecast – which appears considerably different from the recent trend. Combining the impact of PA's proposed adjustments to the Company's customer count forecast and the adjusted weather-normalized UPC projection, we derive the resulting volume forecast (Reference Case - PA Adj., green line in Figure 7-6). The combination of fuel-conversions and HP installations initially keeps the volume fairly stable but as the pace of electrification rises, gas usage begins to decrease – as expected.

[166] Source: Company's response to PA-087.

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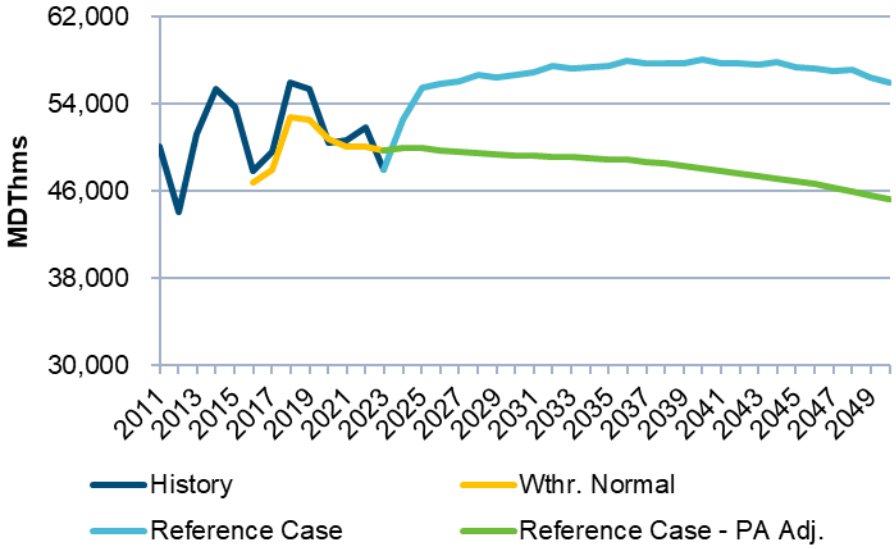
Figure 7-7: NMPC Residential Volumetric Forecast[167]



As Figure 7-7 shows, the step change in the forecasted Reference Case UPC leads to a corresponding step change in the volumetric forecast – which appears considerably removed from the recent trend. Combining PA's proposed adjustments to the Company's Reference Case customer count forecast and the adjusted weather normalized UPC projection, we find that the resulting volume forecast is a reasonable potential outcome. The combination of fuel-conversions and HP installations initially keeps the volume fairly stable but as the pace of electrification rises, gas usage begins to erode – as expected.

Once again, PA's proposed adjustments to the Company's Reference Case Design Day demand forecast is the result of its modeling assumptions, the key observation is that we expect the Residential sales to begin declining in the early 2030's and end up about 9% lower than the weather-normalized level in 2023 by 2050.

7.3.2 NMPC Commercial Customer Sector Forecast

Our analysis shows the historical patterns suggest that the Commercial customer-base moves in close tandem with the Residential customer base. Leveraging that close relationship, PA began with an initial projection. Since future electrification and fuel-switching effects are not reflected in historical data, PA developed its projections of HP installations and conversions from oil to formulate its proposed adjustments to the Company's forecast. Consistent with the recent trend, our analysis projects a slight rising trend through the mid-2030s followed by a decline due to electrification impacts as shown in Figure 7-8.

[167] *Ibid*.

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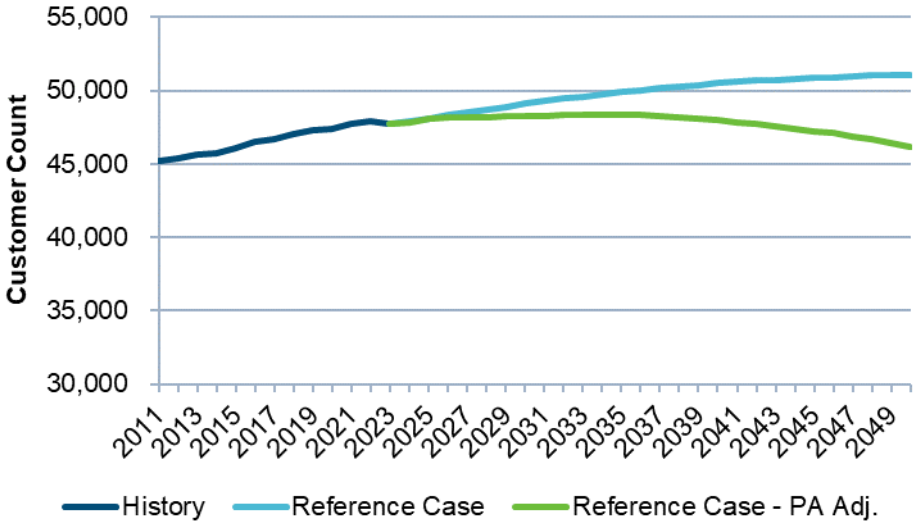
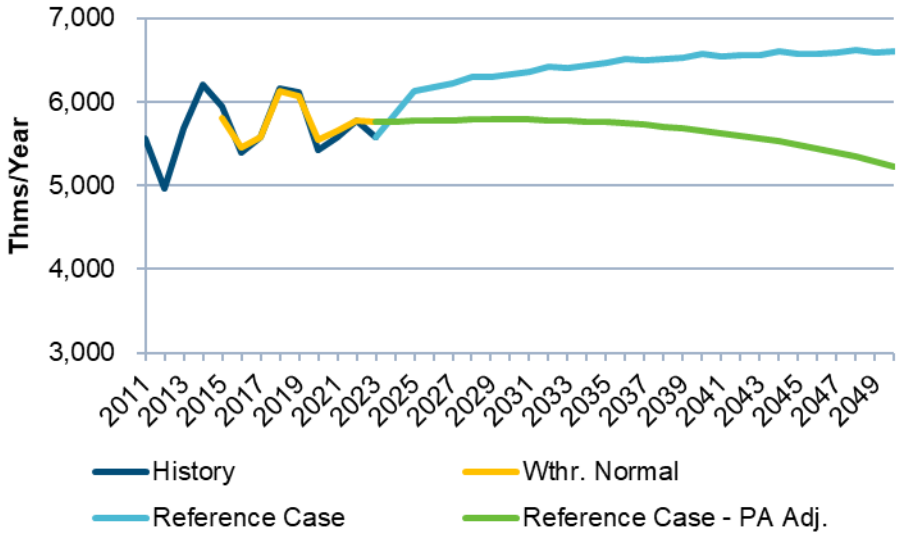
Figure 7-8: NMPC Commercial Customer Count Forecast[168]



Consistent with Moody's forecast of regional employment patterns, we think that while there already is a downward pressure on the growth of the commercial customer-base, we do think there will be some 'stickiness' or inertia that keeps the numbers stable for the next decade but by 2050 we expect the number of commercial customers to be about 3% lower than the 2023 level.

NMPC Commercial UPC Forecast: Like for the Residential sector, our analysis finds the Company's Commercial UPC forecast a bit aggressive – especially due to the step-change that leads to a discontinuity with respect to recent history. PA developed its projections of HP installations, decommissioned meters and fuel-conversions for the Commercial sector and incorporated them in its proposed adjustments to the Company's Reference Case Design Day forecast. Starting with our projections of the weather normalized UPC, we then layered on the volumetric impacts representing proposed adjustments to arrive at an adjusted forecast shown in Figure 7-9. Given recent patterns, we see a gradual rise for the next few years followed by a steady erosion – as expected – due to growing impact of electrification.

Figure 7-9: NMPC Commercial UPC Forecast[169]



Combining the Customer Count and UPC forecasts, Figure 7-10 shows the resulting volumetric forecast from PA's proposed adjustments for the Commercial segment. The trajectory of the Company's Reference Case

[168] *Ibid*.
[169] *Ibid.*

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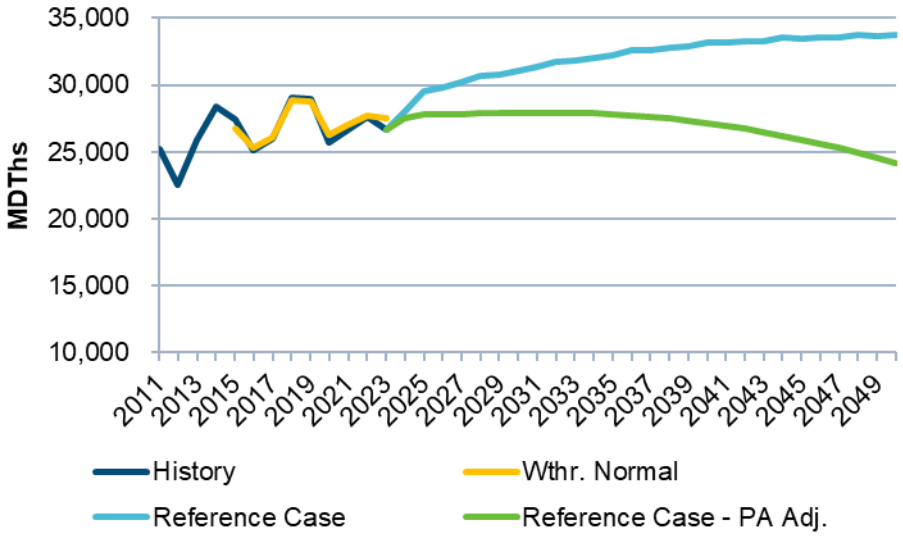
UPC forecast is apparent in the Company's volumetric forecast. We think that given the evolving marketplace, the volume could remain relatively stable through the 2030s before falling through the rest of the forecast period as shown by the Reference Case - PA Adj, green line.

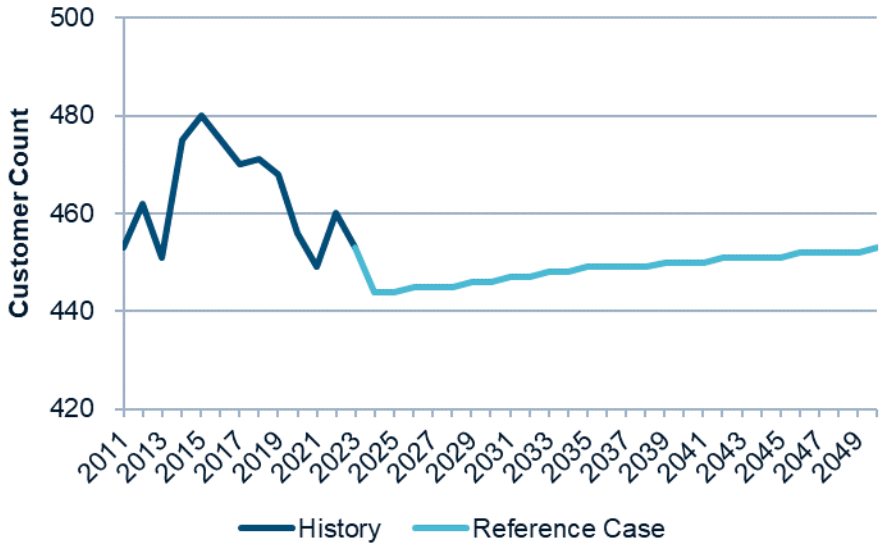
Figure 7-10: NMPC Commercial Volumetric Forecast[170]



7.3.3 NMPC Other Categories Forecast

As shown below in Figure 7-11, the Company forecasts that the customer count in the Other customer segment will stay ostensibly stable through the horizon. We consider the forecast to be reasonable.

Figure 7-11: NMPC Other Customer Count Forecast[171]



As shown in Figure 7-12, the Company's UPC forecast for the Other segment reflects a step-change that causes the glidepath to deviate from recent trends. However, despite the apparent discontinuity, PA holds that given the nature of customers in this segment, the Company's subject-matter experts have a unique view on usage. So, we will accept this forecast for our analysis of the RLP Plan. In order to provide some perspective, we do include a trend-based projection (Reference Case – PA Adj.) in the chart.

[170] *Ibid*.
[171] *Ibid.*

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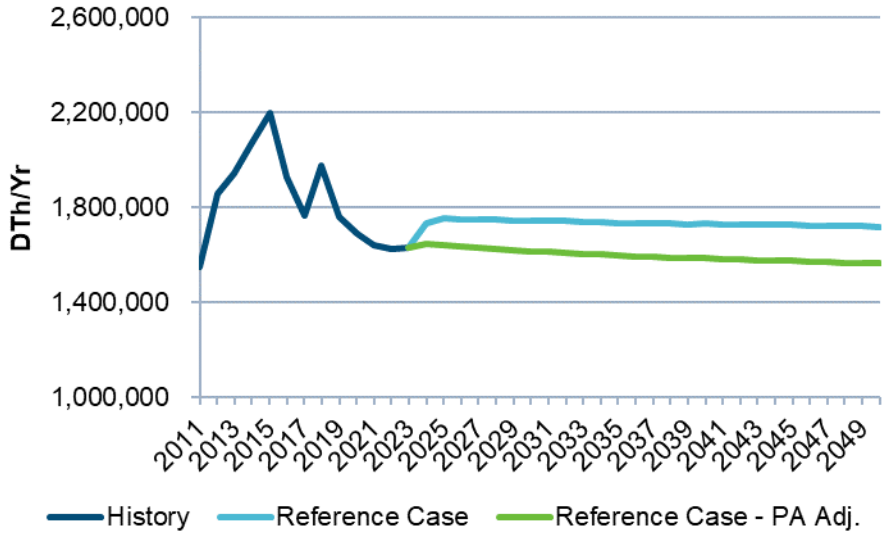
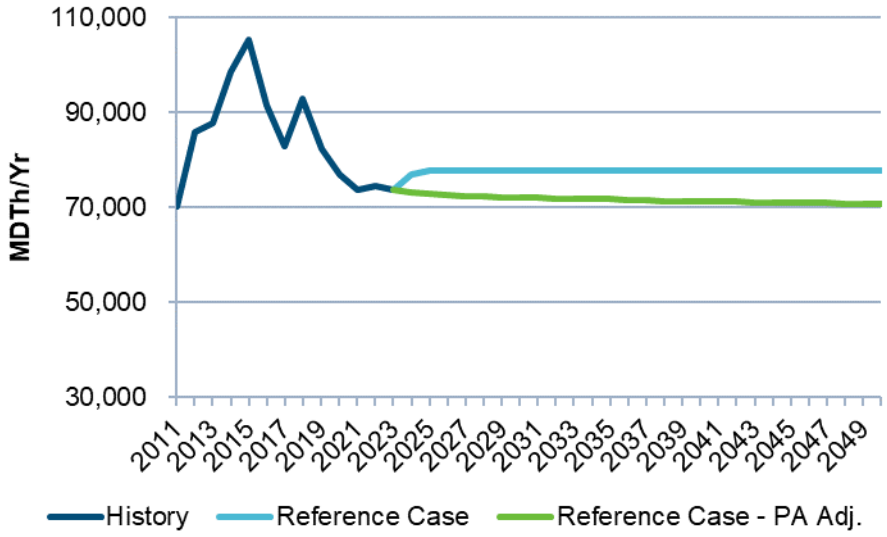
Figure 7-12: NMPC Other Customer UPC Forecast[172]



Accepting the Company's Customer Count and UPC forecasts, we also, therefore, incorporate the Company's volumetric forecast shown in Figure 7-13. Similar to Figure 7-12, we also incorporate a trend line (Reference Case – PA Adj.).

Figure 7-13: NMPC Other Volume Forecast[173]



7.3.4 NMPC Total Volumetric Forecast

Aggregating the sectoral volumetric forecasts, we arrive at our view of a territory-wide volumetric forecast, as shown in Figure 7-14. The green line in this view reflects the proposed PA adjustments to the Company's Design Day demand forecast.

[172] *Ibid*.
[173] *Ibid.*

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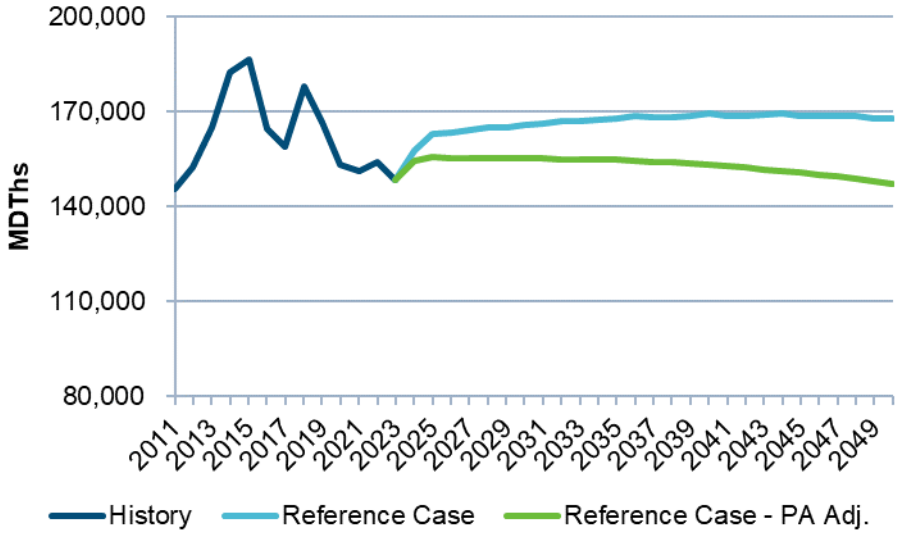
Figure 7-14: NMPC Total Volumetric Forecast[174]



According to this chart, when incorporating PA's proposed adjustments, the overall volume will follow a path that reflects the combined impact of demographic changes, the evolving macroeconomic landscape, and electrification and fuel-switching patterns. With the post-Covid recovery seemingly complete, we project that load begins to slide by 2035 with an acceleration occurring in the early 2040s. The 2050 level of 147,332 MDth is just under 1% below our estimate of the weather normalized level in 2023.

It is our determination that the current Reference Case forecast could be on the high side and that a more reasonable forecast is possible by making the adjustments proposed in this report. In addition, two major companies in the region – GlobalFoundaries and Micron – have recently published plans to expand operations which could impact their demand for natural gas.[175, 176]

7.3.5 NMPC Design Day Peak Forecast

In order to develop a PA perspective on the Design Day forecast, we began our analysis with a review of the implied Design Day Load Factor as shown in Figure 7-15.[177]

[174] *Ibid*.
[175] Source: GlobalFoundaries. (November 20, 2024). https://gf.com/gf-press-release/globalfoundries-and-u-s-department-of-commerce-announce-award-agreement-on-chips-act-funding-for-essential-chip-manufacturing/.
[176] Source: Micron. (April 25, 2024). https://investors.micron.com/news-releases/news-release-details/micron-biden-harris-administration-us-senate-majority-leader.
[177] Calculated as the ratio of the average daily usage to the reported Design Day peak.

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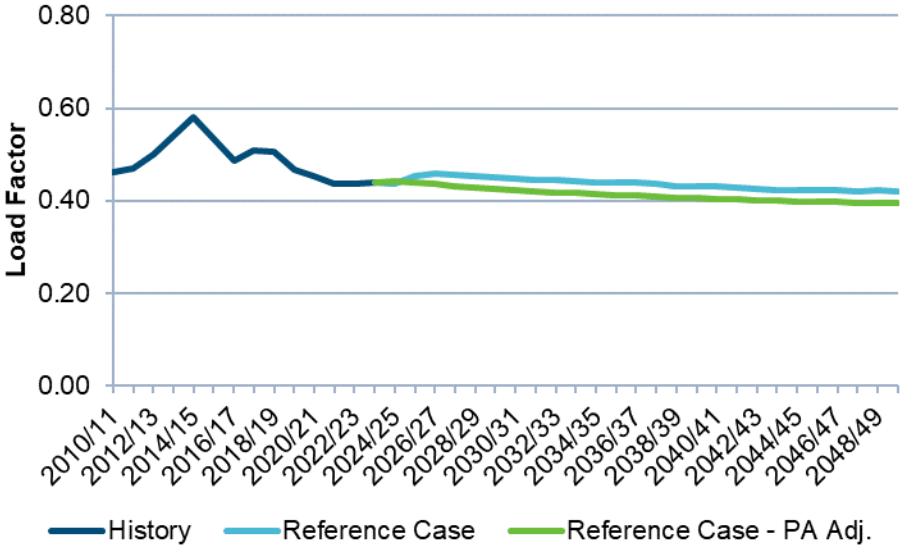
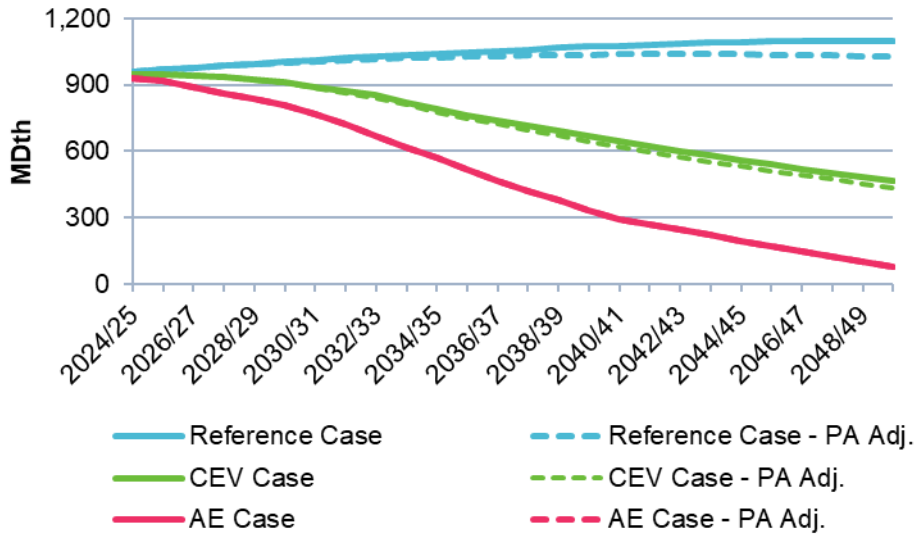
Figure 7-15: NMPC Implied Design Day Load Factor[178]



While the downward sloping forecasted trajectory in the Company's Reference Case is reasonable – consistent with both the recent trend as well as our understanding of the load dynamics resulting from effects of electrification, we find the step change in 2024-25 a by-product of the high volumetric forecast. Since we consider the Load Factor to be a relatively stable characteristic that evolves in a deliberate manner, we adjusted the forecast such that we preserve the trajectory while eliminating the step-change. We think that approach as shown by the historical trend line in Figure 7-15 a reasonable adjustment.

To develop our view of the Reference Case Design Day forecast, we then applied the adjusted Load Factor to the demand forecast, including PA's proposed adjustments to the Company's forecast as discussed above. Further, we scaled the Company's CEV scenario forecast based on the differential from PA's proposed adjustments to the Company's Reference Case forecasts. PA accepted the Company's AE scenario forecast. Figure 7-16 shows the Company's Design Day demand forecast (solid lines) and the Company's forecast with PA's proposed adjustments (dashed lines).

Figure 7-16: NMPC Design Day Demand Forecasts[179]



[178] Source: Company's response to PA-0191, Supplemental Attachment 1.
[179] Source: *Ibid.*

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PA adjustments to the Company's Reference Case Design Day forecast would be 1,028 MDth/day in 2050 as compared to the Company's forecast of 1,096 MDth/day (i.e., 6.2% lower). Correspondingly, for the CEV scenario, PA's proposed adjustments to the Company's Reference Case Design Day demand forecast of 435 MDth/day as compared to 464 MDth/day (i.e., 6% lower) for the Company's forecast by 2050.

PA has one additional observation pertaining to the volumetric and Design Day demand forecasts. On November 20, 2024, GlobalFoundaries and the US Department of Commerce announced an up to $1.5 billion award under the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act to allow GlobalFoundaries to expand their chip manufacturing and technology development in upstate New York.[180] This award follows the previously signed announcement in February 2024. In April 2024, Micron Technologies, one of the world's largest semiconductor companies, announced a $6.1 billion award, also under the CHIPS and Science Act, to support chip manufacturing in upstate New York and Idaho.[181] It is unclear how these potential expansions are reflected in the Company's volumetric forecast. As such, PA recommends that National Grid provide specific impact, if any, on its UPC, sales, and Design Day demand forecasts in the NMPC territory in Annual Updates to its long-term plan filing as required by the Commission in the Planning Order.

7.4 Downstate[182]

The DSNY region includes KEDNY (Kings County, Richmond County, and part of Queens County) and KEDLI (Nassau County, Suffolk County, and part of Queens County). As shown in Table 7-5 below, the KEDNY markets covered approximately 1.28 million customers in 2023 with 94% in the Residential category (43.7% being RN and 50.4% being heating customers); 1.5% are in Multi-family buildings, 4.0% Commercial customers and the remaining shared among Other and Non-Firm DR (interruptible) loads. PA observes that while the customer mix has been relatively stable over the past few years, there has been a steady decline in the count of RN Residential customers. RN Residential customers have fallen from just under 590,000 in 2014 to just under 560,000 in 2023 – an average decline of 2,200 customers per year since 2018, which is a key dynamic.

[180] Source: GlobalFoundaries. (November 20, 2024). https://gf.com/gf-press-release/globalfoundries-and-u-s-department-of-commerce-announce-award-agreement-on-chips-act-funding-for-essential-chip-manufacturing/.
[181] Source: Micron. (April 25, 2024). https://investors.micron.com/news-releases/news-release-details/micron-biden-harris-administration-us-senate-majority-leader.
[182] In this Report, PA has reviewed the load forecast - customer and usage dynamics - for DSNY in the aggregate. This approach is primarily because the data provided by the Company for the impacts of electrification and fuel-conversions is at that level. However, we do discuss the macroeconomic landscape and housing statistics separately for the KEDLI and KEDNY territories to provide details key to the narrative.

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Table 7-5: KEDNY Historical Customer Base[183]

	Res. – Non-Htg	Res. – Htg	Commercial	Multi-family	Other	Non-firm DR	Total
2014	587,719	576,875	49,394	17,207	3230	188	1,234,613
2015	593,472	584,406	49,832	17,670	3076	350	1,248,806
2016	573,611	603,561	50,076	17,991	2975	348	1,248,562
2017	571,754	611,474	50,529	18,412	2677	354	1,255,200
2018	570,449	617,175	51,165	18,723	2520	356	1,260,388
2019	566,757	628,034	51,233	18,963	2367	356	1,267,710
2020	559,374	633,471	51,348	19,147	2282	360	1,265,982
2021	561,158	639,481	51,736	19,414	2189	439	1,274,417
2022	561,554	642,773	51,562	19,643	2036	428	1,277,996
2023	559,508	651,563	51,893	19,912	1918	422	1,285,216

The KEDLI region is also dominated by the Residential sector. PA observes 90% of the total customer base is Residential and Commercial accounts for just under 10% of the base in 2023. While the 2023 share of RN customers is relatively small at 12.1% (as compared to 44% for KEDNY), PA observes yet again the key dynamic of a decline in RN customers. As shown in Table 7-6 below, RN Residential customers fell from 111,000 in 2014 to just under 77,000 in 2023.

Table 7-6: KEDLI Historical Customer Base

	Res. – Non-Htg	Res. – Htg	Commercial	Multi-family	Other	Non-firm DR	Total
2014	111,312	401,986	56,830	1,635	204	11	571,978
2015	110,659	410,447	57,351	1,618	194	11	580,280
2016	100,981	426,667	58,217	1,641	182	11	587,699
2017	96,216	436,410	58,491	1,662	176	12	592,967
2018	93,519	445,554	59,072	1,688	178	11	600,022
2019	87,244	458,499	59,386	1,715	172	11	607,027
2020	86,407	465,478	59,930	1,739	174	14	613,742
2021	82,467	475,057	60,502	1,749	174	12	619,961
2022	80,114	482,469	60,060	1,753	172	13	624,581
2023	76,447	491,180	60,303	1,762	170	13	629,875

[183] Source: Company's response to PA-047, Attachment 1.xlsx.

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A comparative assessment reveals some notable observations that are key to understanding the different dynamics unfolding in the two territories.

- Both have experienced a population growth slowdown and are facing a shrinking demographic base (detailed discussion below) – suggesting that a large component of the changing structure of gas usage across the various segments involves existing customers. Furthermore, the way the landscape is evolving varies considerably.
- Overall, the residential customer-base (excluding multi-family customers) has grown a lot faster over the 2014-23 period in KEDLI as compared to KEDNY – annual average growth rates of 1.1% and 0.4%, respectively – despite the former seeing a greater decline in Population/Household growth.
- Furthermore, over the same period, the RN customer count fell a lot faster in KEDLI than in KEDNY – -4.1% vs. -0.5%. However, the heating segment grew considerably faster in KEDLI than in KEDNY – 2.3% vs. 1.4%. These trends suggest (1) an impressive conversion rate of RN customers (presumably from oil heating) in KEDLI and (2) a relatively greater propensity in KEDNY to electrify.

Macroeconomics

As previously discussed for NMPC, Covid also resulted in a series of shocks to the DSNY economy that has led to a profound transformation in consumer behavior and gas demand patterns for KEDLI and KEDNY. While some effects were relatively transient, the unprecedented nature of the pandemic has engendered apparent structural changes (e.g., work from home, commercial vacancies, population outflows from the state etc.). Uncertainty around the path of economic recovery necessarily introduced some volatility in economic forecasts as is reflected in the frequent revisions of near-term trajectories of some key economic variables. However, as forecasts stabilized, it became clear that longer term trends in some macroeconomic factors show declines which will continue to impact DSNY and forecasts for natural gas customer counts.

The specific variables critical to the forecast of gas demand are population, the number of households, regional GDP, and employment. As Table 7-7 and Table 7-8 show, the regional economy at large, as characterized by the real GMP, did recover from the Covid-related disruptions and the projection is for sustained and steady growth in both KEDLI and KEDNY territories, albeit at a level lower than pre-Covid for KEDNY. With respect to Employment both KEDNY and KEDLI saw a rebound and projections are for a temporary stabilization at levels higher than pre-Covid levels for KEDLI over the next few years. However, by the end of the current decade the expectation is that the influence of regional demographic dynamics will lead to a slow contraction in the labor force and, hence, Employment. This trend is evidenced by the negative annual average growth rates for KEDLI and KEDNY post 2030.

As shown in Table 7-7 and Table 7-8 below, the latest (July 2024) forecast from Moody's Analytics supports the Population decline trends in KEDLI and KEDNY exhibited by the data used in the Company's forecasts albeit with some moderation - presumably reflecting a less pessimistic post-Covid projection in the short term but suggesting a sharper drop in growth rates in the latter part of the forecast horizon. A key observation is that Population decline is a long-term phenomenon that accelerates over time. Beyond the post-Covid adjustment, the progression of Household forecasts also points to an acceleration in the decline in new Household formation implying a faster shrinkage in the Company's potential customer base. Particularly striking is the forecast for KEDLI, with Population growth already firmly negative and projected to continue declining leading to a sustained shrinkage in Households by the end of this decade – thus implying a gradual (organic) contraction in the customer base.

In PA's view, Households are the most suitable macroeconomic variable to estimate long-term trends in Residential meter counts, considering this variable reflects the phenomenon of one or more individuals deciding to establish a distinct new domicile. PA finds a high positive correlation between Households and Residential Customer Counts revealed in the analysis of historical data not only for the DNY territory but throughout New York. While Household growth depends closely on Population growth, the last decade or so has revealed demographic changes whereby a falling Household size (Persons per Household) has weakened that relationship. Historically, Housing Stock has a strong positive correlation with Households – for the obvious logical reason that new construction is intended to house newly formed households (actual and anticipated).

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We consider Housing Stock as a less suitable explanatory variable for forecasting long-term Customer Counts for two reasons. First, while both Population and Households in the region are projected to begin declining imminently by Moody's, the Housing Stock forecast shows an unexpectedly rising trend – as shown in Table 7-7 below. Secondly, considering the state and local laws and regulations, even if there is an increase in Housing Stock, PA believes the likelihood new construction translates into new gas customers is minimal.

Table 7-7: KEDLI Macroeconomic Landscape: Average Annual Growth Rates

	Households	Population	Employment	Real GMP	Housing Stock - SF	Housing Stock - MF	Housing Starts
2010-2015	0.34%	0.15%	1.29%	1.65%	0.09%	0.14%	7.46%
2015-2020	0.03%	0.37%	-1.51%	0.10%	0.12%	0.13%	-3.41%
2020-2025	0.27%	-0.22%	2.43%	1.77%	0.13%	0.18%	13.44%
2025-2030	-0.07%	-0.26%	-0.05%	2.01%	0.25%	0.22%	-1.26%
2030-2035	-0.04%	-0.29%	-0.11%	1.71%	0.20%	0.20%	-4.62%
2035-2040	-0.22%	-0.33%	-0.21%	1.50%	0.14%	0.18%	-3.48%
2040-2045	-0.31%	-0.40%	-0.28%	1.33%	0.10%	0.15%	-3.06%
2045-2050	-0.33%	-0.45%	-0.39%	1.30%	0.08%	0.14%	-2.40%

Table 7-8: KEDNY Macroeconomic Landscape: Average Annual Growth Rates

	Households	Population	Employment	Real GMP	Housing Stock - SF	Housing Stock - MF	Housing Starts
2010-2015	1.57%	1.26%	3.59%	4.14%	0.04%	0.28%	63.65%
2015-2020	0.04%	0.27%	1.83%	2.26%	0.07%	0.65%	-21.84%
2020-2025	-0.25%	-0.68%	3.19%	2.41%	-0.03%	0.59%	8.95%
2025-2030	0.11%	0.01%	-0.11%	1.53%	-0.02%	0.71%	-2.10%
2030-2035	0.08%	-0.10%	-0.14%	1.58%	-0.03%	0.59%	-2.13%
2035-2040	-0.17%	-0.21%	-0.28%	1.56%	-0.04%	0.52%	-1.82%
2040-2045	-0.36%	-0.32%	-0.38%	1.44%	-0.06%	0.41%	-1.80%
2045-2050	-0.38%	-0.40%	-0.51%	1.44%	-0.05%	0.37%	-1.55%

Heating Fuels

KEDLI

A review of ACS data for the KEDLI counties[184] shows that it has a dramatically different customer profile as compared to KEDNY, which is discussed in the next section. PA observes electricity as a primary heating fuel has had a relatively muted growth path in KEDLI – the share of homes growing from 5.7% in 2010 to just 7.3%

[184] The KEDLI territory is characterized as the combination of Nassau and Suffolk counties.

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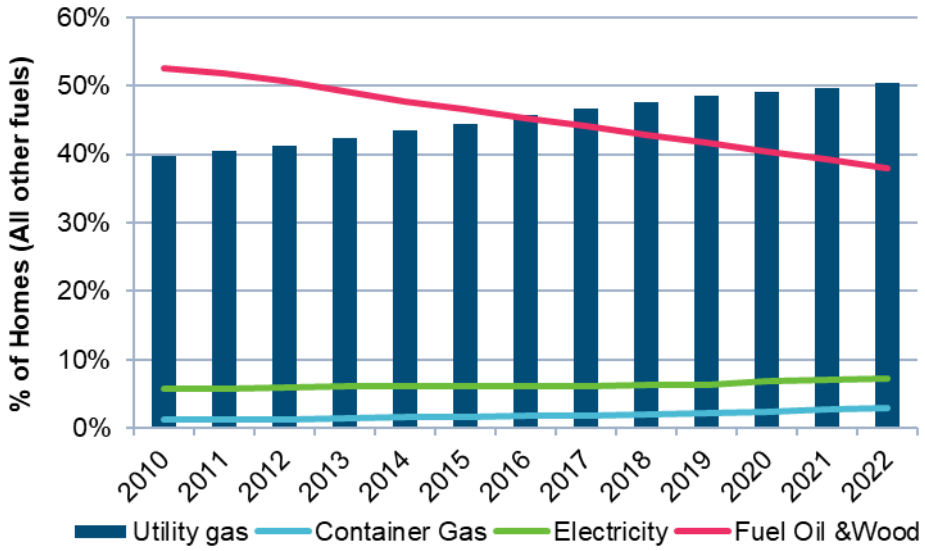
in 2022[185] as represented by the red line Figure 7-17 in[186] and Figure 7-18 below. Some salient observations are:

- Even though the share of gas has risen from 40% in 2010 to 50% in 2022, as shown in Figure 7-17, evidence shows that even with an average of over 9,000 homes being added over the past five years, the glidepath is showing signs of tapering recently.
- As a corollary, FO still occupies a considerable share – 38% in 2022, down from 53% in 2010 as evidenced by the pink line in Figure 7-17. As shown in Figure 7-18, there remain well over 350,000 households that continue to use this high-emitting heating fuel. While this reality demonstrates a challenge to the Company with respect to achieving decarbonization targets, it also presents a considerable potential for a sizable portion of the populace to switch to heat pumps. Even though around 8,000 homes switched out of FO during the last five years, that rate is slowing down.
- The share of electricity has risen from 5.7% in 2010 to 7.3% in 2022 – a relatively slow pace. This suggests that HP installations have yet to adopt an accelerating trend.
- Overall, strong evidence exists that fuel-switching out of oil has favored gas and that new construction also seems to tilt toward gas heating.

Figure 7-17: KEDLI Residential Space Heating Fuels % of Homes



[185] 2022 is the most recent year for which this ACS date is available.
[186] The corresponding change for KEDNY was from 4.8% to 9.9%.

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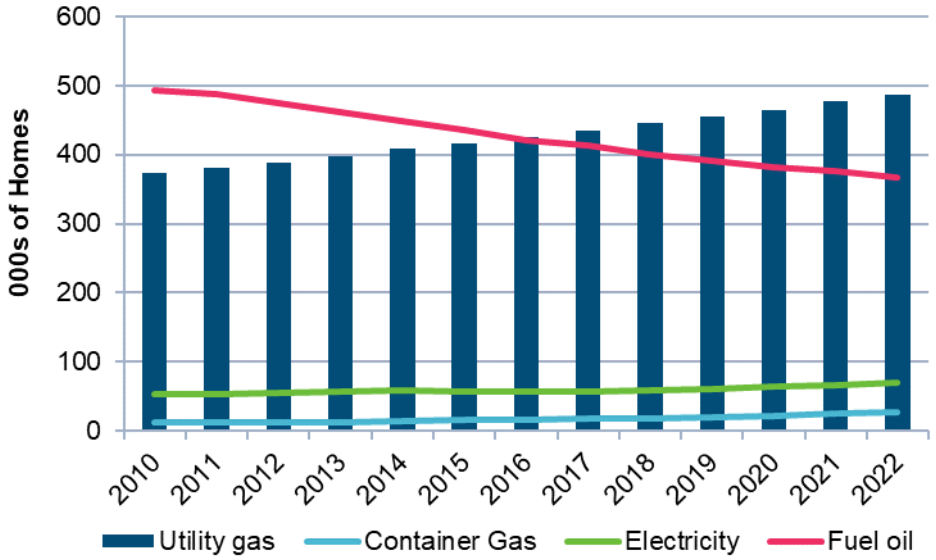
Figure 7-18: KEDLI Residential Space Heating Fuels Number of Homes (000s)



KEDNY

A review of ACS data for KEDNY[187] indicates that gas is the primary heating fuel accounting for 76% of the housing units. However, between 2017 and 2022, there were 83,000 new housing units added – with roughly 25% being single-family homes – but the number of homes using gas heating grew by only 32,000 (38.5%), thereby suggesting that most new construction are electrifying. However, we also observe that both the share and count of homes relying on FO have been falling steadily over the past decade[188] - an indication that gas customers might be capturing a part of the fuel-switching, but with an increasing portion going to electrification. The recent upturn in both the numbers and share of homes relying on electricity as shown by the green line in Figure 7-19 adds support to that trend.

Some key observations are as follows:

- While the share of gas-heated homes grew from 70% in 2010 to 76% in 2022, that trend has shown signs of reversal since 2019 – supporting the notion that greater numbers are opting for electrification.
- While the share of FO is down from 22% in 2010 to 8% in 2022 – with an average of around 2,500 switching annually, during the last five years - that trend has slowed down considerably, suggesting the influence of socio-economic or other factors.

The share of electricity as a heating fuel doubled from 5% to 10% between 2010 and 2022, with a sharp acceleration in adoption since 2019. With the impending impact of local laws limiting the use of fossil fuels in new construction starting 2026, we think that an assessment of the load forecast ought to pay special attention to electrification trends embodied in the KEDNY forecast. Based on the ACS data, the 2010-22 period saw an annual average of 16,000 customers adopt electricity as the primary heating fuel as shown in Figure 7-19 and Figure 7-20. While it is reasonable to expect a near-term spurt in new construction activity to ensure gas connection to the buildings, the slowing population growth (due to both organic factors – birth and death rates – and net-migration) will affect the speed of new construction in the coming years. Combining these factors will place even more focus on the role of heat pumps to help drive decarbonization (and natural gas customer counts and volumes).

[187] The KEDNY territory is characterized as the combination of Kings County (Brooklyn), Richmond County (Staten Island) and 60% of Queens County.

[188] While the next few years will provide a clearer sense, we think that the recent slowing of decline in both measures might be related to Covid-related disruptions and that the glidepaths will return to pre-Covid trajectories.

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Figure 7-19: KEDNY Residential Space Heating Fuels % of Homes

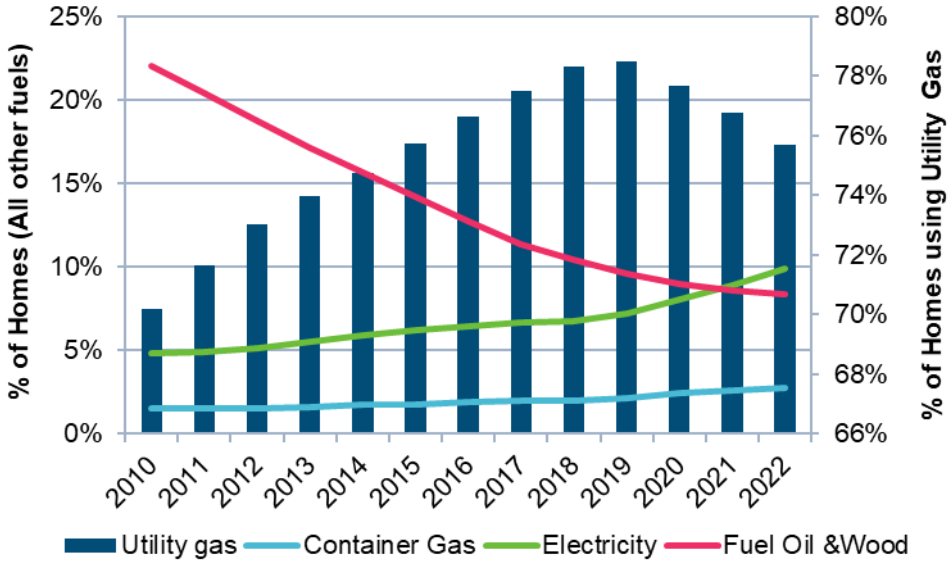
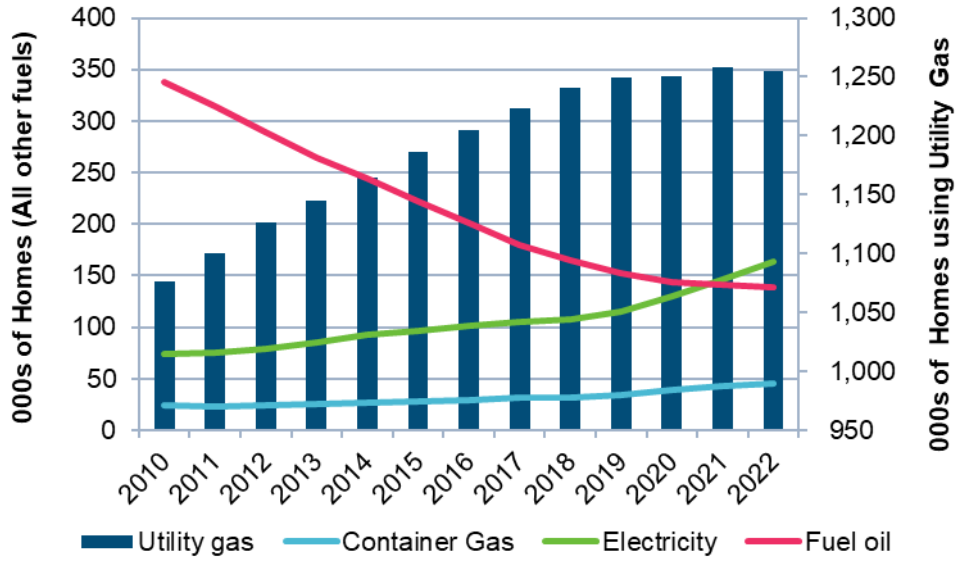


Figure 7-20: KEDNY Residential Space Heating Fuels Number of Homes (000s)



It is PA's understanding that the Reference Case, which also serves as a business-as-usual scenario, employs an approach based on econometric modeling that embodies historical trends and ongoing patterns in fuel conversions, current EE initiatives, etc. The CEV and AE scenarios then involve netting out various levels of the combined impact of policy-induced mandates, decarbonization measures, relatively aggressive EE gains, etc. This discussion, like the one for NMPC, focuses on the Reference Case because we consider that to be the foundation for developing the scenario forecasts.

7.4.1 DSNY Residential Customer Segment Forecast

Similar to our NMPC analysis, for our assessment of the FLT Plan, PA's load analysis focused on the customer and volumetric forecasts in the Company's Reference Case. We consider this a useful approach as it forms the foundation for not only the Design Day peak forecasts but also the corresponding scenario forecasts. As described in the FLT Plan, the Reference Case reflects the impacts of existing customer programs and "… clean energy investments that the Commission has approved as well as existing legislation."[189] Based on this description PA assumes that the forecast captures ongoing electrification and decarbonization patterns –

[189] Source: FLT Plan, p. 17.

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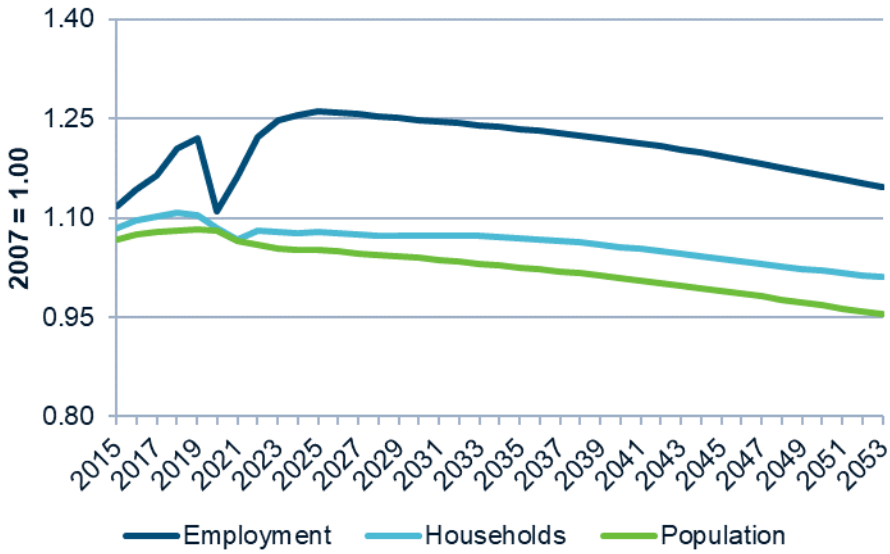
which has secular implications for both the gas usage and the customer-base, especially in the Residential sector.

It is useful to set the stage for this discussion by (1) highlighting what we consider the key underlying macroeconomic forces shaping the Residential (and Commercial) customer bases and (2) conducting an analysis of the Company's forecasts of heat-pump installations – that deduct from the customer count - and fuel conversions – that add to the customer count.

Macroeconomic Forces: Figure 7-21 shows the historical and forecasted data for Private Non-Farm Employment, Population and Households converted into indices – for graphic convenience – based on the respective 2007 levels as the base, i.e., showing the annual values as a ratio of the 2007 value.

Figure 7-21: DSNY Macroeconomic Indicators (2007 = 1.00)



The key observations are (a) Population is already in decline, (b) Households appear stable for the next few years before beginning a decline and (c) Employment while still climbing is expected to peak in 2026-27 and then also begin falling. These results suggest a negative tendency with respect to organic customer growth in both sectors. The implied decline in the typical household size (Persons per household) does impact the UPC but only slightly as it does not affect space heating load – which accounts for around 80% of gas usage.

Heat-pump Installations and Oil-to-Gas Fuel Conversions: In PA's analysis of the DSNY load forecast, the other key component is the assessment of data pertaining to HP installations in the two territories. While we did not have access to the sort of detailed monthly data provided under the auspices of the Clean Heat Program for either territory, we did obtain annual HP installation data from the program's annual reports.[190] As shown in Table 7-9, PSEG-Long Island (PSEG-LI) (applicable to KEDLI) provided data on Commercial installs but not on the number of meters decommissioned; correspondingly, Con Edison's data (applicable to KEDNY markets) does include information on decommissioned meters but not on Commercial installs.[191]

After discussions with subject-matter experts from the Company, PA understands the Company's FLT Plan's definition of a decommissioning reflects a drop in usage but not a customer fully disconnecting their gas service. In our assessment of the impact of residential electrification of space heating, PA had requested the Company provide information by end-use,[192] which they did not provide. Absent this data, we used corresponding data on the structure of Residential gas usage for other New York gas utility territories as a reasonable proxy. PA assumes a 'decommission' results in Residential usage decrease to 15% of the initial level. We arrived at this assumption based on our analysis of the end-use structure of gas usage in other New York gas utility territories. The 85% reduction in the UPC as a result of a Full-Heat Pump installation reflects

[190] https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7BC02EAA8E-0000-C931-8097-B36618C0FE15%7D
[191] PA acknowledges that by incorporating Con Edison's figures all subsequent projections and analysis may yield results biased toward the high side because the KEDNY territory covers only a portion of Con Edison footprint and we do not have an appropriate basis for apportioning the share attributable to Kings, Richmond, and a part of Queens County.
[192] Source: Company's response to PA-059.

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the assumption that the combination of water heating, cooking and other end-uses constitute 15% of a typical customer's natural gas usage. 15% may still be a bit high, especially for DNY as either the share of heating usage might be lower or not all customers that "decommission" gas service for space heating will also have gas water heating, clothes drying, and cooking.[193]

Table 7-9: Heat Pump Cumulative Installations – 2021-23

	KEDLI (based on PSEG-LI)			KEDNY (based on Con Edison)		
	Total HPs	Partial Heat %	Commercial %	Total HPs	Partial Heat %	Decommission after Install %
2021	8,757	71%	5%	9,661	33%	1%
2022	14,575	59%	14%	23,518	21%	26%
2023	22,536	48%	15%	28,933	17%	37%

Further, in the absence of detailed data such as initial fuel-usage, we assume that gas-customers will account for the dominant share of heat pump installations. Given the potential for non-gas customers installing heat-pumps lies mostly in the KEDLI territory and, given its minority share in the DNY region, PA observes the Company's assumptions are on the conservative side. For example, a recent presentation by PSEG-LI projected that its territory shall have 68,000 dwellings electrified by 2030.[194]

DSNY Residential Customer Counts: As shown in Figure 7-22 in the Company's Reference Case, the Residential customer-base continues to grow over the horizon with some tapering taking place toward the end of 2040s. Based on the macroeconomic landscape painted by Moody's Analytics' data and electrification trends discussed above, PA's analysis considers this a rather aggressive forecast. In order to develop our view, we began with an econometric projection based on Households – the chief driver of customer growth over history. While this projection reflects the view that future demographics and macroeconomic realities shall differ greatly from the past, it does not incorporate emerging phenomenon like accelerating electrification and fuel-switching which are discussed below.

[193] In our assessment of the impact of residential electrification of space heating, PA requested the Company provide information by end-use [PA-059], which they did not provide. Absent this data, we used the 15% figure based on data on the structure of Residential gas usage for other New York gas utility territories.
[194] 2024 Utility 2.0 Plan Update (dps.ny.gov): Matter 14-01299, PSEG Long Island Home Comfort + Efficiency Programs (www.psegliny.com).

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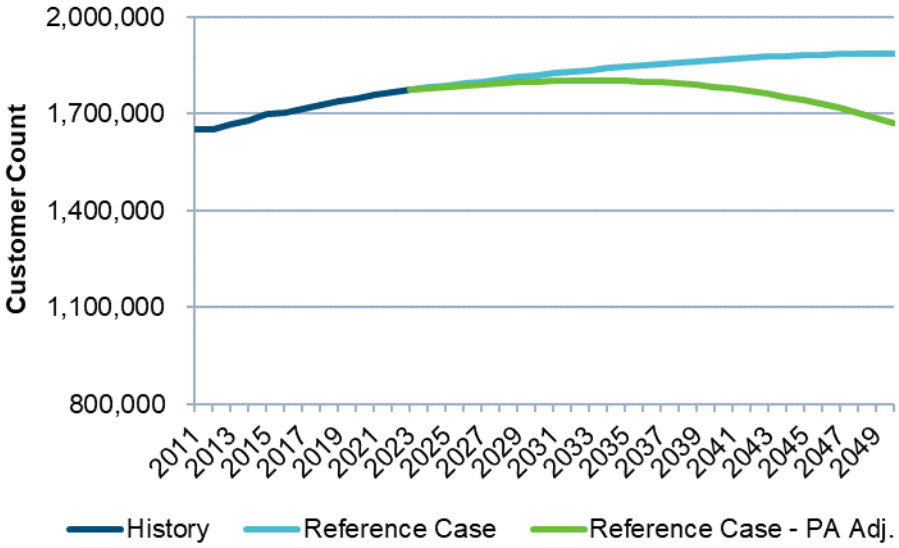
Figure 7-22: DSNY Residential Customer Forecast[195]



PA's analysis also incorporates our projections of:

- Overall HP installations,
- Share of Partial-heat units,
- Decommissioning rates and
- Fuel conversions from homes formerly on oil, wood, or coal.

Upon review, we determined that the Company's Reference Case forecast of oil-to-gas conversions was in line with our projection and, hence, we incorporated it in our analysis. While the impact of forecasted demographic trends clearly portends a shrinking RH, layering on PA's recommended impacts of the electrification and fuel-switching dynamics mentioned above yields the Reference Case – PA Adj. forecast as reflected by the green line in Figure 7-22 – which indicates continued but slowing growth through the end of the current decade followed by a steady erosion.

We recognize that certain assumptions regarding the speed of electrification and the evolving fuel-mix with respect to space-heating involved applying statistical inferences for the entire Con Edison territory to the KEDNY footprint (largely in Brooklyn and Queens) which might impact the downward effects of HP installations on customer counts. However, the salient point is that PA's analysis (and proposed adjustments for the Company to consider) shows that based on macroeconomic and electrification trends the residential customer count will likely end up noticeably lower than the Company's Reference Case forecast for DSNY.

DSNY Residential Use-per-Customer (UPC): Figure 7-23 shows the historical and the implied Company Reference Case UPC for the RH and RN categories combined.

[195] Source: Company's response to PA-087.

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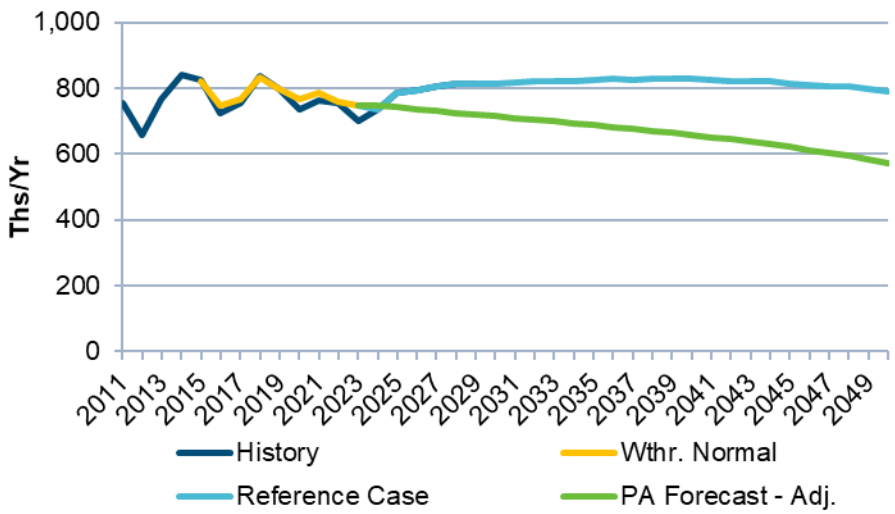
Figure 7-23: DSNY Residential (RH and RN Combined) UPC Forecast[196]



In order to guide our assessment, PA first weather normalized the monthly UPC data for the 2014-23 period as shown by the yellow line in Figure 7-23. PA began with a projection of weather normalized annual UPC and then layered on the implied per-customer volumetric impacts of:

- The reduced usage due to Partial Heat HPs,
- The reduced usage due to Full Heat HPs leading to decommissioned gas connections, and
- Higher usage due to homes switching out of FO, wood etc. and into natural gas.

The result is shown as Reference Case - PA Adj. in Figure 7-23 above. We believe our proposed adjustments provide a conservative projection that is not only consistent with the observed trends but also embodies the expected downward impact of the combination of ongoing efficiency-related patterns as well as the expected impacts of electrification and fuel conversions. Based on our analysis, PA finds the step change between recent history and the 2025 level in the Reference Case difficult to explain. We recommend the Company revisit the underlying assumptions as discussed in this section of the report in Annual Updates as required by the Commission, especially pertaining to recent historical trends, macroeconomic trends, and electrification of heating on the UPC forecast for the Reference Case.

DSNY Residential Volumetric Forecast: As Figure 7-24 shows, the step change in the Company's Reference Case UPC forecast leads to a corresponding step change in the volumetric forecast – which appears considerably removed from the recent trend. Combining PA's proposed adjustments to the Company's Reference Case forecast for customer counts and our proposed adjustments for weather normalized based UPC projection, we find that the resulting volume forecast noted as Reference Case – PA Adj. by the green line in Figure 7-24 is a reasonable modification to the Company's forecast. Whereas the volume tracks well with the recent trend in the weather-normalized levels for the next 4-6 years, the impact of demographics and HP installations is likely to begin exerting downward pressure leading to an accelerating decline post-2035.

[196] Source: Company's response to PA-087.

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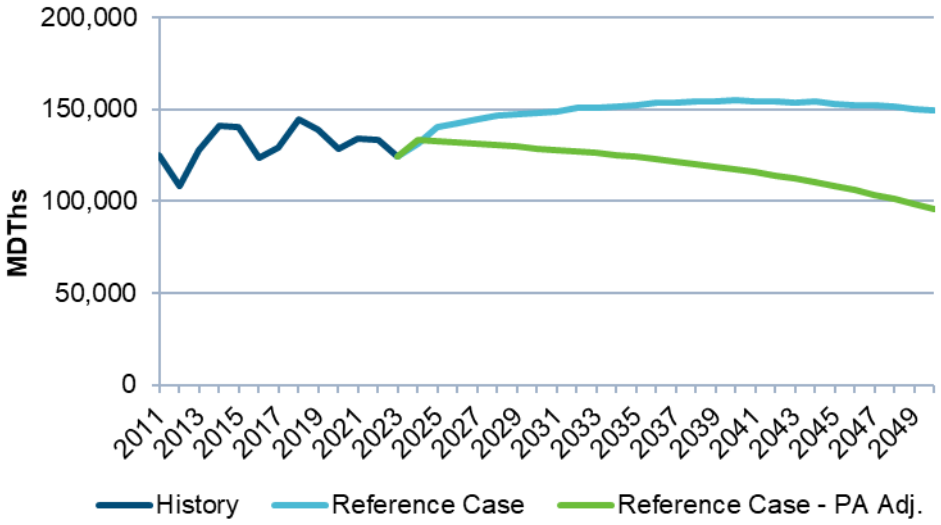
Figure 7-24: DSNY Residential Volumetric Forecast[197]

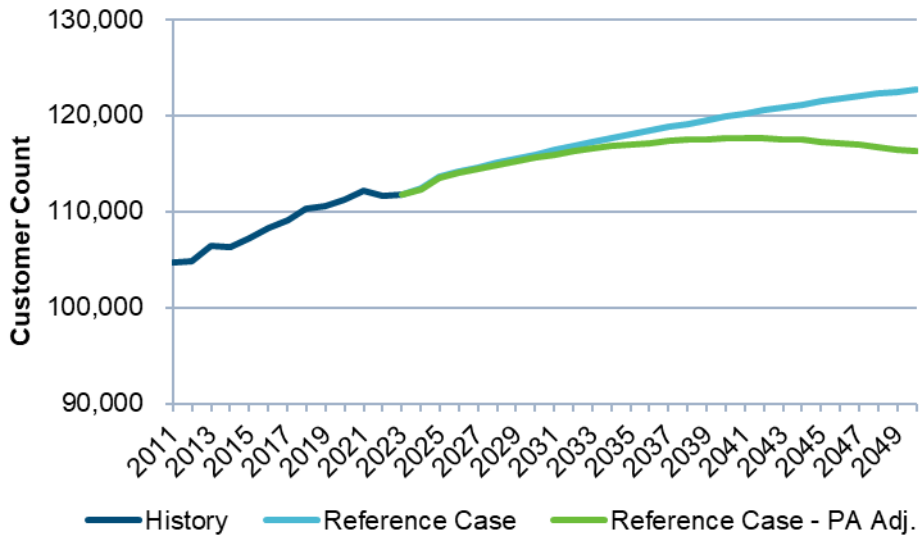


7.4.2 DSNY Commercial Customer Sector Forecast

DSNY Commercial Customer Counts: Historical patterns suggest that the Commercial customer-base moves in close tandem with the Residential customer base. Leveraging that close relationship, PA began with estimating a statistical relationship between the two and then used its econometric forecast of Residential Customers (as shown in Figure 7-24 above) as an input to derive adjustments to the Company's Reference Case Commercial Customer Count forecast.

Furthermore, since future electrification and fuel-switching effects are not reflected in historical data, PA developed its projections of HP installations and fuel conversions to further refine our proposed adjustments to the Company's Commercial Customer Count forecast. Consistent with the recent trend for the Residential segment, we project a slight rising trend through the late-2030s followed by a slight decline due to electrification and macroeconomic impacts as shown in Figure 7-25.

Figure 7-25: DSNY Commercial Customer Forecast[198]



Consistent with Moody's forecast of regional employment patterns, we think that while there already is a downward pressure on the growth of the commercial customer-base, we do think there will be some

[197] *Ibid*.
[198] *Ibid.*

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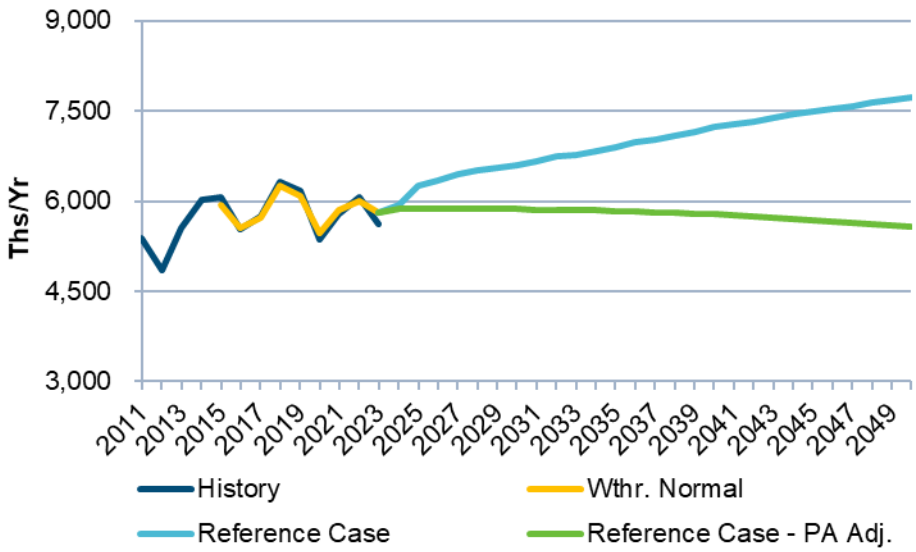
'stickiness' or inertia that keeps the numbers from falling. Even after showing some erosion in the 2040s, the count ends up roughly 4% higher than the 2023 level.

DSNY Commercial Use-per-Customer (UPC): PA's analysis also finds the Company's Commercial UPC forecast rather aggressive – especially due to the step-change in 2025 that leads to a discontinuity with respect to recent history. Beyond the step-change, we cannot discern the rationale for the rising UPC trend in the Reference Case given that the past decade has revealed a relatively flat trajectory. PA used projections of HP installations, decommissioned meters, and fuel-conversions for the Commercial sector from PA-190 to inform its proposed adjustments to the Company's Reference Case forecast. Starting with our projections of the weather-normalized UPC, we then layered on the volumetric impacts representing the PA proposed adjustments to the Company's Reference Case forecast to arrive at an adjusted view of the Company's forecast shown as Reference Case - PA Adj., the green line in Figure 7-26. Consistent with recent patterns, we see stability through the end of the current decade followed by a gentle decline that accelerates after 2040 due to growing impact of electrification.

Figure 7-26: DSNY Commercial UPC Forecast[199]



Similar to the Residential UPC forecast for DSNY, we recommend the Company revisit the underlying assumptions in Annual Updates as required by the Commission, especially pertaining to recent historical trends, macroeconomic trends and electrification of heating on the UPC forecast for the Reference Case.

DSNY Commercial Volumetric Forecast: Combining the Customer Count and UPC forecasts, Figure 7-27 shows the resulting volumetric forecast for the Commercial segment. The trajectory of the Company's Reference Case UPC forecast is also apparent in its volumetric forecast. Consistent with discussions above pertaining to the proposed PA adjustments to the Company's forecast for UPCs, we think that given recent trends and the evolving marketplace with respect to electrification and other factors the Companies' forecast is aggressive. Our proposed adjustments to the Company's forecast suggest volumes will remain relatively stable through the 2030s before falling through the remaining years of the forecast horizon.

[199] *Ibid*.

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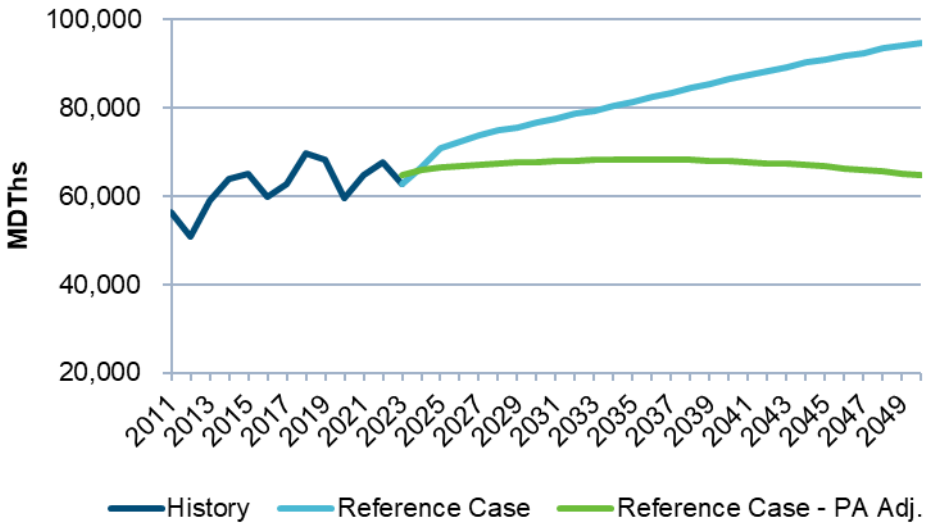
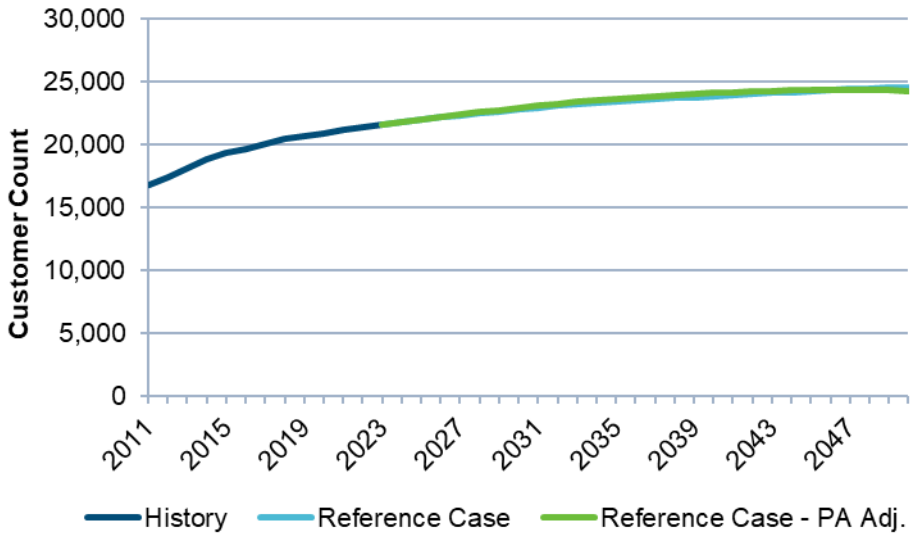
Figure 7-27: DSNY Commercial Volumetric Forecast[200]



7.4.3 DSNY Multifamily Sector Forecast

DSNY Multifamily Customer Counts: As shown in Figure 7-28 below, PA's proposed adjustments to the Company's Reference Case ostensibly matches the Reference Case through the end of the current decade but deviates lower becoming relatively flat through the end of the horizon. While we incorporated effects of attrition due to electrification, the absence of reliable and adequate data led to just a modest proposed adjustment with respect to the Companies' forecast.

Figure 7-28: DSNY Multifamily Customer Forecast



DSNY Multifamily Usage per Customer (UPC): As in other market segments, the Company's Multifamily UPC forecast underlying its Reference Case forecast (Figure 7-29) also exhibits a step change that puts the trajectory out of step with the recent trend. While the forecast maintains the stability demonstrated during the last few years through 2030, we find it highly unusual that it transitions to a rapidly rising pattern subsequently. Our analysis suggests a more immediate decline is likely.

[200] *Ibid*.

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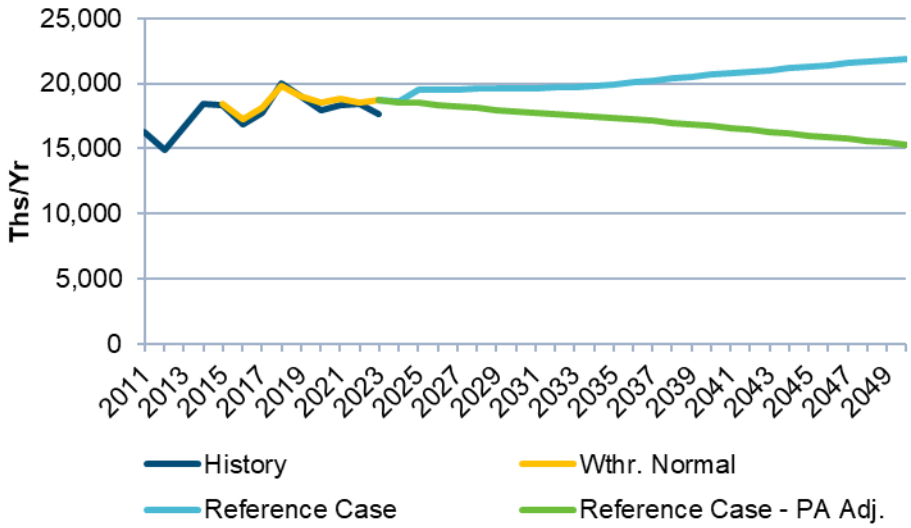
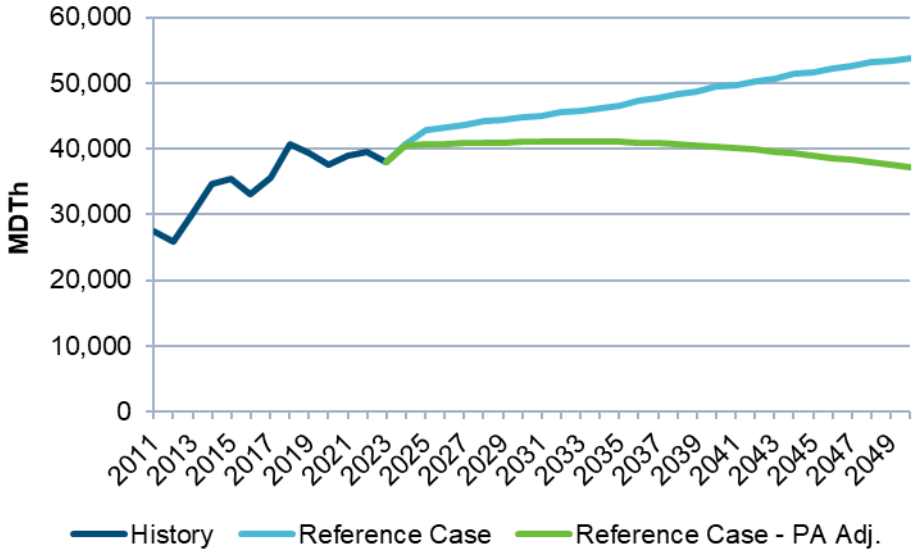
Figure 7-29: DSNY Multifamily UPC Forecast[201]



Similar to the Residential and Commercial UPC forecasts for DSNY, we recommend the Company revisit the underlying assumptions in Annual Updates as required by the Commission, especially pertaining to recent historical trends, macroeconomic trends and electrification of heating on the UPC forecast for the Reference Case.

DSNY Multifamily Volumetric Forecast: Combining the Customer Count and UPC forecasts, Figure 7-30 shows the resulting volumetric forecast for the Multifamily segment. The trajectory of the Company's Reference Case UPC forecast is also apparent in its volumetric forecast. Consistent with discussions above pertaining to the PA analysis and proposed adjustments for UPCs, we think that given recent trends and the evolving marketplace with respect to electrification etc., the Companies' forecast is aggressive. Our proposed adjustments to the Company's forecast suggest that volumes will remain relatively stable through the 2030s before falling through the remaining years of the forecast horizon.

Figure 7-30: DSNY Multifamily Volumetric Forecast



Since fuel-conversions are a relatively minor phenomenon in this customer segment, the bulk of the dynamics impacting PA's analysis and proposed adjustments to the Company's forecast come from the impacts of

[201] *Ibid*.

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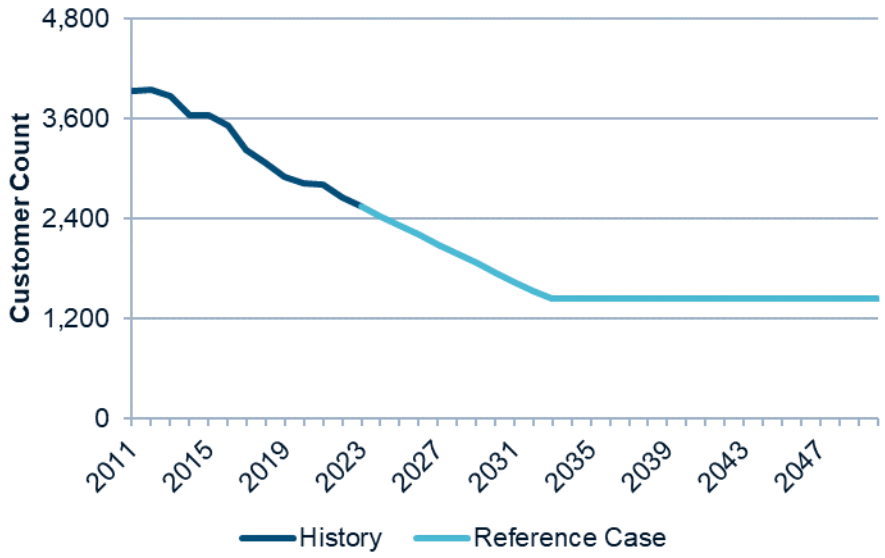
electrification. In PA's analysis, we see fuel conversions making impact only into the early 2030s, after which we see the expected decline in the sales volume.

7.4.4 DSNY Other Sector Forecast

We combined the Non-firm Demand Response (NFDR) and the Other customer category into a unified one for this analysis.

DSNY Other Customer Counts: Based on the information available pertaining to this customer segment, PA accepts the Company's forecast supporting the Reference Case for Customer Counts as shown in Figure 7-31.

Figure 7-31: DSNY Other Customer Forecast[202]



DSNY Other Customer Usage Per Customer (UPC): While we find the UPC trajectory dramatically removed from what historical patterns might suggest, it is plausible that the Companies have particular insights into the gas usage patterns of customers in this segment that are not discernable in ways that are more relevant to other market segments. PA, therefore, chose to accept the Reference Case forecast. However, in Figure 7-32 we have included a trend-based projection (Reference Case – PA Adj.) to provide some perspective as to where the magnitudes might be if historical patterns were to persist.

[202] *Ibid*.

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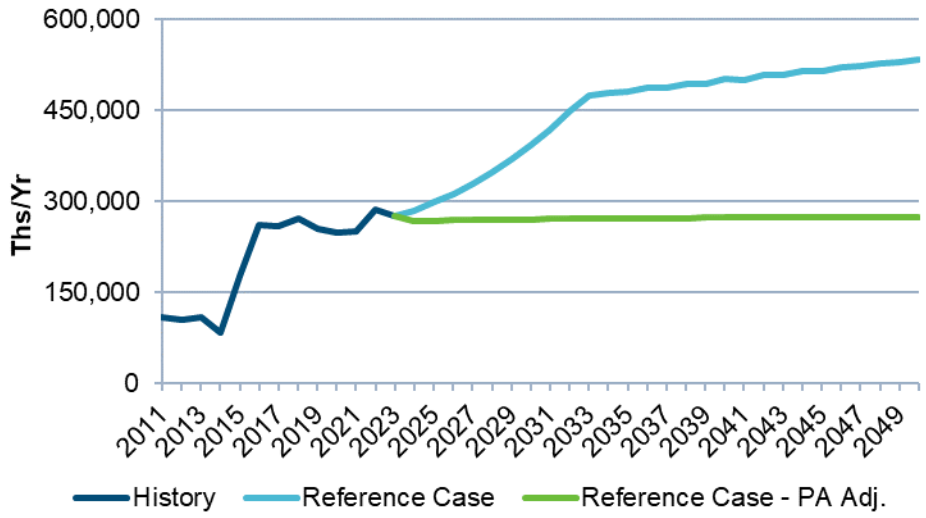
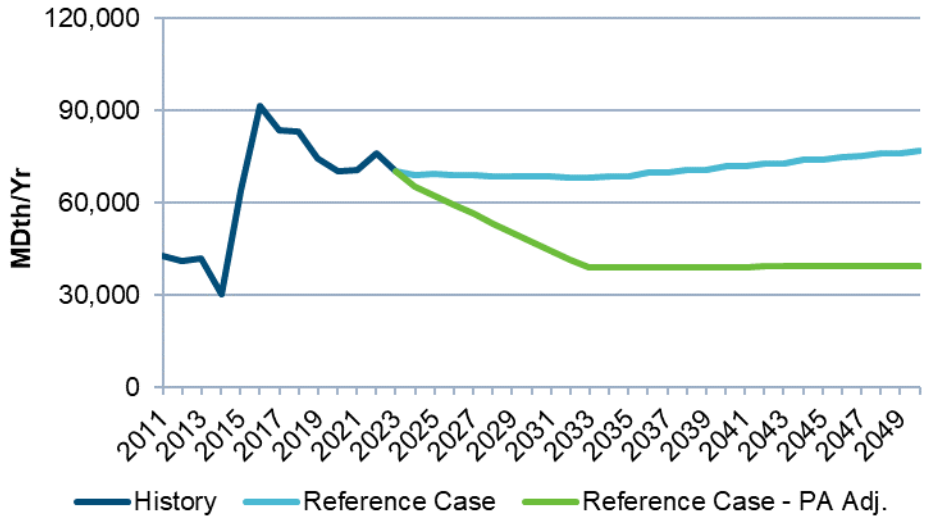
Figure 7-32: Other Customer UPC Forecast[203]



DSNY Other Customer Volumetric Forecast: Based on our analysis of the customer counts and UPC for the Other Customer segment note above, our initial conclusion is that the particular glidepath of volumes will remain stable for the next decade before shifting to a rising pattern, similar to the Company's forecast. However, a trend line (Reference Case – PA Adj.) noting the volumes implied by combination of recent Customer Counts and UPCs is also provided in Figure 7-33 to offer readers a perspective.

Figure 7-33: DSNY Other Volumetric Forecast[204]



7.4.5 DSNY Total Volumetric Forecast

Figure 7-34 displays PA's proposed adjustments to the Company's Reference Case total volumetric forecast, which is basically a sum of the volumetric forecasts for the major customer segments. As mentioned above, the effect of the step-changes in the Company's forecast for Residential, Commercial and Multifamily volumes underlying its Reference Case adds up to a higher glidepath than PA's analysis (and proposed adjustments to the Company's forecasts) suggests is likely.

[203] *Ibid*.
[204] *Ibid.*

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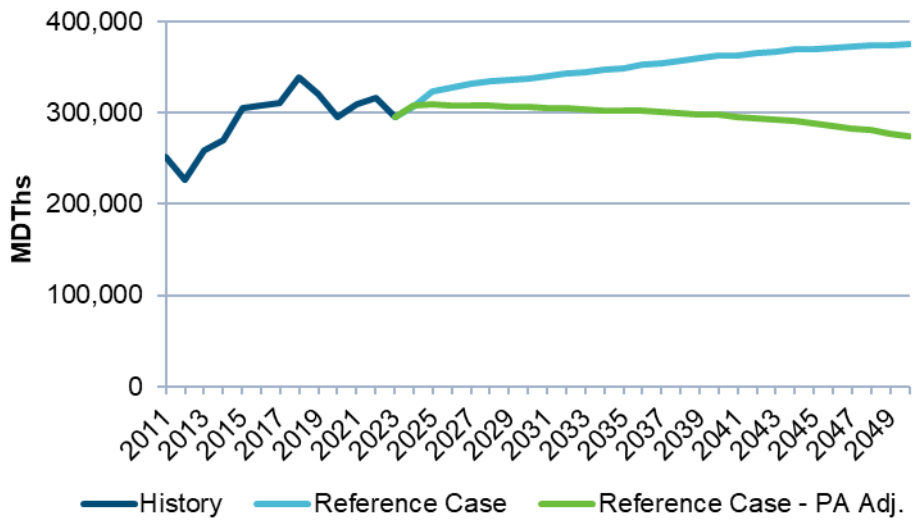
Figure 7-34: DSNY Total Volumetric Forecast[205]



We think the adjustments proposed by PA to the Company's DSNY Reference Case demand forecast reasonably illustrate that the impacts of electrification and projected macroeconomic forces will lead to a sales pattern that shows consistency with recent trends as well as reflects the expected shrinking market for natural gas in the region as opposed to the upwards step change forecast by the Company. As described above, we expect an accelerating decline in volumes in the latter part of the planning horizon.

We recommend that the Company consider revisiting their forecast analysis in Annual Updates as required by the Commission, based on a more thorough assessment of macroeconomic factors and electrification. It is our determination that the current demand forecast underlying the Company's Reference Case is on the high side and that a more reasonable view ought to see lower levels.

7.4.6 DSNY Design Day Peak Forecast

In order to develop PA's perspective on the DSNY Design Day demand forecast, we began our analysis with a review of the implied Design Day Load Factor.[206]

PA finds the near-term increase (or, step-change) in the forecasted trajectory is a by-product of the corresponding pattern in the sales volumes for several DSNY customer segments discussed above. We expect that as the impacts of electrification and customer attrition begin to take hold, the annual sales volume will fall, but that the dynamics for the peak might be relatively sluggish – implying a falling load factor. To evaluate the Reference Case Design Day demand, we applied a load factor to PA's proposed adjustments to the Company's Reference Case total volumetric forecast shown above in Figure 7-34. We find the resulting Reference Case – PA Adj., as shown in green within Figure 7-35, is more consistent with both the recent trend as well as a reasonable reflection of expected load dynamics than that of the Company's (light blue).

[205] *Ibid*.
[206] Calculated as the ratio of the average daily usage to the reported Design Day peak.

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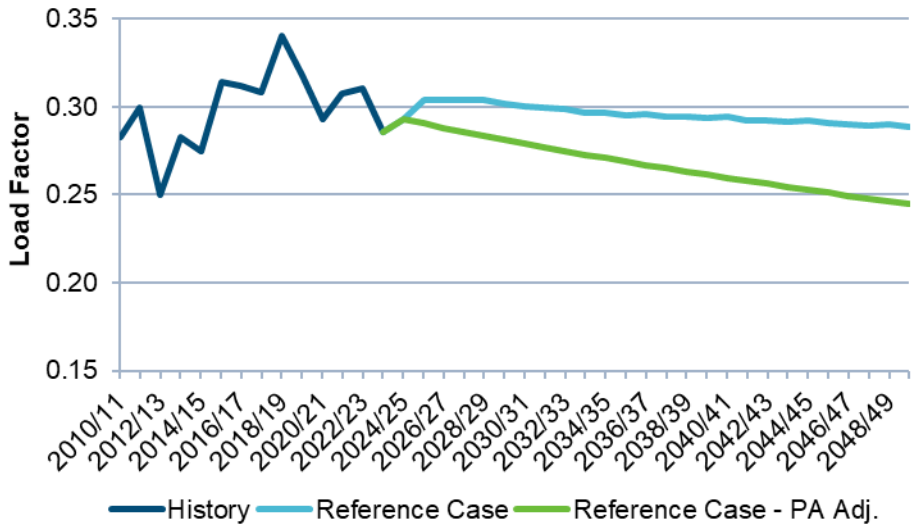
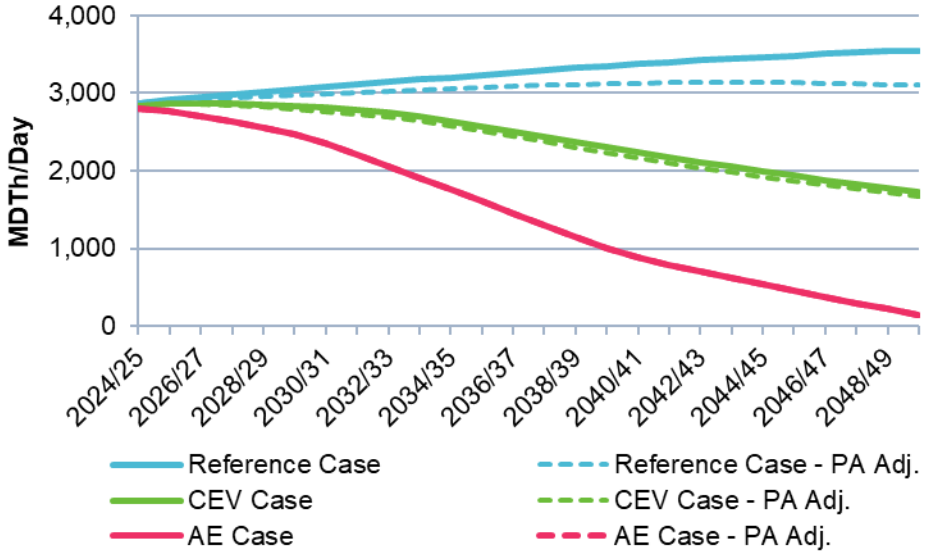
Figure 7-35: DSNY Implied Design Day Load Factor[207]



Further, we scaled the Company's CEV Case to reflect the impact of the proposed PA adjustments on the differential between the Company's Reference Case forecasts. PA accepted the Company's AE scenario forecast. Figure 7-36 shows the Company's Design Day demand forecast (solid lines) and that forecast with the impact of PA's recommended adjustments (dashed lines) versions.

Figure 7-36: DSNY Design Day Demand Forecasts[208]



Based on our analysis, PA's proposed adjustments to the Reference Case Design Day forecast results in 3,101 MDth/day in 2050 as compared to the Company's forecast of 3,551 MDth/day (i.e., 14% lower). Correspondingly, for the CEV scenario, PA's proposed adjustments result in Design Day demand of 1,673 MDth/day in 2050 as compared to 1,733 MDth/day (i.e., 4% lower) in the Company's forecast. We adopted the AE scenario forecast as provided by the Companies.

PA notes that the effects of electrification and a changing macroeconomic landscape are powerful forces in this region and that available evidence from the electric utilities do indeed point to patterns that deviate from those presented by the Company. While our analysis reflects different assumptions regarding the speed and

[207] Source: Company's response to PA-0191, Supplemental Attachment 1.
[208] *Ibid.*

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extent of electrification that differ from those embodied in the Company's Reference Case, we believe PA's adjustments are reasonable.

7.5 Recommendations to Improve Future GSLTPs

Recommendations for National Grid to improve the customer and load forecast components of the future GSLTPs are summarized below.

1. Provide evidence and studies on the implications of the economics of heat pumps on customer counts and use-per-customer (UPC) and how it may change over time.
2. Provide a detailed description of the nature of customers included in the "Other" category for NMPC, KEDLI and KEDNY as well more insights into new or additional load they have factored into their forecast.
3. Review PA's observations pertaining to the (1) macroeconomic, (2) fuel conversions and (3) electrification assumptions and consider revisiting the demand forecast in Annual Updates to the long-term plan.
4. Reconcile the heat pump forecast(s) for the projections published by the regional electric utilities in Annual Updates to the long-term plan.
5. Provide specific impact, if any, of non-residential customer on its UPC, sales, and Design Day demand forecasts in the NMPC territory in Annual Updates.
6. Provide updated hydraulic models that reflect any such incremental demand related to new non-residential customers in Annual Updates.

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8 Economic Assessment

PA has continued reviewing the economic aspects of the FLT Plan based on the information presented by the Company, responses from the Company to several data requests, technical conferences, and SME discussions. In this section, PA provides updated observations regarding bill impacts, Disadvantaged Communities, cost-benefit analyses, and NPAs, along with recommendations to improve these aspects in future GSLTPs.

8.1 Bill Impacts Overview

The bill impact analysis is intended to provide clear quantitative and qualitative explanations for the proposed capital projects, overall expenses, and net present value of total costs included in the long-term plan for each scenario and how these costs will impact customer bills. In the FLT Plan, the Company outlines their bill impact methodology for select service classes across the NMPC, KEDLI and KEDNY service territories. We understand the Company's approach entails forecasted revenue requirements, meter counts, and total volumes of gas delivered for each scenario to each customer class. The Company notes that the results presented in the FLT Plan are illustrative and the analyses performed do not "paint a complete picture of the impacts of these scenarios, and important factors remain outside the scope of this work."[209]

PA agrees with the Company that significant uncertainties exist including, but not limited to, energy policy in New York and across the US; technology improvements and therefore cost implications, customer sentiment about decarbonization, and additional information and analyses can certainly help improve the optimal selection of a scenario. However, one of the primary objectives of this long-term planning effort and Stakeholder engagement process is to inform the Company's long-term investment decisions that will be made in the short-, mid-, and long-term. The uncertainties will always exist, and the Company should do its utmost best to make no-regret decisions and increase the value of investments made in long-lived infrastructure assets to maximize the value for its customers and Stakeholders and minimize risks and unintended consequences. Therefore, PA encourages the Company and Stakeholders to use the illustrative and directional analysis conducted by the Company to help inform investment decisions that will be made in the near term.

Below we summarize the key assumptions we believe are critical and may result in an over or under-estimation of bill impacts throughout the forecast period in which the Company should consider revisiting these assumptions and further test the sensitivity of these assumptions in future iterations of the GSLTP.

- PA anticipates that energy policies across New York and technological improvements will lessen the demand for natural gas in the future. All else equal, lower gas volumes delivered to customers over the forecast period will result in an upward pressure on bill impacts for customers who are remaining on the gas network.
- PA observes any forecast of costs associated with the development of LCFs is highly speculative given the evolving nature of these markets. With respect to the FLT Plan, we find the costs are likely under-estimated, given the nascent commercial scale, limited supply, and high demand from hard to electrify sectors for these fuels. Even in an optimistic scenario where cost of LCFs declines significantly over the forecast period, RNG and hydrogen are forecasted to remain a premium product and will be 3-6 times more expensive[210] than natural gas as presented by the Company in the FLT. LCFs fuel blending will drive the supply costs upward, resulting in higher gas bills for customers. In addition, in absence of a holistic targeted plan for decommissioning certain sections of the gas network, the Company will need to make significant investments to repair, replace, and maintain the gas network, all of which will ultimately need to be paid for by customers and drive up the cost of gas delivery rates.
- We expect the combination of lower volumes and high gas costs (both supply and delivery) will increase rates and gas bills precipitously to a point that service becomes unviable. The Company's FLT Plan suggests that under the AE scenario, by 2050 a typical customer could experience a 3,340% bill increase compared to 2024.[211] Such a dramatic bill increase is not sustainable nor acceptable and

[209] Source: FLT Plan, p. 155.
[210] NYSERDA, 2022, p. 44.
[211] Source: FLT Plan, Table 8-2.

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the Company and Stakeholders should identify measures to proactively manage rate increases and avoid such possibilities.

- Further, the increase in gas bills will further improve the favorability of heat pump economics and result in higher electrification of various end use cases. When paired with policy and electrification incentives, PA observes that heat pump adoption and economic favorability could be under-valued by the Company in the FTL Plan.

During a SME discussion, the Company explained to PA that based on their modeling efforts, under some scenarios, there is a potential risk of cross subsidization among customer classes. As such, under some scenarios, no customers are forecasted to be left in certain customer classes to pay the revenue requirement of that rate class. This is an important and sensitive topic that should be discussed and evaluated as cross-subsidization of costs across customer classes has direct economic and fairness implications. This subject should be covered in depth in future GSLTPs, and effective measures should be identified and implemented to avoid this unintended consequence to the extent possible. PA considers additional analysis and discussions on how best to potentially eliminate or minimize this cross subsidization risk a key area of further assessment going forward. PA has identified a few key measures that have the potential to minimize the affordability challenges. These mechanisms include 1) targeted and strategic deployment of electrification and LCFs, 2) avoidance of unnecessary investments that will likely be underutilized, and 3) properly accounting for the potential reduction in gas demand. These strategies are discussed in further detail in Section 8.1.3.

8.1.1 Methodology

In the FLT Plan, the Company outlines their bill impact methodology for representative customers within each customer class across the NMPC, KEDLI and KEDNY service territories. The Company utilizes forecasted revenue requirements (RR) and meter counts for each scenario, which include forecasted annual values for rate bases, taxes, post-tax return on rate base, depreciation, operations, maintenance (O&M), DSM program costs, and purchased fuel (accounting for fuel costs and fixed costs).[212] The Company does not include increases in electric bills in the bill impact analysis.

The Company retained the same methodology for the bill impact analysis between the RLT and the FLT Plans. In the FLT Plan, the Company outlines specific capital expenditure forecasts for each scenario and incorporated indicative cost categories and expenditures as part of the bill impact analysis.[213] These capital expenditures are discussed in further detail in Section 6 of this report.

Integral to the bill impact analysis are the Company's assumptions around demand for gas throughout the forecast period. For the purposes of this analysis, PA provides a qualitative view of bill impacts based on information provided in the FLT Plan. PA is not attempting to reforecast bills for any customer class. Based on our review of the Company's bill impact analysis, we understand a qualitative view of bill impacts can be depicted using the relationship between two primary drivers for customer bills. The total costs to operate the gas system and the total volumes of gas delivered to each customer class are key metrics in evaluating the bill impacts, as demonstrated in Figure 8-1.

Figure 8-1: Components of the Bill Impact Analysis

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

Gas Rate = (1. **Total cost of operating the Gas Network**) / (2. **Total Gas Volumes Delivered**)

Bill Impact = Gas Rates x a typical customer's **gas consumption**

In the FLT Plan, the Company notes that "Customer demand for gas is growing and is projected to continue to grow in the future despite ambitious existing energy efficiency and heat electrification programs."[214] PA

[212] Source: FLT Plan, p. 156.
[213] Source: FLT Plan, p. 156.
[214] Source: FLT Plan, p. 6.

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observes drivers that are expected to place downward pressure on customer counts. These drivers include macro-economic factors and impacts from electrification and EE, all discussed further in PA's overview and updated analysis of the Company's demand projections in Section 7. Increased system operating costs, combined with lower volumes of gas sold, will lead to higher natural gas rates (both delivery and commodity), and potentially increase the customer bills even higher than forecasted by the Company for most customers.

8.1.2 Bill Impact Results

Table 8-1 shows the average monthly bill increase for a residential gas customer through to 2050, relative to a 2024 baseline, for the three scenarios in the FLT Plan.

Table 8-1: Average Monthly Residential Bill – FLT Plan[215]

	Reference (% increase compared to 2024)	CEV (% increase compared to 2024)	AE (% increase compared to 2024)
2024	$136	$136	$136
2030	$204 (49%)	$252 (85%)	$279 (105%)
2040	$263 (93%)	$355 (160%)	$718 (427%)
2050	$302 (121%)	$442 (224%)	$4,691 (3,340%)

Results from the residential bill impact analysis have remained consistent between the RLT and the FLT Plan. Importantly, residential customer bills, both the delivery and the commodity portions, are forecasted to increase in all three scenarios throughout the forecast period.

Delivery & Commodity Costs

In addition to overall bill impacts, the Company included a breakdown of delivery only and commodity only bill impacts. Throughout the forecast period, both gas delivery and gas commodity costs are forecast to increase significantly. Gas delivery costs are forecasted to increase due to a smaller number of customers remaining on the gas system that will share the costs of operating and upgrading the gas delivery network (e.g., leak prone pipe replacements). Gas commodity costs are also forecasted to increase due to the blending of LCFs into the gas supply. The delivery costs from the FLT Plan are displayed in Table 8-2.

Table 8-2: Average Monthly Residential Bill (Delivery Only) – FLT Plan[216]

	Reference (% increase)	CEV (% increase)	AE (% increase)
2024	$103	$103	$103
2030	$162 (56%)	$205 (98%)	$235 (127%)
2040	$218 (110%)	$339 (194%)	$631 (510%)
2050	$257 (148%)	$368 (256%)	$4,460 (4,211%)

[215] Source: FLT Plan, Table 8-2.
[216] Source: FLT Plan, Table 8-3.

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Results from the residential delivery-focused bill impact analysis have remained consistent between the RLT and the FLT Plan. Delivery costs are forecast to increase across all three scenarios throughout the forecast period.

The commodity costs for the FLT Plan are displayed in Table 8-3. Overall, gas commodity costs are forecast to increase, driven by blending traditional natural gas with LCFs, such as RNG and hydrogen.

Table 8-3: Average Monthly Residential Bill (Commodity Only) – FLT Plan[217]

	Reference (% increase)	CEV (% increase)	AE (% increase)
2024	$33	$33	$33
2030	$42 (27%)	$47 (42%)	$44 (33%)
2040	$45 (36%)	$51 (54%)	$87 (164%)
2050	$45 (37%)	$74 (125%)	$231 (602%)

Results from the residential commodity-focused bill impact analysis have remained consistent between the RLT and the FLT Plan. Commodity costs are forecast to increase across all three scenarios throughout the forecast period.

Customer Count & Revenue Requirement

The two primary factors driving the bill impact results presented in the FLT Plan are customer counts and revenue requirements. In the FLT Plan, the Company states that the CEV scenario will be the most affordable for customers remaining on the gas network in 2050, given that there will be more customers sharing gas network costs, as compare to the other scenarios, in 2050.[218] As customer counts decline (Figure 8-2) and revenue requirements increase (Figure 8-3), the revenue requirement per customer increases, as shown in Figure 8-4.

[217] Source: FLT Plan, Table 8-4.
[218] Source: FLT Plan, p. 163.

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Figure 8-2: Residential Customer Count by Scenario (2024-50)[219]

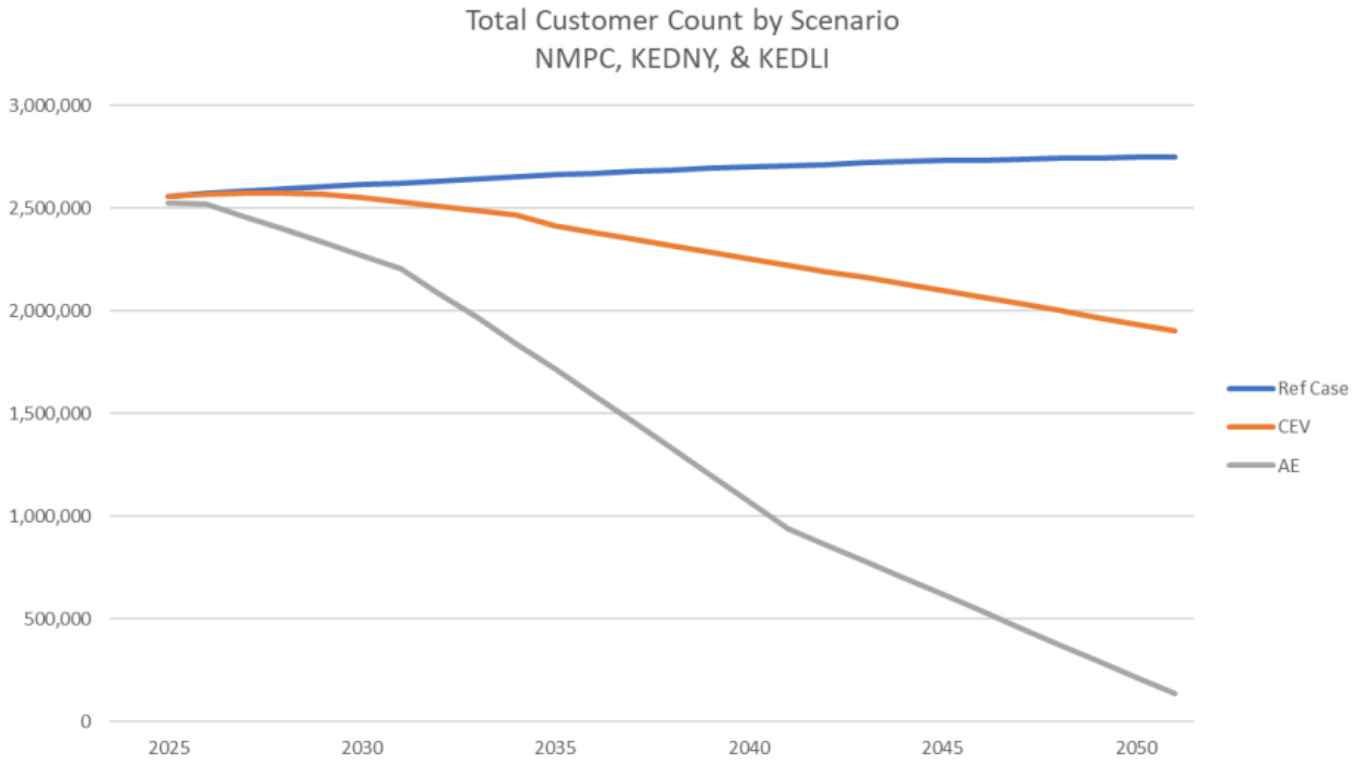
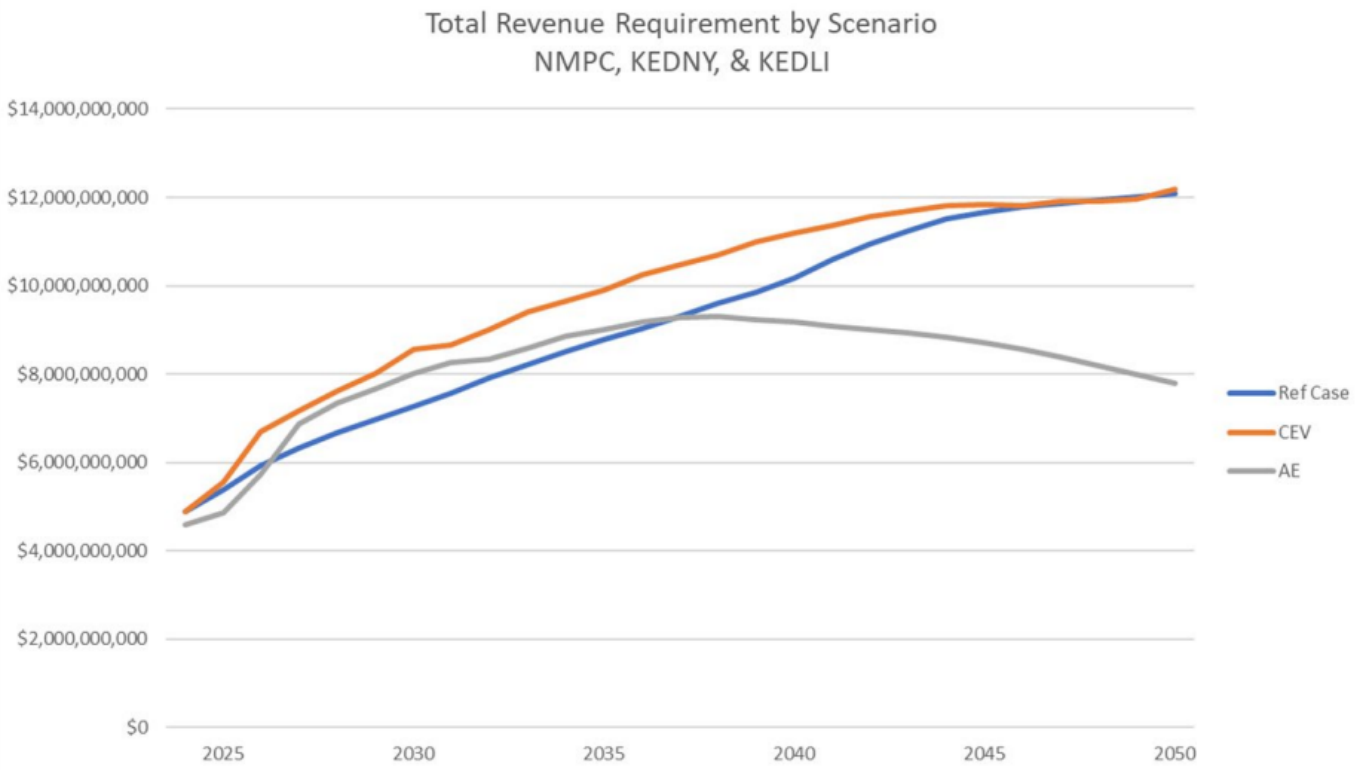


Figure 8-3: Total Revenue Requirement by Scenario[220]



[219] Source: FLT Plan, Figure 8-6.
[220] Source: FLT Plan, Figure 8-5.

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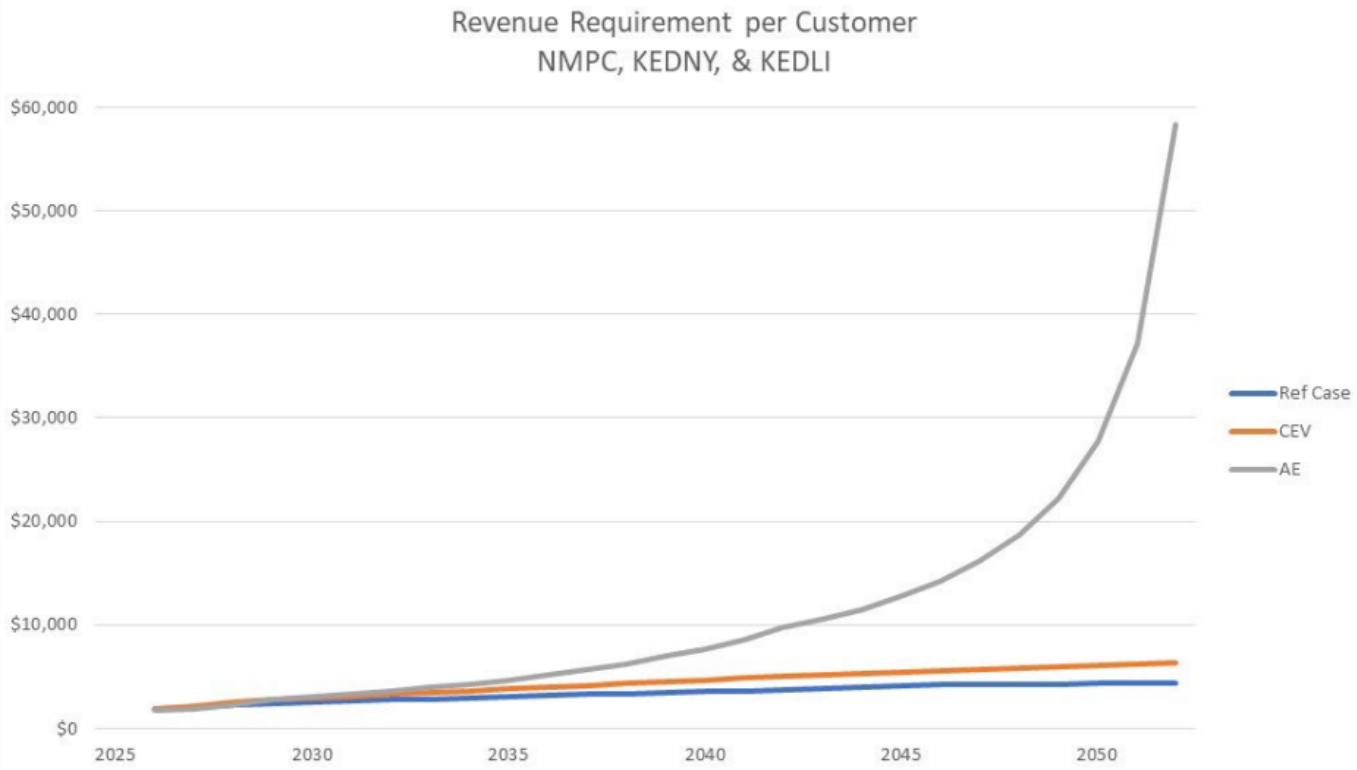
Figure 8-4: Revenue Requirement Per Customer (2024-50)[221]



The rapid bill increase in the AE scenario is primarily driven by the dramatic decline in total volumes of gas delivered to customers and decline in customer count, due to electrification and energy efficiency, paired with a relatively flat overall revenue requirement. In the CEV scenario, a 33% reduction in customer counts is forecast, as compared to the Reference Case by 2050, with those customers using 73% less gas than under the Reference Case in 2050. In the AE scenario, customer counts are roughly 95% less than under the Reference Case scenario.[222] The AE plan relies less on LCFs blending, as compared to the CEV scenario, by focusing more heavily on electrification. Therefore, while still impactful, the cost of LCFs blending in AE is less significant than CEV.

Although in the FLT Plan the Company anticipates customer counts will decline at a relatively constant rate overtime, in the revenue requirement per customer analysis, the incremental impact each departing customer will have on the cost for remaining customers in the latter half of the forecast period will have a larger effect on the annual change in gas bills for remaining customers. Therefore, the FLT Plan notes some changes to the revenue requirement and cost allocation among various rate classes may be needed to support equity and energy affordability.[223] Changes to cost allocation is an important topic that is beyond the scope of this report. PA encourages the Company and Stakeholders to continue discussing this important topic to explore the most optimal solutions for addressing the potential cost shift and reasonableness of changes proposed by the Company to the cost allocation formulas in other appropriate regulatory proceedings.

8.1.3 Strategies to Keep Bills Affordable Under Uncertain Futures

The Company has indicated that the FLT Plan is illustrative and directional and is therefore not intended to "paint a complete picture of the impacts of these scenarios, and important factors remain outside the scope of this work."[224] PA appreciates the challenges of a single point forecast when many variables are at play and observe the following key economic implications influencing the bill impacts of the FLT Plan:

- The Reference Case does not meet the emissions reduction targets and requirements outlined in the CLCPA, local laws, and New York decarbonization mandates and therefore is not a reasonable

[221] Source: FLT Plan, Figure 87-4.
[222] Source: FLT Plan, p. 163.
[223] Source: FLT Plan, p. 172.
[224] Source: FLT Plan, p. 155.

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scenario to be discussed in this LTP proceeding. This scenario does not add much value other than providing a benchmark for what the emissions could look like under the business-as-usual trajectory. Alternatively, the CEV heavily relies on LCFs, whereas the AE predominantly relies on electrification.

- Industry-wide questions remain relative to how best to overcome the barriers that LCFs are facing for playing a meaningful role in decarbonizing gas LDC operations, considering the expensive, limited supply, and significant investments are required to ensure pipeline integrity and safety for blending these fuels.
- Additionally, electrification, energy efficiency, and DSM measures result in a reduction of volumes of gas delivered and customer count and also puts upward pressure on gas rates. However, if done properly (i.e. targeted and coordinated electrification), this pathway has the potential to reduce emissions while maintaining affordability. PA encourages the Company and Stakeholders to explore strategies to identify barriers to deploy a coordinated electrification and other solutions that can maximize the value of electrification across the service territories.

As noted earlier, PA observes several key assumptions that could contribute to an under-estimation of bill impacts throughout the forecast period. If proper measures are not taken, bills will increase precipitously for customers who remain on the gas system under both CEV and AE scenarios. PA believes there are mechanisms that can be utilized to lower the bill impact on all customers, including those who choose to remain on the gas system. These mechanisms include 1) targeted and strategic deployment of electrification and LCFs, 2) avoidance of unnecessary investments that may be underutilized in the future, and 3) properly accounting for the potential reduction in gas demand.

Targeted and Strategic Deployment of Electrification and LCFs

The CEV and AE scenarios are highly effective at reducing GHG emissions, as discussed in further detail in Section 9.1 of this report. However, both scenarios result in significantly higher bills for customers who remain on the gas network. This is primarily driven by the fact that volumes will significantly decline under these scenarios, and one of the most effective ways to keep rates affordable is to reduce the total system costs in line with reductions in gas volumes.

Strategic electrification and targeted deployment of LCFs present two opportunities for reducing costs while supporting the broader objective of decarbonizing the gas operation. PA observes CEV and AE are the only scenarios with meaningful reductions in GHG emissions. As a result, total volumes of gas delivered to customers in the denominator of gas rate formula will be significantly lower. The FLT Plan describes a decrease in gas volumes in DSNY of -3.31%/year for the CEV and -12.3%/year for the AE scenario from 2023-50.[225] For NMPC, the Company describes a decrease in gas volumes of -2.4%/year for the CEV scenario and -9.18%/year for the AE scenario.[226] However, the cost of operating the gas network is not declining at the same pace, it is even increasing in certain time horizons. All else equal, this will translate to an increase in gas rates and gas bills. One of the most effective solutions for managing bills is to systematically scrutinize each and every investment decision above a certain threshold to ensure that such investments are truly “no regret” and have value to the customer base under all possible future scenarios.

The Company has outlined an intention to optimize and target electrification efforts through the build out of their NPA plan, explored in Section 8.4 of this report. By focusing NPAs on areas of LPP in need of replacement, the Company can strategically test if electrification is achievable and reduce or eliminate the need for capital investments to replace the LPP. By optimizing the replacement of LPP, and electrifying where possible, the Company could develop a view on the most crucial segments of pipe that must be replaced from a safety and resiliency perspective, identify segments of LPP that could be potential candidates for electrification, and ultimately limit their capital budget for LPP replacement. The Company has not had much success in meaningfully scaling NPAs to date. In their BCA, the Company identifies a very similar overall cost to replace LPPs across all three scenarios ($482-$517-million-dollar total), even despite the assumption that electrification will be rolled out in an accelerated manner in the AE scenario.[227] This cost estimate suggests that the Company is not really envisioning any possibility in scaling NPAs to the point where a substantial portion of the LPP gas network will not be replaced. LPP replacement programs account for $15.3 billion (32%

[225] Source: FLT Plan, p. 48.
[226] Source: FLT Plan, p. 50.
[227] Source: Company’s response to PA-0168.

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of total projected CapEx) and $19.6 billion (28% of total projected CapEx) under the AE and CEV scenarios, respectively.[228]

PA encourages the Company and Stakeholders to continue exploring solutions to rapidly scale deployment of NPAs to minimize the overall system cost with the ultimate goal of keeping rates and bills manageable for all customers in future GSLTPs and other regulatory proceedings.

Like targeted electrification, in future GSLTPs, PA encourages the Company to develop a robust view on targeted deployment of LCFs to reserve the use of such fuels for hard-to-electrify customers. Some end-use applications of natural gas are more suited for electrification than using LCFs. PA encourages the Company to develop a view on these use cases and present them in future GSLTPs. The expensive premium that RNG and hydrogen have compared to traditional natural gas (3-6 times as projected by the Company even with the Company's optimistic cost projections), and other limitations dictated by the technical considerations (e.g., limits on maximum safe level of hydrogen blending) makes the use of LCFs in residential applications difficult, unlikely, and speculative. On the other hand, there are other applications of gas that are much harder to electrify, and based on industry best practices, remain a good candidate to be decarbonized with the use of LCFs. Such targeted use cases of LCFs will be highly localized and eliminate the need for repairing, replacing, and maintaining hundreds if not thousands of miles of gas pipeline in the Company's service territory over the forecast period.

The rising commodity costs of gas as a result of LCFs blending, as discussed in Section 8.1.2, can provide further incentive for electrification of space and water heating over time and result in higher upward pressure on gas rates. PA would like to reiterate the ask for the Company to conduct a comparative high-level analysis of home heating annual cost using various solutions and present it in future GSLTPs. Such analysis should depict the annual operation cost for a typical residential customer heating their home with 1) conventional natural gas, 2) fuel oil, 3) electric resistance, 4) heat pump, and 5) gas blended with LCFs. Such analysis will help the Stakeholders better understand the cost premium of RNG and hydrogen fuel blending compared to other fuels and help the Company rule out certain use cases of LCFs that will likely be economically unfeasible. In its reply comments, the Company indicates that developing a fully formed view of the economics of heat pumps is beyond the scope of The Order. PA maintains the view that economics of space heating for residential customers with LCFs fuel blending at projected price points poses significant affordability challenges and welcomes any insights or analyses that Stakeholders can provide on this topic to help inform the competitiveness of the economics of space heating using gas blended with LCFs.

By re-organizing and prioritizing efforts around electrification and the deployment of LCFs, the Company can focus on investments that will have significant importance under most if not all future scenarios. By doing this, the Company can re-write the narrative of decarbonizing the gas system to reflect the very likely future where lower gas volumes are delivered to customers while affordability of rates are maintained.

Avoidance of Unnecessary Investments That May Be Underutilized

The FLT Plan includes an overall finding that "new approaches to manage bill impacts for remaining gas customers will be essential for any successful gas decarbonization transition pathway."[229] To reduce these future bill impacts, the Company and Stakeholders should diligently focus on identifying investments that may run the risk of being underutilized over the next several decades and eliminating any unnecessary investments throughout the forecast period. The Company should consider revising its CapEx forecasts that coincide with revised demand forecasts, as the latter may impact investments in a number of broad categories (e.g., customer growth, meters, and system reinforcements).

As mentioned above, the Company indicated during a SME discussion that based on their modeling efforts, under some scenarios, there is a potential risk of cross-subsidization among customer classes. As such, under decarbonization scenarios, no customers are left in certain customer classes to pay the revenue requirement of that rate class.

PA would recommend the Company outline initiatives that would minimize this cross-subsidization impact by identifying these stranded or under-utilized investments in a timely manner and developing alternatives to minimize them. This additional analysis will provide Stakeholders a more complete view of the severity of this

[228] Source: Company response to PA-027, Supplemental Attachment 2.
[229] Source: FLT Plan, p. 158.

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cross-subsidization risk for each scenario and potential impact on bills. In response to one of PA's DRs, the company explained that one such mechanism could be an evolving revenue requirement allocation to alleviate the cost burden on one customer class. PA observed the Company maintains a constant revenue requirement allocation among customer classes throughout the forecast period.[230]

The Company's recommendation is one solution among many that can minimize the negative impact. However, it does not directly address the root cause of this cross-subsidization issue. PA encourages the Company and Stakeholders to continue discussing this issue and finding the most effective ways to minimize this cross-subsidization issue.

Properly Account for Potential Reduction in Gas Demand

The Company continues to apply optimistic assumptions for customer and volumes growth, despite limitations on gas hook-ups and decarbonization policies in NY. Three specific policies in New York will affect customer ability to use natural gas in the coming decade. In the FLT Plan, the Company has considered the impact of:

- Local Law 154 (LL 154) – starting in 2024, LL 154 limits the installation of gas systems or equipment in New York City for newly constructed buildings less than seven stories tall, and in buildings taller than seven stories starting in 2027.[231]
- AEB – starting in 2026, limits the installation of gas systems or equipment in new construction up to seven stories tall statewide, and in all new buildings starting in 2029.[232]
- Local Law 97 (LL 97) – imposes greenhouse gas (GHG) emissions limits on large buildings in New York City and requires building owners to report their energy use and reduce emissions. If not compliant, building owners will face penalties for exceeding emission limits.[233]

The Company describes in the FLT Plan that these policies were considered when forecasting customer growth from new construction. The Company cites that exceptions will be made to these policies which is a main driver of the increase in their customer count growth throughout the forecast period. In response to a PA data request, the Company described their assumption that 50% of new construction starting in 2026 would be exempt from the gas restricting policies. The Company held the 50% exception rate throughout the forecast period.[234] A change to this assumption will result in lower retail gas demand over the forecast period. The role and impact of these polices and other factors discussed below are explored further in Section 7.1. In response to a PA recommendation, in the FLT Plan, the Company provides further detail to their considerations around LL 154, AEB, and LL 97. The Company stresses considerable uncertainty surround the impact of these policies and states that they believe the Reference Case scenario adequately captures the impacts of these policies based on information available. The Company explains the inclusion of data published by the NYC Department of Buildings to inform building-level forecasts and that the Company will continue to monitor and incorporate new data and information related to these policies as it updates forecasts annually.[235]

Additionally, based on PA's review of the FLT Plan, the Company is likely under-valuing the adoption of heat pumps and electrification in their service territory. Paired with policy and electrification incentives, PA observes that heat pump adoption and economic favorability could be under-valued by the Company in the FLT Plan. When coupled with legislation limiting certain fossil gas fueled equipment and building systems, as well as federal and state incentives for electrification, we would expect the Company to begin experiencing a decline in the number of new gas heating customers and volumes.

Lastly, the FLT Plan suggests that the Company is likely not accounting for a decrease in HDDs over the forecast period, resulting in overestimation of delivered gas volumes compared to what will likely be needed due to warmer winters over the forecast period. Adjusting the forecasted volumes of delivered gas for a reduction in HDDs over the forecast period, will result in higher upward pressure on gas rates beyond what the Company has forecasted across all three scenarios.

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[230] Source: Company's response to PA-0148 and PA-084.
[231] Building Electrification - Buildings.
[232] All Electric Buildings | New York State Assembly.
[233] LL97 Greenhouse Gas Emissions Reduction - Buildings.
[234] Source: Company's response to PA-0101 and PA-0153.
[235] Source: FLT Plan, p. 31.

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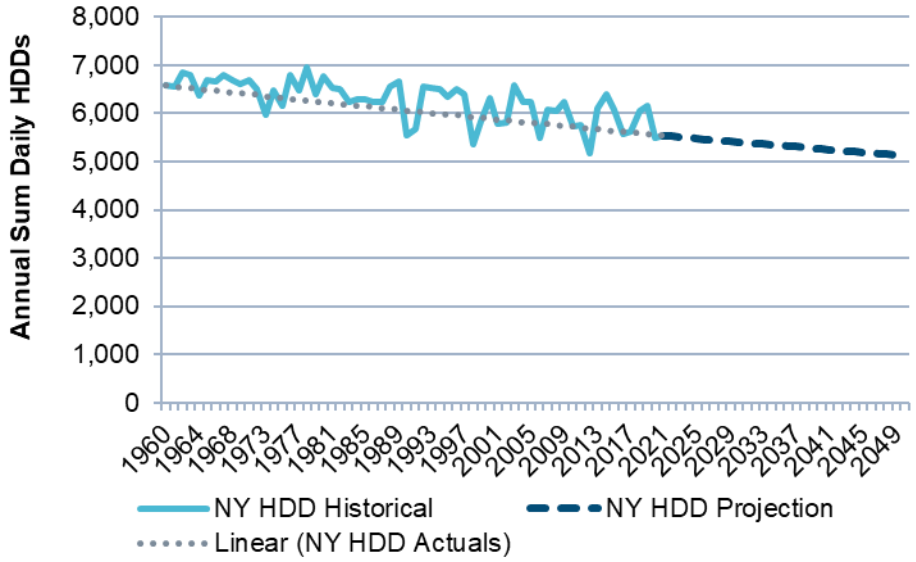
A warming trend across the US has been documented over the past decades and this trend is projected to continue in the future. To assess the trend of warming winters, PA examined the warming winter trend in New York state leveraging HDDs from 1960 through 2021, published by the EIA.[236] Between 1960 and 2021 annual HDDs in NY have declined from 6,573 to 5,537, a 15.8% reduction, as seen in Figure 8-5.

Figure 8-5: Historical and Projected Trend of New York HDDs (1960-2049)[237]



The continued decline in the annual sum of daily HDDs bolsters the assumption that gas volumes consumed for space heating in residential and non-residential applications will decrease through the projected period, putting an upward pressure on gas rates beyond what the Company has already forecasted. This trend will further improve the economic favorability of electric appliances over gas, potentially accelerating the pace of heat pump adoption and other electric appliances over the projected period, beyond what the Company has forecasted. Therefore, PA recommends the Company account for such reduction in annual sales Annual Updates as required by the Commission, which will result in additional upward pressure on gas bills.

8.2 Disadvantaged Communities

In the FLT Plan the Company has expressed a commitment to working transparently and collaboratively with Stakeholders and communities to support their efforts in maintaining equity and supporting environmental justice communities throughout the clean energy transition. Combined with internal initiatives, the Company states they are working to advance the goals of New York's CLCPA and deliver the benefits of clean energy to Disadvantaged Communities across their service territory. The Company describes their focus on working with and for customers in Disadvantaged Communities to improve infrastructure, and "expand[ed] outreach to provide accessible, authentic engagement and representation" through the clean energy transition, in addition to expanding participation in EE and affordability programs.[238]

PA encourages the Company to develop targeted analyses to inform the bill impact of the decarbonization scenarios for customers in Disadvantaged Communities and highlight for Stakeholders and the Commission how bill impacts may differ for Disadvantaged Communities compared to other customers, and what initiatives the Company is going to deploy to manage the bills for these vulnerable customers.

In addition, the Company should develop targeted programs to support and mitigate the bill impacts for this customer class. PA recommends retrieving aggregated customer information specific to Disadvantaged Communities to inform the bill impact of the decarbonization scenarios on customers in these communities. Information such as annual gas consumption, annual customer bills, and typical use cases for gas could help inform how Disadvantaged Communities will be impacted under the different decarbonization scenarios. In

[236] EIA SEDS released June 23, 2023.
[237] *Ibid.*
[238] Source: FLT Plan, p. 185.

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the FLT Plan, the Company states that this recommendation would require a new analysis and that this recommendation merits further discussion with DPS Staff and PA. The Company states its belief that this would best be considered in a future planning cycle.[239] PA encourages the Company to work with DPS Staff to develop this insight to benefit Disadvantaged Communities and low-income assistance funding.

The Company has indicated that they have obtained customer account information designated by census tract and are working toward operationalizing processes to enable more detailed analysis and updating of information on a regular cadence.[240] In response to a data request, PA learned that currently the Company does not maintain customer account information by census tract.[241] PA would encourage the Company to identify customer accounts within Disadvantaged Communities to allow for more granular data on customer bills and gas usage to help the Company identify the bill impacts specific to Disadvantaged Communities and potentially work to alleviate the impact of rising bills in low-income communities. In addition, having a specific baseline for bill impacts in Disadvantaged Communities will be beneficial for tracking the success of Disadvantaged Communities-targeted programs.

PA has discussed the importance of investigating the size of the annual energy assistance funding that would be required to support low and moderate income if the gas rates and bills increase as the Company has forecasted in the FLT. PA is concerned that the amount of low-income assistance programs will need to increase significantly to support LMI customers, and it is unclear how such programs will be funded over time and what happens if such funding is not secured to support LMI customers.

Lastly, PA would encourage the Company to estimate a forecast of customers in Disadvantaged Communities as part of future long-term gas planning efforts. Currently, the Company reports 20% of their residential customers to be in the low-income bracket and 13% in moderate-income bracket, meaning 20% of the Company's residential customers are eligible for the Low-Income Home Energy Assistance Program (LIHEAP).[242] PA expects that developing an understanding of what percent of future customers will be eligible for LIHEAP funding upon rising gas rates and what percent are located in Disadvantaged Communities will be critical in planning for equitable energy affordability throughout the forecast period.

8.3 Benefit-Cost Analysis

The FLT Plan includes a BCA for the three scenarios using methodology established in the BCA Framework Order.[243] The purpose of the BCA is to compare quantifiable benefits and costs accrued to society throughout the forecast period to 2050. A BCA is a useful tool to help the Company and Stakeholders make informed decisions on the basis of aggregate costs and benefits of various investment decisions.

The New York CLCPA has set statewide priority and impetus for action in decarbonizing various sectors across New York state, 85% by 2050 in line with science based global targets to minimize GHG emissions and reduce the adverse impacts of climate change.[244] Legislators, regulators, and Stakeholders across New York have agreed that action must be taken to limit the costs and disastrous impacts of climate change. It has become clear that the costs of doing nothing will greatly exceed the costs of actions needed to limit the negative impacts of a changing climate for New Yorkers. The BCA results presented by the Company are all below 1.0. While BCAs above 1.0 are preferred, this is not a requirement but rather a suggests that costs of taking action to reduce GHG emissions by the Company exceeds the benefits.

The CEV scenario results in the benefit-cost ratio of 0.60, the highest ratio, representing the most favorable result for the total service territory. However, it is important to note that all scenarios and all operating companies result in a benefit-cost ratio of less than 1.0, meaning the costs outweigh the monetized benefits for the three scenarios.[245] In addition, the CEV and the AE scenarios in aggregate for NMPC, KEDLI, and

[239] Source: FLT Plan, p. 31.
[240] Source: Company's response to PA-080.
[241] Source: Company's response to PA-080.
[242] Source: Company's response to PA-0165.
[243] New York State Public Service Commission, Order Establishing the Benefit-Cost Analysis Framework, January 21, 2016. ("BCA Framework Order").
[244] Scoping Plan - New York's Climate Leadership & Community Protection Act.
[245] Source: FLT Plan, Table 8-6.

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KEDNY result in almost an identical BCA ratios (0.60 and 0.59, ratios within 0.01 of one another), suggesting a lack of material differences between the two scenarios in relation to the BCA.

The BCA framework is a powerful tool that helps decision makers systematically understand the benefits and costs of a certain decision. A BCA ratio can be used as a measure to evaluate the cost-effectiveness of various solutions. The BCA framework has flexibility in its use and estimates for various costs and benefits. The framework relies on many input assumptions, some of which are not standardized nor could even be systematically quantified. For example, system boundaries for what is in scope and what is out of scope can be drawn arbitrarily, and key stakeholders who may be impacted by the decision on hand may not be properly identified, in some cases the benefits or costs occurred to these stakeholders may not be fully accounted for as they are not represented in these discussions. In addition, the timeframe through which the benefits and costs are assessed is not necessarily agreed upon by all stakeholders. Therefore, the outputs of the BCA are subject to potential multiple and broad interpretations.

PA believes work can be done by the Company, Stakeholders, and Regulators through a collaborative process in the proper regulatory working sessions to refine BCA inputs and how reasonable those inputs and estimates are. Such a process can result in a more impactful BCA calculation in line with the broader message of CLCPA. PA believes it is important for Stakeholders to understand that the Company's BCA results rely on many assumptions, most of which are highly uncertain, and input from stakeholders can further enhance the robustness of assumptions and results. In this report PA assesses the reasonableness of the assumptions made by the Company and makes recommendations to the Company and Stakeholders on key assumptions that should be reviewed and decided upon collectively.

The FLT Plan, like the ILT Plan and RLT Plan, utilized the Societal Cost Test (SCT) as the primary BCA tool. The Company identified the SCT as the most appropriate test for BCA of long-term gas planning because of the broad energy system, customer, and societal implications of decarbonizing the gas network.[246] Table 8-4 outlines the Company's benefit and cost definitions used for the SCT.

Table 8-4: Benefit-Cost Test Definitions in the SCT[247]

Benefit-Cost Category	Cost / Benefit	Description[248]
Avoided Gas Supply	Benefit	Estimated based on reduction in geologic natural gas consumption and change in geologic gas prices under each scenario.
Avoided Gas Infrastructure Revenue Requirement	Benefit	Based on assumed capital expenditures based on the latest filed Capital Expenditure Plans, annual O&M, and existing rate base for each operating company.
Avoided GHG Emissions from Gas Combustion[249]	Benefit	Include avoided carbon dioxide, methane, and nitrous oxide molecules. Inclusive of fuel mixing programs and reductions in end-use consumption through DSM programs.
Avoided Emissions from Methane Leakage	Benefit	LPP is replaced in KEDNY and KEDLI through the end of 2044 and in NMPC through 2033 in all scenarios. LPP is assumed to be replaced if no decommissioned. Emissions factors from "New York State Oil and Gas Sector: Methane Emissions Inventory" were applied.
Avoided Electricity Consumption	Benefit	These values are held at $0 for each scenario.[250]
Avoided Electric Capacity	Benefit	These values are held at $0 for each scenario.[251]

[246] Source: FLT Plan, p. 171.
[247] Source: FLT Plan, Table 8-5.
[248] Source: FLT Plan, p. 217-219.
[249] Avoided GHG Emissions from Gas Combustion are reported as lbs./MMBtu. The "avoided societal cost for each GHG [were] sourced from the NY DEC Establishing a Value of Carbon Appendix Section 12.6. A 3% discount rate method was used for each GHG and adjusted to 2025 dollars using the utility WACC." Source: Company response to PA-0219. FLT Plan, p. 217.
[250] Source: Company's response to PA-0168.
[251] *Ibid.*

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Added Hydrogen and RNG Fuel Supply	Cost	Additional commodity cost of hydrogen and RNG under each scenario through 2050, based on commodity costs used in CLCPA study.
Added Future of Heat Infrastructure Revenue Requirement	Cost	Incremental revenue requirement associated with increased investment in Future of Heat infrastructure, including networked geothermal, hydrogen, and RNG interconnection.
LPP Retirement Revenue Requirement	Cost	Incremental revenue requirement associated with LPP retirement.
Increased Electricity Consumption	Cost	Increased electric consumption through heat electrification measures adding end-use consumption. Location-based marginal prices developed for each operating company based on NYISO zone.
Increased Electric Capacity	Cost	Increased electric demand increases demand on existing electricity system. Avoided generation capacity cost, marginal cost of transmission, and marginal cost of distribution contribute to this cost.
Increased GHG Emissions from Electricity	Cost	Differing estimates of heat electrification through time. Emissions are quantified through the application of the marginal emissions rate forecast from NYSERDA.
Gas Utility Energy Efficiency Administrative Costs	Cost	Administrative costs incurred by operating companies from incremental energy efficiency pursued under each scenario. Based on actual administrative expenses per unit of savings.
Incremental Participant Cost	Cost	Cost of demand-side management technology to society, relative to typical technology readiness. Excludes impact of incentives.
Non-Gas Utility Electrification Administrative Costs	Cost	Administrative costs associated with implementation of energy efficiency and electrification not borne by operating company.

The results of the SCT BCA by LDC and scenario are consistent between the RLT Plan and the FLT Plan. The results for the FLT Plan are presented in Table 8-5.

Table 8-5: Benefit-Cost Test Ratios – FLT Plan[252]

Operating Company	Benefit-Cost Test	Reference	CEV	AE
NMPC	Societal Cost Test (SCT)	0.69	0.70	0.76
KEDNY	Societal Cost Test (SCT)	0.36	0.50	0.48
KEDLI	Societal Cost Test (SCT)	0.49	0.68	0.65
National Grid Territory Total	Societal Cost Test (SCT)	0.46	0.60	0.59

In response to a data request, the Company provided the Excel BCA model used for the RLT Plan.[253] The BCA model was not updated between the RLT Plan and the FLT Plan, therefore PA has reviewed the most up-to-date version.[254] This model helped PA develop a better understanding of the allocations of costs and benefits across the three scenarios. Benefits calculated in the BCA analysis include avoided emissions from methane leakage, avoided GHG emissions from gas combustion, avoided gas infrastructure revenue requirement, and avoided gas supply. In response to a data request, the Company provided details regarding the assumptions made in their BCA analysis. The Company provides clarity around the assumed carbon price used for the BCA calculations and the accounting of upstream emissions in accordance with the New York

[252] Source: FLT Plan, Table 8-6.
[253] Source: Company's response to PA-0168.
[254] Source: Company response to PA-0217.

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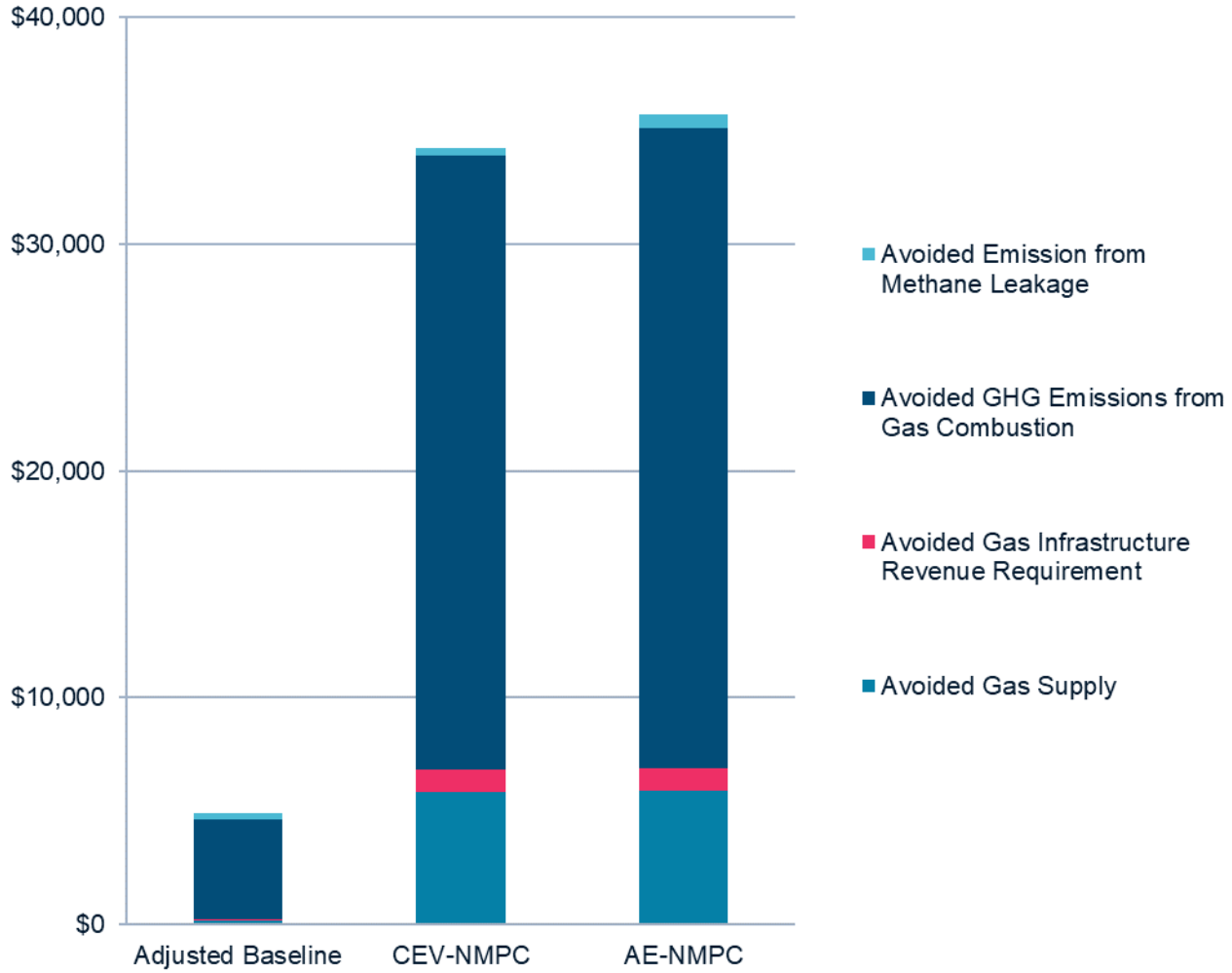
Department of Environmental Conservation in the BCA model. The Company confirms the use of the NY DEC for the societal cost of carbon based on a 3% discount rate.[255]

For NMPC, total benefits of the CEV scenario total to $34,219 million dollars. For the AE scenario in NMPC, total benefits equal $35,702 million dollars.[256] Figure 8-6 provides a breakdown of the primary benefit drivers informing the BCA in the FLT Plan.

Figure 8-6: Benefits by Scenario (in million dollars)- NMPC[257]



Costs included in the SCT BCA analysis include electric utility administrative costs, incremental participant costs, program administrative costs, increased GHG emissions from electricity, increased electric capacity and consumption, LPP retirement revenue requirement, added future of heat infrastructure revenue requirement, and added hydrogen and RNG supply. In addition to CO_2 accounting, the Company is accounting for other GHG emissions (e.g., CH_4 and N_2O emissions) in their BCA calculations. Upon electrification of homes, customers will be replacing natural gas with electricity for their needs. The Company is accounting for the upstream emissions that are released in the process of generating electricity (e.g., from natural gas or other fossil fuels). The power grid emissions are forecasted to decline overtime as the power grid in New York decarbonizes over time. It is unclear to PA if the Company is properly accounting for upstream emissions as a result of methane emissions or gas flaring in the natural gas extraction and transport processes before natural gas enters the Company's transportation and distribution network.

[255] Source: Company response to PA-0219. Avoided GHG Emissions from Gas Combustion are reported as lbs./MMBtu. The "avoided societal cost for each GHG [were] sourced from the NY DEC Establishing a Value of Carbon Appendix Section 12.6. A 3% discount rate method was used for each GHG and adjusted to 2025 dollars using the utility WACC." FLT Plan, p. 217.
[256] Source: Company's response to PA-0168.
[257] *Ibid.*

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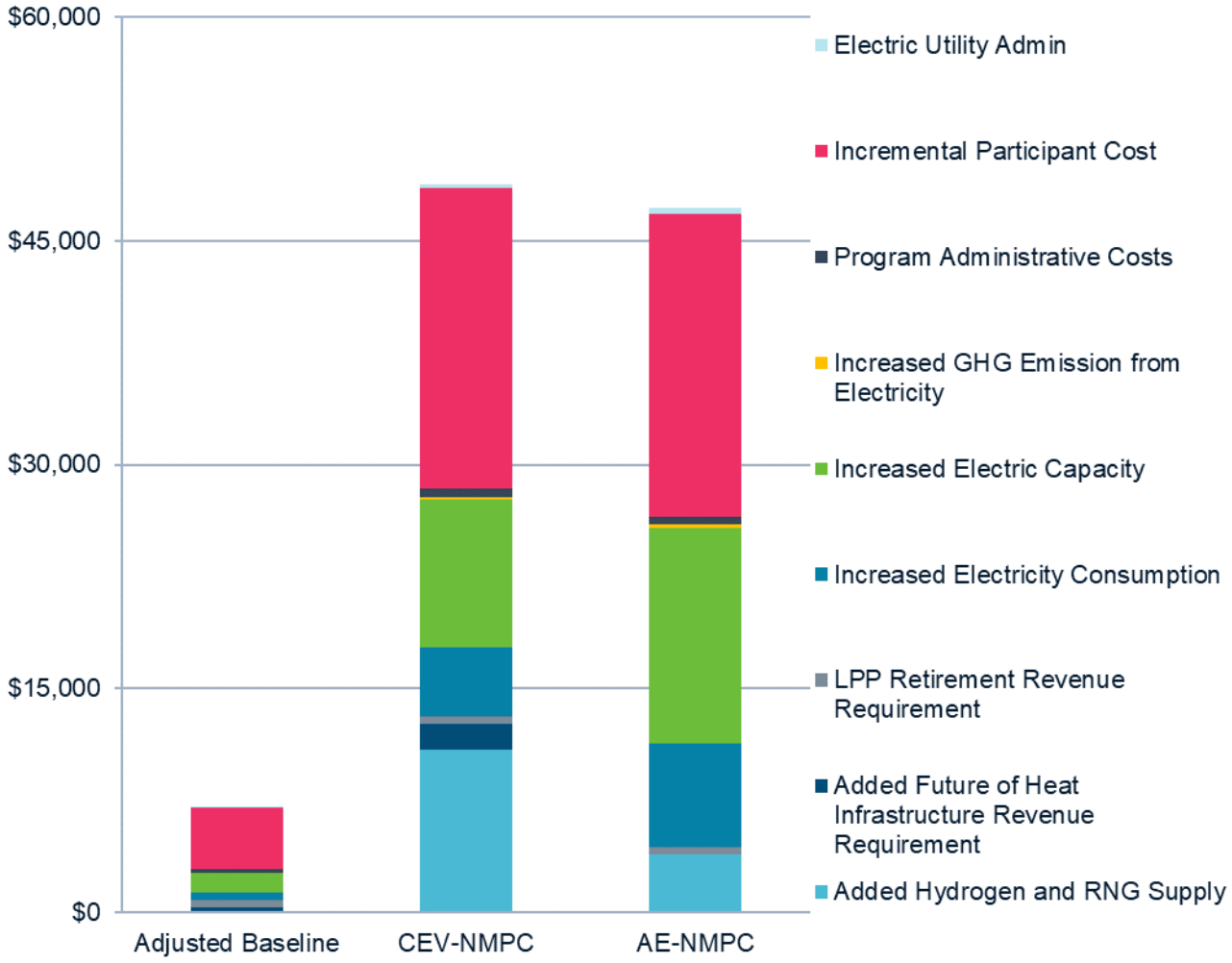
For NMPC in the CEV scenario, costs total $48,810 million and for the AE scenario, costs total $47,259 million. Figure 8-7 provides a breakdown of the primary cost drivers informing the BCA in the FLT Plan.

Figure 8-7: Costs by Scenario (in million dollars)- NMPC[258]



8.3.1 Key Findings

As seen in the figures above, participant incremental costs associated with EE and heat electrification represent the largest costs in the CEV and AE scenarios followed by Increased Electric Capacity costs and Added Hydrogen and RNG Supply. Participant incremental costs are defined as "the incremental cost of demand-side management technology adoption to society, relative to typical technology baselines."[259] The Company notes that these costs exclude the impact of incentives for EE and electrification, as those costs are considered a pass-through in the SCT.[260]

PA recommends the Company identify other primary levers in future GSLTPs to pull within the BCA framework to help Stakeholders understand under what circumstances the benefits of certain initiatives can outweigh the cost across the three scenarios. PA confirms understanding that the Company has calculated BCAs up to 2050.[261] PA finds this approach reasonable but stresses the importance that the costs and benefits of various investments do not stop at 2050, and there will likely be residual value in costs or benefits in gas or electric assets post 2050. Based on our analysis of the presented BCA results, PA hypothesizes that either: 1) some benefits are likely not fully accounted for or underestimated (e.g., health benefits, avoided upstream and

[258] *Ibid.*
[259] Source: FLT Plan, p. 262.
[260] *Ibid.*
[261] Source: Company response to PA-0220.

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downstream GHG emissions), or 2) some costs are potentially overestimated (incremental participant cost), and therefore further assessment of certain costs and benefits is warranted.

Increased Electricity Capacity costs should be thoroughly examined.

The increased electricity capacity costs used in the SCT BCA are estimated by the Company to account for the marginal cost of generation, transmission, and distribution capacity that will be required to support electrification of buildings. This accounts for one of the largest line items of cost under the AE scenario and deserves further assessment and scrutiny.

PA recommends the Company further assess whether the Increased Electricity Capacity costs are properly estimated in their BCA framework in future GSLTPs and Annual Updates. First, based on the Company's BCA model, PA observed that there was a cumulative 7.3 GW delta between the summer and winter peaks across the 3 electric utilities participating in New York ISO market in 2022. Based on the values presented in the BCA model, during the hottest days of that summer, when air conditioning load was surging, electric demand reached its peak for the year, and during these hours New York's electric grid delivered 25.2 GW of power to end use customers in the KEDNY, KEDLI and NMPC footprints, while in the winter the peak demand was 17.8 GW in 2022.[262] These amounts suggest that portions of the electric grid may be capable of supporting heating electrification and serving incremental demand during the winter months. The Company should further investigate and evaluate the available electric grid capacity and potential future cost of generation, transmission and distribution that may be required to electrify customers at scale. Based on our experience, the electric distribution system is likely capable of delivering the additional 7.3 GW of power across New York (as illustrated in this example) in the winter to end use customers, a capacity that could be strategically used to deploy heat pumps in some locations across New York. The Company's analysis should be transparent such that Stakeholders can understand all components of the total cost to electrify existing gas customer demand. Based on NYISO's heat pump analysis, the incremental 7.3 GW of capacity noted above could potentially support the electrification of hundreds of thousands of homes; however, the extent to which the electric grid requires upgrades to achieve such a result must be studied in detail.[263]

The estimate illustrated above may be further impacted as additional EE, DSM, demand response solutions, and other rate designs minimize the coincidence factor of space heating appliances' peaking load with overall system load and create additional headroom for deploying further electric appliances such as heat pumps, heat pump water heaters, and induction stoves without driving the need for significant investments in the electric grid in the near future.

Despite the "accelerated" electrification assumption under the AE scenario, the benefits of rapid electrification do not seem to materialize in avoiding gas infrastructure spend. PA encourages the Company and Stakeholders to further explore the potential that existing electric grid infrastructure is capable of supporting additional winter demand to further realize the benefits of electrification by avoiding investments in the gas network. PA recommends the Company, in future GSLTPs, reviews and further explain the reason for the low estimates of avoided gas infrastructure in both the AE and CEV scenarios and provide guidance to Stakeholders regarding the circumstances under which electrification can result in lower investments in the gas infrastructure.

Grid upgrades will bring additional benefits such as resilience, reliability, and support electrification of transportation (electric vehicles)

In addition to supporting electrification of buildings, electric grid upgrades accounted for by the Company will likely improve the firmness of the electric grid and support other public benefits such as transport electrification, grid resilience, grid reliability, etc. Therefore, either the Company should allocate only a portion of these costs to building electrification or properly account for benefits that such investments will bring to the customers in their territory under the benefits side of BCA calculations. Either way, it does not seem appropriate to allocate all of these costs that will have additional benefits only to building electrification as it will make building electrification less favorable in the BCA framework.

Company should prioritize investments with high value, no matter the scenario

[262] Source: Company's response to PA 11-168, "Electric Peak Demand Tracking" tab.
[263] Assuming peak demand of a heat pump to be 7 kW for a typical home in New York per NYISO's 2024 Building Electrification Assumptions, published on March 21, 2024.

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The Company is only accounting for a very small portion of gas infrastructure costs to be potentially avoided under the Avoided Gas Infrastructure Revenue Requirement line item (less than $1 billion for AE scenario for NMPC BCA). If these high gas infrastructure costs prove to be reflective of potential continued reliance on the gas network for carrying hydrogen and RNG, the Company should revisit how to spend this money. PA would encourage the Company to consider how these costs could be reallocated towards providing increased targeted electrification and development of NPAs, including EE and DSM measures.

PA believes these considerations and alterations to the BCA should result in BCA ratios with more favorable results. Electrification provides benefits over use of natural gas or RNG that are difficult to quantify that are not currently represented in the BCA calculations such as health benefits. Modeling BCAs over a longer time period beyond the current modeling that only extends to 2050 could support the narrative that doing something, although costly, will be better than doing nothing to alleviate the impacts of a changing climate.

8.4 Non-Pipeline Alternatives

In the FLT Plan, the Company discussed the importance of NPAs and stressed that they will continue to explore and pilot approaches that could result in more frequent success of NPAs.[264]

The Company outlines their approach to NPAs:[265]

- The Company will retain an NPA implementation contractor. This contractor will perform four primary functions: 1) community engagement support, 2) customer outreach and engagement, 3) home/building energy assessments, and 4) equipment and measure installation.
- Through this contractor, the Company will contact customers as soon as an NPA opportunity is identified. The Company describes this as a capital project that is determined to be NPA-feasible and has passed an initial cost-effectiveness test.
- The Company stresses the importance of near-simultaneous decision-making among eligible NPA participants within a tight timeframe for successful deployment. Therefore, the Company's NPA outreach and engagement will include remote outreach via mail, e-mail, phone calls, door-knocking, and in-person events. Additionally, the Company plans to engage with local community organizations and include information about upcoming NPA opportunities on their website and promotional materials.
- The Company will continue to explore best practices for conducting NPA outreach in tenant-occupied buildings.
- The Company will focus on implementing NPAs in Disadvantaged Communities.
- The Company points out that it will soon file a Service Line NPA proposal for its downstate territories, in accordance with the terms of the KEDNY-KEDLI Joint Proposal. The proposal will include a framework for providing incentives to eligible participants that are requesting a new connection to the gas system or that require service line replacement.
- The Company is developing its Integrated Energy Planning capabilities, which will provide insight into areas of the system where electrification-based NPAs will be able to be deployed with the lowest probability of electrical infrastructure investment.
- The Company will continue its work with the New York City Housing Authority for potential large-scale NPAs.
- The Company plans to file an annual NPA Opportunities and Programmatic Success reports, outlining updates on NPA efforts.

Overall, these NPA strategies programs align with decarbonization targets and serve to reduce traditional gas infrastructure investments with EE, DSM, or electrification measures. In assessing NPA solutions for new customer connections, ensuring customers are educated in non-fossil options will ensure customers understand their options and perhaps accelerate electrification. As discussed earlier in Section 8.3 of this report, the Company forecasts a very similar overall cost to replace LPPs across all three scenarios ($482-$517-million-dollar total), even under the AE scenario.[266] This suggests that the Company is not really

[264] Source: FLT Plan, p. 115.
[265] *Ibid.*
[266] Source: Company's response to PA-0168.

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envisioning the possibility of materially scaling NPAs to the point where substantial miles of the LPP gas network will not be replaced.

PA hypothesizes that performing an NPA assessment for all capital projects may prove to be counterproductive. Some capital projects are too small, low-cost, and may be integral to safety and reliability of the gas system. PA would encourage the company and Stakeholders to consider enacting investment thresholds whereas an NPA assessment would trigger if a capital project were above a financial and timeline threshold. Establishing thresholds can help the Company provide sufficient lead time for third parties to develop and provide feedback on NPA measures and implementations.

8.5 Recommendations to Improve Future GSLTPs

Based upon our work to date and observations in this section, our recommendations for the Company to improve the economic impact components of future GSLTPs are summarized below.

1. The Company and Stakeholders are encouraged to continue discussing revenue requirements and cost allocations, as this is an important topic to explore the most optimal solutions for addressing the potential cost shift, cross subsidization risk, and reasonableness of changes proposed by the Company to the cost allocation formulas in other appropriate regulatory proceedings.
2. Develop a targeted deployment of LCFs for hard-to-electrify customers to reduce the capital expenses associated with LCFs development and deployment and promote electrification and NPAs.
3. Develop a targeted analysis to inform the bill impact for customers in Disadvantaged Communities and how it may differ from the rest of the customer base. PA recommends retrieving aggregated customer information specific to Disadvantaged Communities to inform the bill impact of the decarbonization scenarios on customers in Disadvantaged Communities.
4. Estimate a forecast of customers in Disadvantaged Communities as part of the long-term gas planning effort and level of low-income assistance funding needed to support customers if rates increase as projected by the Company under AE and CEV cases.
5. Consider enacting minimum investment thresholds for NPA considerations, where an NPA assessment would be triggered if a capital project were above a certain financial and timeline threshold. In addition, we recommend the Company design guidelines to provide adequate time for NPA solicitation and deployment as this market is less mature than traditional investments in the gas network.
6. Continue discussing the potential cost shifting risk across various rate classes to explore the most optimal solutions for addressing the potential cost shift and reasonableness of changes proposed by the Company to the cost allocation formulas in other appropriate regulatory proceedings.
7. Explore strategies to identify barriers to deploy coordinated electrification and other solutions that can maximize the value of electrification across the service territories.
8. Continue exploring solutions to rapidly scale deployment of NPAs to minimize the overall system cost with the ultimate goal of keeping rates and bills manageable for all customers.

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9 Environmental Assessment

In this section, PA provides observations on the environmental-related aspects of the Company's FLT plan, along with recommendations for improvement to future GSLTPs. This section highlights the GHG emission impacts of the decarbonization scenarios and analyzes the Company's plans to blend LCFs into the gas network.

9.1 GHG Emissions

In the FLT Plan and the RLT Plan, the Company expresses strong support for New York's climate action goals and acknowledges the Company's critical role in reducing GHG emissions by fostering an effective, affordable, and equitable clean energy transition. Among the Company's climate action targets are New York State's CLCPA, that requires a statewide GHG emission reduction of 40% by 2030 and 85% by 2050, based off 1990 levels, and the Company's internal initiative "Net Zero by 2050", in which the Company aims to reduce Scope 1, 2, and 3 GHG emissions to achieve net zero by 2050.[267] The Company's wide-reaching approach to emission reduction includes:

- Developing and scaling DSM programs to help their customers consume less fossil fuel, including energy efficiency measures,
- Electrifying heating through the installation of heat pumps,
- Modernizing natural gas infrastructure to reduce natural gas leaks[268], and
- Blending LCFs such as RNG and hydrogen.

Between the RLT Plan[269] and the FLT Plan, there were changes in reported GHG emissions for the NMPC CEV and AE scenarios. The emissions reductions reported in the FLT Plan are depicted in Table 9-1. The Company attributes changes to GHG emission results to a formula error that resulted in emissions reductions from the blending of LCFs in NMPC to be excluded in the results presented in the RLT Plan.[270] Results were developed using the 20-year Global Warming Potential approach and are consistent with the methodology in the New York Department of Environmental Conservation emission accounting framework.[271]

Table 9-1: GHG Emissions Reductions by Scenario (2024-50) – FLT Plan[272]

Operating Company	Impact Type	Reference	CEV	AE
NMPC	CO_2e (metric tons)	64,064,604	338,540,468	369,965,601
KEDNY	CO_2e (metric tons)	84,910,484	464,975,112	496,770,362
KEDLI	CO_2e (metric tons)	74,808,236	333,241,644	372,236,435
National Grid Territory Total	CO_2e (metric tons)	223,783,325	1,136,757,224	1,238,972,398

[267] National Grid Responsible Business Charter 2023.
[268] As LPP infrastructure is replaced over time, leakage rates (i.e., the average number of leaks per mile of main in service) should decline. Under the assumption that whether the Company pursues the CEV or AE scenarios there will ultimately be no LPP remaining in the distribution system, it is reasonable to assume that there would be no material difference in leakage rates between the two scenarios once the LPP program is completed. It is also reasonable to assume that the number of leaks found on the system will be greater under the CEV scenario than under the AE scenario since more miles of gas distribution main would remain in service under CEV.
[269] Source: RLT Plan, Table 7-7.
[270] Source: FLT Plan, p. 157.
[271] NYSERDA, Fossil and Biogenic Fuel GHG Emission Factors (2023).
[272] Source: FLT Plan, Table 8-8.

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GHG emission reductions are attributed to avoided gas combustion net of increased electric sector emissions. The Company clarifies their assumption that emissions from the electric grid decline through 2040, after which the electrical demand system is assumed to have zero emissions, as required by the CLCPA.[273]

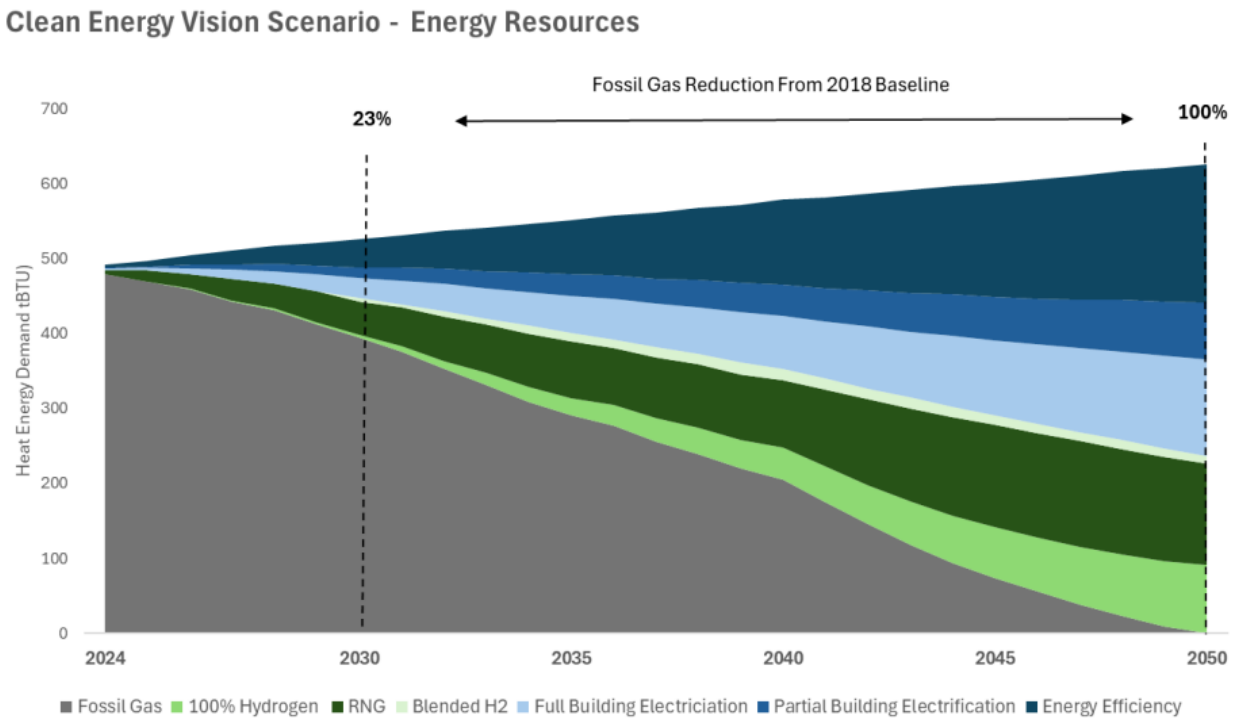
To progress the GHG emission reductions the Company will likely need to establish a collaborative effort to support emissions reductions from fossil fuels, including collaboration with Stakeholders from the state agencies, neighboring electric utilities, climate infrastructure and technology companies, and advocates. Collaboration with Stakeholders can lead to a scale up of NPA and electrification deployment and adoption, especially in Disadvantaged Communities and neighborhoods that may be slower to electrify and may have more leaking infrastructure. Collaborative approaches can help drive an equitable reduction in GHG emissions across their New York service territory.

9.2 Low-Carbon Fuels

As discussed in Section 8.5, strategic investment in energy efficiency, electrification, DSM measures, and targeted LCFs deployment can be both cost saving and impactful for emission reductions, as gas throughput and combustion is lessened over time. The FLT Plan includes the use and development of LCFs as a key decarbonizing measure to progress toward the Company's decarbonization scenarios. The Company has evaluated the inclusion of RNG and green hydrogen for blending into their supply mix, discussed in further detail in Section 4 of this report, in both the CEV and AE scenarios. The bill impact implications of LCFs are discussed in Section 8.1.2.

The CEV scenario, which represents the Company's preferred pathway, aims to eliminate fossil fuels from the gas network by 2050. The CEV scenario utilizes the expansion of electrification, energy efficiency, and the delivery of renewable natural gas and green hydrogen to customers.[274] Figure 9-1 illustrates the energy resources forecast for the CEV scenario.

Figure 9-1: Clean Energy Vision Scenario (2024-50) – FLT Plan[275]



The AE scenario relies on higher levels of electrification, as compared to the CEV but still utilizes significant volumes of LCFs, albeit more limited. However, the AE scenario does not utilize blended hydrogen in the gas

[273] Source: FLT Plan, p. 173.
[274] Source: FLT Plan, p. 18.
[275] Source: FLT Plan, Figure 2-7.

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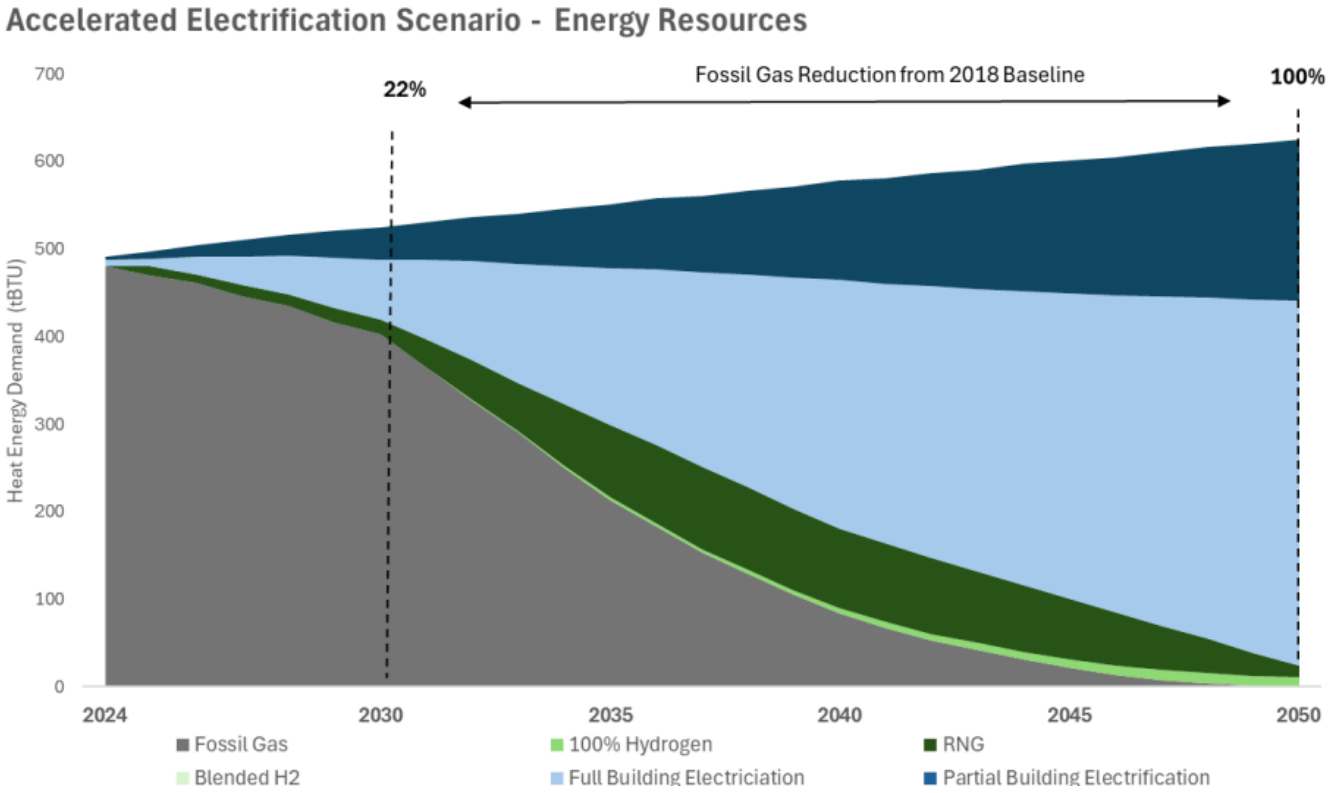
system. The energy resources planned for the AE scenario throughout the forecast are displayed in Figure 9-2.

Figure 9-2: Accelerated Electrification Scenario – FLT Plan[276]



Renewable Natural Gas

To inform their outlook on RNG potential, the Company utilized recent studies and publications from the American Gas Association and NYSERDA. The Company then contracted with a third-party consultant to develop an estimate of the Company's share of RNG potential. The third-party report was intended to support the Company's New York Climate Leadership and Community Protection Act Study and was informed by the AGF Study, the NYSERDA study, and an American Gas Association Study.[277] Results from this study are displayed in Table 9-2.

Table 9-2: Estimate of Annual RNG Production from Eastern US. States, and Potential RNG Supplies Available to New York[278]

RNG Supply Cases Defined by AGF	Annual RNG Supply Potential Eastern US. in 2050 (TBtu/year)	Estimated Share of Eastern US. RNG Supply potential in 2050 (TBtu/year)	
		NY State	National Grid (NY only)
Low Supply Case	1,158	150	83
High Supply Case	2,199	285	158

[276] Source: FLT Plan, Figure 2-8.
[277] NYSERDA, Potential of Renewable Natural Gas in New York State; 76 Case 19-G-0309, et al., Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of The Brooklyn Union Gas Company d/b/a National Grid NY for Gas Service, "National Grid New York Climate Leadership and Community Protection Act Study, Final Report," (Filed March 17, 2023); AGA, Potential of Renewable Natural Gas in New York State
[278] Source: FLT Plan, Table 5-2.

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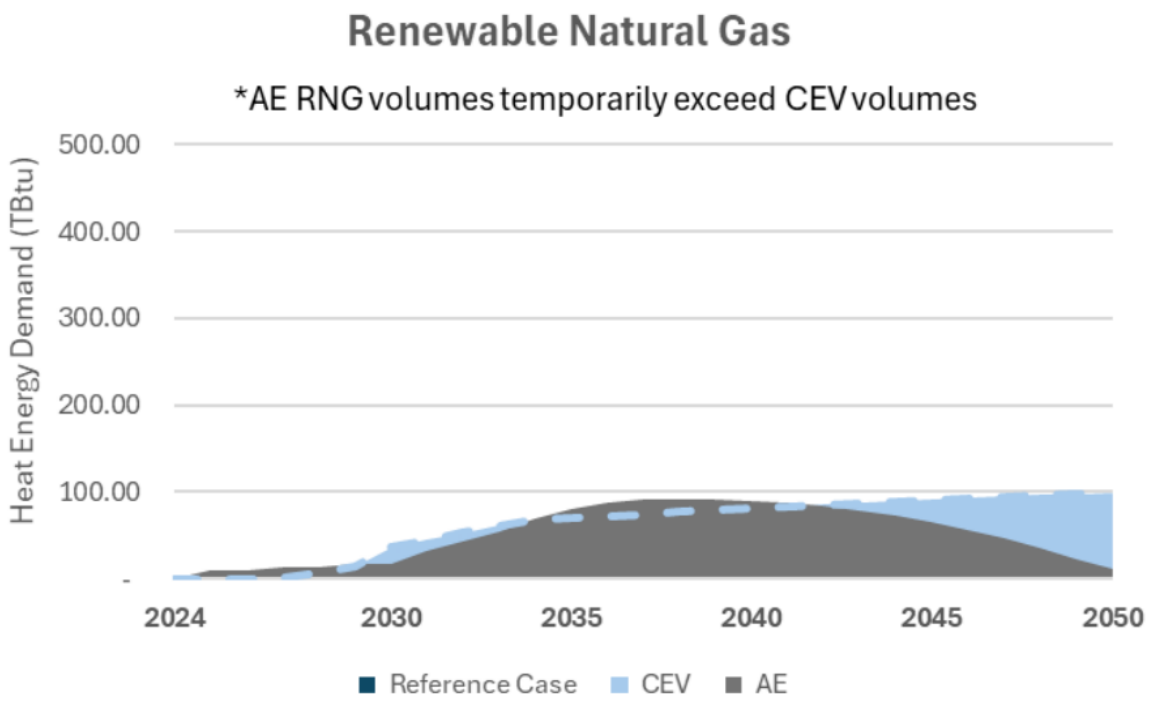
Regional share of non-power, non-industrial natural gas sales in 2020	13.0%	7.2%

The low and high potentials found in this study suggest the Company will need to procure between 83 and 158 TBtu/year of RNG by 2050 to achieve the CEV decarbonization scenario, representing approximately 7.2% of the average RNG potential in the eastern United States by 2050.[279] The limited supply of RNG is in high demand from multiple hard-to-decarbonize markets, including transportation, power generation, and demand for blending from many other gas utilities, including utilities in New York. Given the limited supply of RNG, PA suggests the Company develop a more targeted use case for RNG by prioritizing hard-to-electrify end-users who will remain on the gas system after the majority of residential and small commercial heating loads are largely electrified.

In its reply comments, the Company indicated that "the volumes of RNG in both the CEV and AE scenarios are not forecasts, but assumptions of how much LCF would be necessary to achieve the CLCPA's targets under different levels of electrification. Both scenarios *assume* that sufficient LCFs will be available to serve heating load that is not electrified."[280] PA is still concerned about the reasonableness of this *assumption* and questions the value of the long-term planning with an assumption that is speculative and highly unlikely. Securing 7.2% of the total RNG market in the Eastern United States for a subset of customers in New York is highly unlikely and raises questions about deliverability of the RNG and cost premium of RNG at such high levels of demand. Instead, PA encourages the Company to develop an alternative view considering the possibility that the Company may not be able to access such massive amounts of RNG.

Both the CEV and AE scenarios utilize RNG and clean hydrogen with increasing heat energy demand throughout the forecast period. The Reference Case does not include LCFs, the CEV scenario 1,653 TBtu of RNG and the AE scenario requires 1,489 TBtus. Both scenarios require the immediate replacement of natural gas with RNG. See Figure 9-3.

Figure 9-3: RNG by Scenario – FLT Plan[281]



[279] *Ibid.*
[280] Source: NY DPS – Case 24-G-0248, National Grid Reply to PA Consulting Initial Report and Stakeholder Comments on the Company's Initial Gas Long-term Plan.
[281] Source: FLT Plan, Figure 9-4.

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Importantly, the Company recognizes that RNG is a nascent market and potential policy changes could dramatically impact current price projections for RNG. Under both the CEV and AE scenarios, the Company assumes that utilities will have the ability to claim environmental attributes associated with RNG, which are currently sold onto the open market.[282] The Company has also expressed the need for potential regulatory changes required to support the LCFs blending strategies.

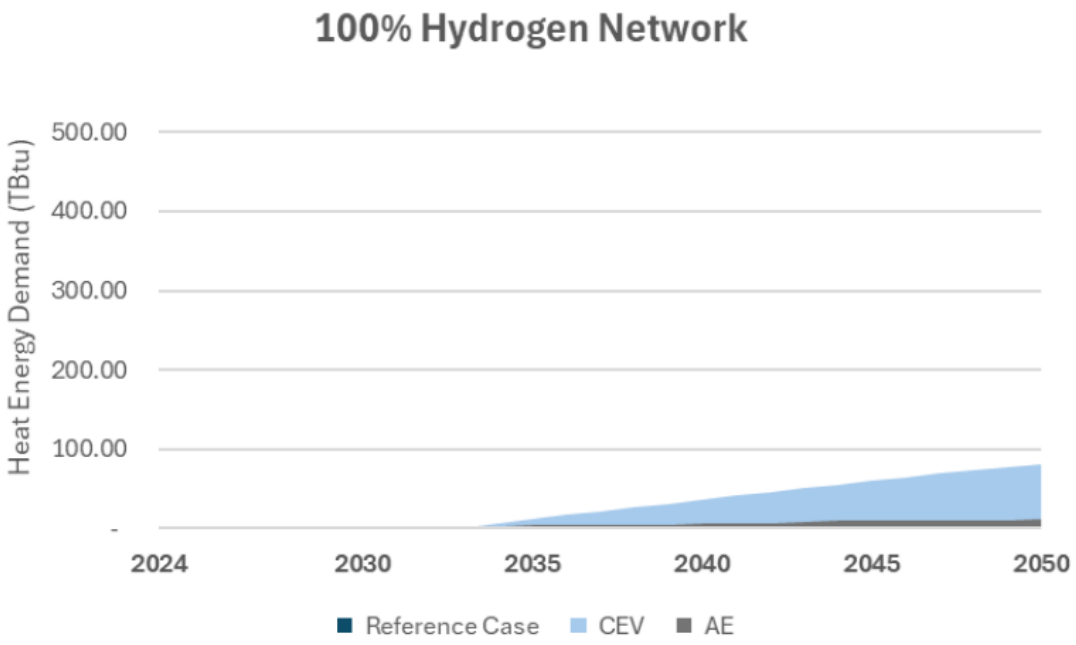
Hydrogen

In the FLT Plan the Company describes the role of hydrogen, specifically green hydrogen (hydrogen produced using electrolysis of water with renewable electricity), as a key element of the CEV scenario to decarbonize gas networks. The Company highlights the usefulness of hydrogen for decarbonizing industrial energy demand and highlights the flexibility of hydrogen as an ideal energy carrier for delivering gas decarbonization in a manner responsive to customer demand and market prices.

To test some of the key hydrogen assumptions, the Company discusses their plans to propose to the Commission a series of hydrogen deployment projects to demonstrate the practicality and evaluate costs of hydrogen blending.[283] One such pilot that is in the KEDLI service territory is the HyGrid project. This project would blend green hydrogen into an existing single-feed gas network servicing 844 customers, primarily residential and small commercial. The network has been upgraded to a suitable distribution infrastructure. The Company anticipates a blend rate starting at 1%, increasing to 20% hydrogen by volume with an operational date expected for the 2027-28 heating season. However, pursuant to the Joint Proposal in KEDNY and KEDLI's recent rate filings, the Company must receive Commission approval prior to blending hydrogen.[284]

The Company has also described the role of 100% hydrogen networks in the FLT Plan, outlining that 100% hydrogen would be made available to geographic clusters of industrial or commercial applications determined hard-to-electrify.[285] The timeline envisioned for the three scenarios to integrate 100% hydrogen networks is demonstrated in Figure 9-4.

Figure 9-4: 100% Hydrogen by Scenario – FLT Plan[286]



PA acknowledges this focused deployment of hydrogen for hard-to-electrify end-users as an important and practical use for hydrogen in a decarbonized economy. However, in response to a data request, PA learned

[282] Source: Company's response to PA-019.
[283] Source: FLT Plan, p. 76.
[284] Source: Company's response to PA-043.
[285] Source: Company's response to PA-066.
[286] Source: FLT Plan, Figure 9-5.

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that the Company is first targeting green hydrogen blending on areas of the gas system that were or will be replaced as part of the LPP program.[287] PA observes that the HyGrid pilot includes blending hydrogen for delivery to residential and small commercial customers who may be better suited for decarbonization through electrification given the price premium of hydrogen when compared to heat pumps.

Case for Targeted Use of Low-Carbon Fuels

A targeted application of LCFs, limited to hard-to-electrify end-uses, could be beneficial in both alleviating costs, as discussed in Section 8.1.3, and from the environmental perspective. Limited supply of LCFs threatens wide scale blending and implementation of both RNG and hydrogen, especially when considering local availability. As discussed in Stakeholder comments filed by the City of New York on September 18, 2024, there are environmental consequences associated with the import of LCFs. The City of New York expresses support for the use of RNG for hard-to-electrify end-uses but only if the RNG is produced locally.[288] Additionally, the City of New York outlines the need for clear criteria around what fuels should be considered zero emissions and local and the need for guidance on an accurate and standard methodology for lifecycle emissions.[289]

Limiting the deployment of LCFs to hard-to-electrify end-uses and avoiding significant volume demand for LCFs can allow the Company to prioritize local procurement of LCFs, as much as possible. PA suggests that limiting the expected demand requirements of LCFs may help alleviate the need to import LCFs and help the Company procure less LCFs at lower cost to customers, given restrictive supply and high demand for the fuels. Maintaining local LCFs to the extent possible will be helpful for keeping the emissions profile of LCFs low and help to lower the costs of blending to customers.

In the FLT Plan, the Company addressed PA's recommendation to explore the potential feasibility of targeted deployment of RNG and hydrogen to hard to electrify commercial and industrial customers. The Company agreed to explore the possibility of this recommendation in their FLT Plan. In their response, the Company discussed their active exploration of the use of hydrogen and RNG for targeted hard to electrify customers, where feasible. The Company described a lack of capability to isolate specific hard to electrify customers without investments in building new networks, as many of these hard to electrify customers are spread across the service territory. The Company highlights that the CEV scenario aims to minimize the cost to customers by repurposing existing Company assets to deliver RNG and hydrogen.[290] PA understands the limitations of isolating specific end-users and is encouraged that the Company agreed to continue exploring targeted LCFs deployment, where possible.[291]

9.3 Recommendations to Improve Future GSLTPs

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

1. Further describe the practicality of securing an RNG market share of 7.2% of average potential RNG in the eastern US given the limited RNG supply and high demand at projected price points and proximity to the Company's territories.
2. Conduct an analysis to determine the price point where blending RNG or hydrogen is more expensive than using heat pumps for space heating in residential and small commercial buildings.

[287] Source: Company's response to PA-064.
[288] Source: City of New York, Stakeholder Comments, Filed September 18, 2024.
[289] *Ibid.*
[290] Source: FLT Plan, p. 17.
[291] Source: FLT Plan, p. 29.

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