

Initial Report of National Grid's Initial Long Term Gas Plan

Prepared for New York Department of Public Service

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paconsulting.com

New York Office

PA Consulting Group Inc.
45th Floor
The Chrysler Building
405 Lexington Avenue
New York
NY 10174
USA
+1 212 973 5900
paconsulting.com

Prepared by: PA Consulting Group, Inc.

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Glossary

AE - Accelerated Electrification	Initial Report - PA's report filed on September 18, 2024
AESD - Automated Emergency Shutdown	IRA - Inflation Reduction Act
BAU - Business as Usual	Iroquois ExC / ExC - Iroquois Enhancement by Compression
BCA - Benefit-Cost Analysis	JP - Joint Proposal
BE - Building Electrification	June 2024 - Company's Annual Load Forecast
C&I - Commercial & Industrial	KEDLI - KeySpan Gas East Corporation
CAC - Climate Action Council	KEDNY - Brooklyn Union Gas Company
CCA - Current Clean Agenda	LCF - Low-carbon fuel
ccASHP - cold climate air source heat pump	LDC - Local Distribution Company
CEV - Clean Energy Vision	LPP - Leak-prone Pipe
CHP - Clean Heat Program	MAOP - Maximum allowable operating pressure
CJWG - Climate Justice Working Group	MDth/d - Thousand Dekatherms per day
CLCPA - Climate Leadership and Community Protection Act	NE:NY - New Efficiency New York
Commission - New York State Public Service Commission	NGLTP - National Grid Long-term Plan
CT-DEEP - Connecticut Department of Energy & Environmental Protection	NMPC - Niagara Mohawk Power Corporation
DAC - Disadvantaged Community	NNI - No New Infrastructure
DIMP - Distribution System Implementation Plan	NPA - Non-Pipe Alternative
DOB - Department of Buildings	NRDC - Natural Resources Defense Council
DPS - New York State Department of Public Service	NREL - National Renewable Energy Laboratory
DSA - Demand Side Analytics	NYC - New York City
DSIP - Distribution System Implementation Plan	NYDEC - New York Department of Environmental Conservation
DSM - Demand side management	NYFS - New York Facilities System
DSNY - Downstate New York	NYPSC - New York Public Service Commission
EE - Energy efficiency	NYS - New York State
EGTS - Eastern Gas Transmission and Storage	NYS CHP - New York State Clean Heat Plan
EMP - Total Employment	NYSERDA - New York State Energy Research & Development
ESCO - Energy Service Company	PA - PA Consulting Group, Inc.
ETS2 - Energy Transfer Station #2	PHMSA - Pipeline and Hazardous Materials Safety Administration
FO - Fuel oil consisting of ultra-low sulfur diesel, which emits more CO2 when combusted than natural gas	Planning Proceeding - Gas Planning Proceeding Gas Number 20-G-0131
GDE - Gas Distribution Engineering	PUT - Pipe Use Transformation
GHG - Greenhouse gas	RFP - Request for Proposal
GMP - Gross Metro Product	RNG - Renewable natural gas
GSHP - Ground source heat pump	RSG - Responsibly sourced gas
HDD - Heating Degree Day	Sales - Volumetric Gas
HP - Heat pump	SCT - Societal Cost Test
HPWH - Heat pump water heater	SME - Subject Matter Expert
ILI - In-Line Inspection	TBtu - Trillion British Thermal Units
ILT Plan - Initial Long-Term Plan	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
Company

UPC - Usage Per Customer

USNY - Upstate New York

UTEN - Utility Thermal Energy Network

VRF - Variable refrigerant flow

YOU - Youth Opportunity Union

1 Executive Summary

This review is being conducted for the New York State Department of Public Service (the Department) pursuant to the 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, which comply with the requirements of the Climate Leadership and Community Protection Act (CLCPA) on a repeating three-year cycle.¹ PA Consulting Group, Inc. (PA) was retained to assess National Grid's Long-Term Plan for its Upstate and Downstate natural gas service territories (collectively, the Company). On May 31, 2024, National Grid (the Company) filed its Initial Gas Long-Term Plan (ILT Plan) in Proceeding Case Number 24-G-0248. This report (Initial Report) summarizes our initial approach, observations, and recommendations.

In the ILT Plan, National Grid says its natural gas long-term plan (NGLTP) 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. PA has completed an initial review of the ILT Plan and observes three scenarios, with fairly clear descriptions of the key assumptions and the resulting metrics such as increased or reduced peak demand and annual sales, and the resulting greenhouse gas emissions, bill impacts and benefit cost tests. Further, the ILT Plan identifies the Clean Energy Vision scenario as the best path forward, but National Grid does not request "approval" of this scenario or for this to be enabled at the exclusion of the third, Accelerated Electrification scenario.³

In our initial review, PA finds the Design Day demand forecast for a given winter season is an important component of the process, especially considering the Company notes that relatively little spare supply may cause their Downstate New York Region (DSNY or Downstate) to experience a supply-demand shortfall by the winter of 2027-28 and their Upstate New York Region (USNY or Upstate) may experience a shortfall by the winter of 2030-31. Therefore, the Design Day demand forecast for a given winter season is an important component of the process going forward. Another key part of PA's assessment of the ILT Plan is a review of hydraulic modeling scenarios that depict how the distribution system is expected to operate under Design Day conditions. While we have begun our assessment, National Grid has informed us that updated models of the New York Facilities System (NYFS) should be available in mid-September. Once we receive the updated NYFS models, we will review those models and other modeling results collectively with the Company's subject matter experts (SMEs). Subsequently, PA's ongoing Winter season supply and Design Day demand assessments will be combined and discussed in greater detail within our Preliminary Findings Report.

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, compressed natural gas (CNG), liquefied natural gas (LNG), and cogeneration (cogen). 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, further discussed within Section 4. In Section 5 of this Report, we also address the requirements related to the Greenpoint Energy Center (Greenpoint) that are outlined in the Joint Proposal (JP), among KEDNY, KEDLI, 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 in part by the Commission on August 15, 2024.⁴

While not specifically discussed in detail in the ILT Plan, it is PA's understanding that National Grid's scenario-based investment plans for the period 2024-50 support the objectives of each scenario. PA's initial observations of these investment plans are discussed in more detail within Section 6. We will work to better

¹ The Order, p. 20-22.

² Source: ILT Plan Section 1.2.

³ Source: ILT Plan Section 9.1.

⁴ 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).

understand the various categories of investment. PA will also work with National Grid to better understand its recent actual investments and how those may inform the overall forecast. Therefore, in this Initial Report we limit our comments to observations about the types of investments required to ensure reliable service for customers; in our Preliminary Findings Report we may also comment on other investment categories based on how those categories of investment influence the overall forecast for a given utility. Finally, in this Initial Report, we will focus primarily on the Reference Case forecasts of the three National Grid utilities. As we gain a better understanding of the key drivers of the other scenario forecasts, we will be better able to opine on how the CEV and AE forecasts differ.

Based upon our review of regional macroeconomic forecasts, we predict slowing to negative population growth, coupled with legislation prohibiting certain fossil gas fueled equipment and building systems, as well as federal and state incentives, to cause a decline in the number of new gas heating customers. More specifically, 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 Reference Case Usage Per Customer (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, changes in heating degree days, among other factors. We have made several initial observations that suggest the annual retail volumes and Design Day forecast are over-stated. We also identify several key assumptions which we believe may result in an under-estimate of bill impacts throughout the forecast period. PA has evaluated the key environmental-related aspects of the ILT Plan, including the potential GHG emissions associated with the three scenarios and plans to blend LCFs into the gas network. We further discuss our detailed assessments of the Economic and Environmental aspects of the ILTP and, identify opportunities for improvement the Company should consider in future iterations of NGLTP.

Within the ILT Plan, National Grid says selection of a preferred scenario is unnecessary and instead, encourages the recognition of barriers to scenarios are the same over "false choices between affordability and emissions reductions, or electrification and alternative fuels." Instead, National Grid encourages scaling of all solutions as fast as possible and urges the Commission to implement the Scoping Plan's recommendations to develop a coordinated gas system transition plan. PA believes successful, cost-effective, and equitable achievement of the State's ambitious climate goals requires a comprehensive assessment of the intersection of natural gas market supply and demand, technical analysis including safety and operational risks, and changing end-use patterns. PA recognizes this planning approach needs a delicate balance of meeting statutory requirements while ensuring delivery of gas services in a safe, reliable, and affordable manner. PA expects to work with the Company, the Department and Stakeholders to understand the key assumptions underlying each scenario and related impacts more fully going-forward, in addition to highlighting areas for further refinement and additional recommendations and opportunities for improvement of the ILT Plan.

In the following sections we summarize the NMPC and DSNY service territories, followed by initial observations of the three scenarios presented within the ILT Plan and conclude with a summary of our key initial observations on the overall Supply, LNG, CapEx, Demand, Economic and Environmental discussed in Sections 4 through 9.

1.1 Service Territory Summary

In Upstate or USNY, Niagara Mohawk Power Corporation (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 within Figure 1-1, below. As of year-end 2023, NMPC served around 630,000 gas customers through approximately 9,220 miles of gas mains.⁵

⁵ U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration, Gas Distribution Annual Data 2010 to present.

Figure 1-1: NMPC LDC Map

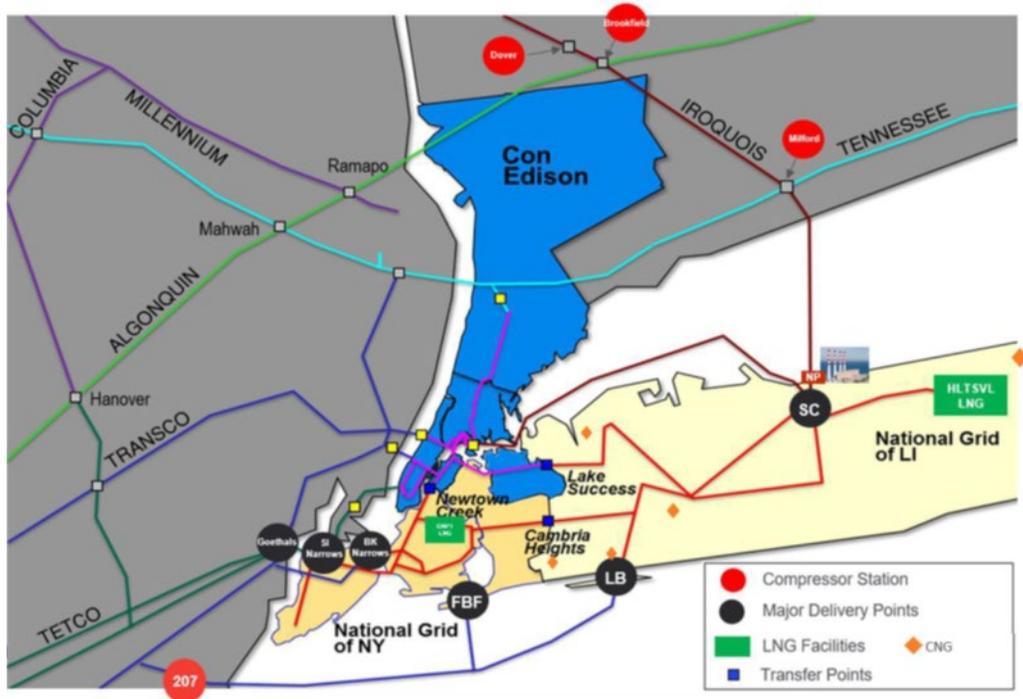


In Downstate or DSNY, The Brooklyn Union Gas Company, operating as National Grid NY (KEDNY), serves Staten Island, Brooklyn, and parts of Queens. KeySpan Gas East Corporation, also operating as National Grid (KEDLI), covers Nassau and Suffolk counties and the Rockaway Peninsula in Queens. Figure 1-2 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 over 1.8 million customers.⁶ As of December 2023, National Grid's Downstate NY gas network spanned approximately 13,030 miles of gas mains.⁷

⁶ 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).

⁷ U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration, Gas Distribution Annual Data 2010 to present.

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 ILT 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** baseline forecast representing a continuation of current legal, policy, and market conditions. National Grid explains that this includes actions it can take without legislative or policy changes but does not achieve New York or National Grid decarbonization objectives by 2050. Existing customer programs and outlook for key drivers that are external to National Grid. This case includes macroeconomic outlook, natural gas and electricity prices, 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.⁸
2. **Clean Energy Vision (CEV) Scenario** 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 Integration Analysis.⁹ 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 ILT Plan describes that in this 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, varied by region. For example, and as discussed in greater detail within this Report, heating oil is more prevalent within the

⁸ Case does not include the impact of CLCPA actions that have not yet been planned or implemented, and it assumes that none of the identified National Grid decarbonization actions in the CEV or AE scenarios have been implemented.

⁹ New York State Climate Action Council Scoping Plan, Appendix G: Integration Analysis Technical Supplement.

NMPC region and resultingly, that region will have different energy profiles and decarbonization options. While the AE scenario is based upon Scenario 3 of the Climate Action Council's Integration Analysis,¹⁰ the ILT Plan also highlights areas of alignment with the CEV and the CAC Scoping Plan's findings, including:

- Recognition that electrification and energy efficiency 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,"¹¹ and the value of using backup heat sources, particularly in cold areas or to mitigate potential electric capacity constraints.¹²
- Recognition that decarbonization will "entail a substantial reduction of fossil fuel natural gas use and strategic downsizing and decarbonization of the gas system."¹³
- 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."¹⁴
- 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.¹⁵

Additionally, the ILT Plan discusses several key outcomes of the decarbonization scenarios, including gas supply mix, changes in net sales, avoided CO2 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.

Table 1-1 Planning Scenario Key Outcomes FY 2025-50

	Reference	CEV	AE
Capital Expenditures (\$ billion) ¹⁶	\$67.5	\$72.4	\$46.3
Gas Supply Mix (2050)	0% RNG 0% Hydrogen	20% RNG 5% Blended Hydrogen	5% RNG 5% 100% Hydrogen
Avoided GHG Emissions from Gas Combustion (\$millions)	\$14,065	\$93,206	\$98,555
Avoided Emissions from Methane Leakage (\$ millions)	\$3,062	\$3,139	\$3,783
Benefit Cost Ratio (National Grid Territory Total)	0.47	0.68	0.60

In the ILT 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 ILT Plan does say that "under the CEV and AE scenarios, supply-demand gaps do not appear." This is consistent with what we would expect, given the AE and CEV scenarios anticipate paths towards lower Design Day demand. As discussed further within our Report, PA believes there is value in applying a de-contracting approach to identify excess capacity and at the least caution should be used regarding the nature and term of any new capacity, and such an exercise would be valuable under AE and CEV. Table 1-2 and Table 1-3 below show the 2024/25 Design

¹¹ Source: Scoping Plan, p. 180.

¹² Source: Scoping Plan, p. 361.

¹³ Source: Scoping Plan, p. 350.

¹⁴ Source: Scoping Plan, p. 351.

¹⁵ Source: Scoping Plan, p. 353.

¹⁶ Source: Company response to PA 1-27.

Day capacity by supply source under the Reference Case. We further discuss our initial observations on the Supply Stack in Section 4.

Table 1-2: NMPC 2024-25 Supply Sources

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

Table 1-3: DSNY 2024-25 Supply Sources

Supply Source	Design Day Capacity (MDth/d)
Firm Pipeline and Storage	2,377
LNG	395
City Gate Peaking	58
CNG	62
Cogen Peaking / Capacity Release	65
RNG	<1
Total	2,957

Winter season supply and Design Day demand are key areas of our analysis going forward 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 service. We further discuss our initial observations on LNG and Greenpoint in Section 5.

Table 1-4 below summarizes the total CapEx forecast for the Company in 2025-50. We observe the Company anticipates \$69.6 billion in the Reference Case, \$74.4 billion in the CEV Scenario, and \$48.4 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 initial observations on CapEx in Section 6.

Table 1-4: FY 2025-50 CapEx (billions)¹⁷

Scenario	KEDLI	KEDNY	NMPC	Total
Reference	\$19.7	\$36.4	\$11.3	\$67.5
CEV	\$19.5	\$38.5	\$14.4	\$72.4
AE	\$13.7	\$24.6	\$8.1	\$46.3

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,

¹⁷ Source: Company response to PA 1-27.

KEDNY and KEDLI. The retail sales forecast is subsequently adjusted for DSM factors, losses etc. to arrive at a wholesale volume forecast which is then translated into Design Day demand. Given the relatively minor magnitudes of the adjustments, there is a high correlation between the annual retail sales and the adjusted baseline wholesale volume and ultimately the Design Day forecasts. As a result, we focused our initial analysis on retail sales (as compared to Design 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 initial observations on Reference Case UPCs for several key customer classes. Initially, PA observes the Company do 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 initial observations that suggest the annual retail volumes and Design Day forecast are over-stated. Additional observations related to the annual volumes forecasts and translating annual retail volumes forecasts into Design Day volumes will be considered in development of our Preliminary Findings Report.

PA has not determined whether the Company is properly modeling the potential rate of heat pump adoption over the forecast period. In particular, PA learned through SME discussions and DR responses, that the Company has not yet developed a view on the economics of heat pumps from the perspective of 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 behaviors 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. Thus, PA would recommend 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 initial observations on the Demand assessment in Section 7.

PA understands the Company employed 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. 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 ¹⁸

Year	Reference	% Increase	CEV	% Increase	AE	% Increase
2024	\$138		\$138		\$138	
2030	\$199	44%	\$257	87%	\$275	100%
2040	\$253	83%	\$368	168%	\$676	391%
2050	\$285	106%	\$530	285%	\$4,022	2822%

In their ILT Plan, the Company included benefit cost analysis (BCA) for the three ILT Plan scenarios using methodology established in the BCA Framework Order, presented in Table 1-6.¹⁹ 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 benefit-cost test ratio closest to 1.0, representing the most favorable cost test for the total service territory. We further discuss our initial observations on the Economic Assessment in Section 8.

¹⁸ Source: ILT Plan, Table 7-1.

¹⁹ Source: ILT Plan, p. 129.

Table 1-6: Benefit-Cost Test Ratios by Operating Company and Scenario²⁰

Operating Company	Benefit-Cost Test	Reference	CEV	AE
NMPC	Societal Cost Test (SCT)	0.67	0.72	0.73
KEDNY	Societal Cost Test (SCT)	0.43	0.60	0.51
KEDLI	Societal Cost Test (SCT)	0.52	0.78	0.65
National Grid Territory Total	Societal Cost Test (SCT)	0.47	0.68	0.60

In the ILT 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 Scenario²¹

Operating Company	Impact Type	Reference	CEV	AE
NMPC	CO ₂ e (metric tons)	27,516,084	322,275,624	348,396,994
KEDNY	CO ₂ e (metric tons)	144,352,925	515,414,713	583,119,721
KEDLI	CO ₂ e (metric tons)	81,962,562	369,729,522	401,695,554
Total	CO₂e (metric tons)	253,831,572	1,207,419,859	1,333,212,270

Although the CEV and AE scenarios appear to be more effective at reducing greenhouse gas (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.”²²

²⁰ Source: ILT Plan, Table 7-5.

²¹ Source: ILT Plan, Table 7-7.

²² Source: ILT Plan, Section 7.3.1.

1.3 Summary of Key Initial Observations

PA believes a robust long-term plan recognizes the importance of balancing 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 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.

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

1.3.1 Supply

In the ILT Plan, the Company indicates 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 2027-28 and USNY may experience a shortfall in the winter of 2030-31.

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 supplies. 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 supply 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 observes the ILT Plan does not explicitly acknowledge the volume of cogen peaking capacity that is at risk in DSNY, how the Company intends to address these shortfalls, or to what degree these contract expirations may influence or alter the Company's projected supply-demand shortfall. PA further understands the National Grid is dependent on the Iroquois EXC project's success to be capable of meeting Design Day demand in the coming years and delay or avoid a moratorium in DSNY.²³ Further, we observe delivered services and city gate peaking services are not discussed at length in the ILT Plan and the Company does not acknowledge the limitations and risks in relying on these types of capacity.

Given the potential DSNY shortfall in winter of 2027-28 and NMPC shortfall in winter of 2030-31, 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. Given the significant nature of the potential shortfalls, PA focuses our efforts on informing our understanding of these key aspects of the supply stack. We will provide our detailed observations and recommendations related to the NMPC and DSNY supply-demand shortfalls within our Preliminary Findings Report.

²³ The ILT 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 2027-28.

1.3.2 LNG

National Grid's two LNG plants at Greenpoint and Holtsville 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.²⁴ 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 on-system 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 initial 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 supply shortfall in 2027-28, we will keenly focus on the implications of completion of the Iroquois ExC project and the need for Vaporizers 13/14 at Greenpoint, as well as the relative benefit to the system of either of those projects on their own. While we will form our own conclusions, we recommend that the Company clarify their perspectives on the relationship between these two supply projects.²⁵

1.3.3 CapEx

National Grid provided PA with CapEx forecasts from 2024-50, for NMPC, KEDLI and KEDNY and each scenario.²⁶ Each forecast includes National Grid's projection of capital requirements needed 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, we believe customer fuel conversions will continue to drive those CapEx requirements. Alternatively, customer growth investments cease in the AE Scenario beginning in 2034. We discuss several aspects of the Company's CapEx forecast in Section 6.

1.3.4 Demand

PA believes three main dynamics will shape the Company's forecasted annual sales and peak demand 1) declining organic growth in customer counts driven by evolving service territory demographics (i.e., macroeconomic factors), 2) 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 3) downward pressure on customer counts, UPC and sales from electrification and EE – a combination of gas customers installing heat pumps and leaving (or reducing reliance on) the gas system and falling UPC, driven by a combination of technological change, state and federal policy evolution, and local laws.

Based upon our review of regional macroeconomic forecasts, we predict slowing to negative population growth, which when coupled with legislation prohibiting certain fossil gas fueled equipment and building systems, as well as federal and state incentives, will cause a decline in the number of new gas heating customers.²⁷ We also observe that customers on FO present a unique challenge with respect to New York natural gas utility decarbonization goals and strategies: while macroeconomic and regulatory forces work to

²⁴ Source: ILT Plan and Company's response to PA 1-2.

²⁵ 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 2027-2028.

²⁶ Company's response to PA 1-27.

²⁷ Implementing the All-Electric Buildings Act requires the Building and Energy codes to prohibit the installation of fossil-fuel equipment and building systems (any equipment or infrastructure excluding cooking equipment used for combustion or supply of fossil fuels) beginning December 31, 2025, for new buildings of seven stories or less, and December 31, 2028, for all new buildings regardless of size or building type.

limit the growth of gas usage, residential and commercial gas customers could continue to grow as a share of customers switch from FO to gas. More specifically, 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. Below we summarize our key observations that suggest the annual retail volumes and Design Day forecast are over-stated.

- We interpret New York State's All Electric Buildings Act and NYC's legislation (embodied in Local Law 154²⁸) aimed at electrifying most newly constructed and substantially retrofitted buildings as potentially consequential moves that will impact gas demand by limiting new customer growth in the Residential, Commercial and Multi-Family customer classes in KEDNY and part of the KEDLI territory²⁹
- The latest economic and demographic forecasts imply a future market landscape that suggests a less optimistic environment for customer growth.
- Incorporation of 2023 actual volume data suggests upward step-changes in the UPC forecast for several customer classes.
- Sound arguments exist for lowering the UPC forecast for the KEDLI Multi-Family customer class and the KEDLI meter count forecast for the Residential Heating customer class.
- As discussed elsewhere in this report electrification trends, improving heat pump economics and decreases in heating degree days will also impact customer counts, UPCs, volumes and Design Day demand.

Finally, PA learned that the Company's 2024 Annual Load Forecast (the June 2024 Update) will be used in development of the Company's revised NGLTP. PA recognizes that the sales forecast continues to evolve and plans to update our analysis of sales, customers, UPC, peak days and bill impacts based on the Company's June 2024 Update.

1.3.5 Economic

In the ILT 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 also identify several key assumptions which we believe may result in an under-estimate of bill impacts throughout the forecast period. The Company should consider revisiting these assumptions in future iterations of the NGLTP.

PA anticipates that accelerated electrification and policies across New York will lessen demand for gas in the future and increase the pace of heat pump adoption and electrification. All else equal, lower gas volumes over time will result in higher bill impacts for customers on the gas system. Second, costs associated with the development of low-carbon fuels (LCFs) may be under-estimated, given the nascent commercial scale, limited supply, and high demand. Higher costs for gas supply blended with LCFs will drive system costs upward, resulting in higher gas bills for customers. Third, the combination of lower volumes and high gas costs associated with the blending of LCFs could drive the economics of heat pumps and electrification to become more favorable over time. Paired with policy and electrification incentives, PA observes that heat pump adoption and economic favorability could be under-valued by the Company in the ITL Plan.

During a SME discussion, the Company revealed 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

²⁸ The Law amends the administrative code of the City of New York, in relation to the use of substances with certain emissions profiles and directs the Commissioner of Buildings to deny construction documents and permits in connection with a building that would require the combustion of these substances, with some exceptions (See <https://legistar.council.nyc.gov/LegislationDetail.aspx?ID=4966519&GUID=714F1B3D-876F-4C4F-A1BC-A2849D60D55A&Options=ID%7CText%7C&Search=combustion>).

²⁹ KEDLI's territory includes portions of Queens County that fall in New York City limits and are therefore affected by the impacts due to Local Law 154.

customers are forecasted to be left in certain customer classes to pay the revenue requirement of that rate class. PA considers additional analysis and discussions on how best to potentially eliminate or minimize this cross subsidization risk an important area of further assessment going forward.

In their ILT Plan, the Company included benefit cost analysis (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 . However, all three of the benefit cost ratios are less than 1.0, meaning the present value of costs outweighs the benefits. PA plans to work with the Company to develop a deeper understanding of the BCA and how the Company can adjust the scenarios to result in more positive benefit-cost ratios. 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 (DACs). The Company is working to operationalize processes to enable more detailed analysis and updating of information on regular cadence. PA encourages the Company to developing targeted analyses to inform the bill impact of the decarbonization scenarios 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 ILT Plan, including the potential GHG emissions associated with the Company's scenarios and their plans to blend LCFs into the gas network. The Company has conducted an assessment of the emissions impact of the two decarbonization scenarios relative to the Reference Case scenario using the New York Department of Environmental Conservation (NYDEC) current accounting framework.³⁰ 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 reduce emissions over one billion metric tons of CO_{2e} by 2050. The ILT Plan presents strong reliance on LCFs and increasing electrification to achieve these emission reduction results. PA plans to work with the Company to further understand the impact of limited supply and high costs of LCFs and electrification on the practicality of achieving these large reductions in emissions throughout the forecast period.

1.4 Recommendations to Improve the ILT Plan

In this section we summarize our Initial Report Recommendations that are designed to improve upon the Company's ILT Plan. PA will continue to refine our recommendations based on additional data received from the Company, Stakeholder comments, or any refinements by the Company to the NGLTP as we prepare our Preliminary Findings Report.

1. Address the inherent risks of relying on delivered services supplies and the costs they may represent to customers.
2. While the ILT Plan does acknowledge the limitations of CNG in the context of replacing existing LNG capacity and notes a wariness to rely too heavily on incremental CNG injection sites, it does not explicitly discuss these risks (e.g., operational and execution risks, market limitations) in the context of using incremental CNG injection sites to meet Design Day demand. PA recommends discussing the limitations of, and risks of overreliance on, additional CNG sites.
3. Delivered services and city gate peaking services are not discussed at length in the ILT Plan and the Company does not acknowledge the limitations and costs in relying on these types of capacity. PA recommends discussing the risks associated with procuring and relying upon incremental city gate peaking supplies and the heightened costs these types of contracts may represent to ratepayers.

³⁰ NYSEDA (2023). "Fossil and Biogenic Fuel Greenhouse Gas Emission Factors". Available at: <https://www.nyseda.ny.gov/-/media/Project/Nyserda/Files/Publications/Energy-Analysis/22-23-Fossil-and-Biogenic-Fuel-Greenhouse-Gas-Emission-Factors.pdf>.

4. The ILT Plan does not explicitly acknowledge that volume of cogen peaking capacity that is at risk in DSNY, how the Company intend to address these shortfalls, or to what degree these contract expirations may influence or alter the Company's projected supply-demand shortfall. PA recommends the Company include this discussion to properly express the degree to which the projected supply-demand shortfall may vary.
5. The Iroquois ExC project is a key supply source across the three scenarios, especially in the near term. PA recommends the Company explicitly explain whether they believe that there are any viable alternatives to the Iroquois ExC project to bridge the supply-demand gap that the Company projects in 2027-28 and emphasize the degree to which KEDLI and KEDNY are reliant on completion of a project over which the Company has no control.
6. The benefits to the DSNY distribution system of the Iroquois ExC project and the Greenpoint Vaporizers 13/14, separately and jointly, should be clearly explained.
7. The ILT Plan does not quantify or discuss the level of CapEx the Company anticipates under any planning scenario, other than providing a list of LNG Plant Maintenance projects in Section 4.4.1. Stakeholders should be provided with information about the investments that ultimately drive the bill impacts included in the ILT Plan.
8. Details identifying the major projects and programs included in the investment categories making up the Company's CapEx forecasts should be included in the RLT Plan. As an example, the nature and scope of on-system supply projects should be clearly explained.
9. The Company should explain why the LPP replacement programs at NMPC, KEDLI and KEDNY companies are forecasted to be completed one year later in the Reference Case CapEx forecasts than in the CEV and AE Scenario forecasts.
10. Discuss and illustrate the impact of specific exemptions to the state and local laws and policies, as it relates to the development of customer, UPC and sales forecasts.
11. Discuss the impact of weather trends as it relates to the development of customer, UPC and sales forecasts.
12. Clearly identify and include the costs associated with Utility Thermal Energy Networks (UTENs), 100% hydrogen distribution infrastructure, and any other costs that may not currently be accounted for into the bill impact analysis to ensure all costs are taken into account and stakeholders have a holistic view of the total costs associated with the Company proposed pathways in their assessment of the long-term plan.
13. Include the implications of reduction in delivered gas volumes as a result of warming trends and energy efficiency upgrades driven by federal and state incentives, in development of the forecasts for UPC and sales to improve the accuracy of their gas sales forecast and bill impact analyses.
14. Develop a view on the economics of heat pumps for space heating and water heating in the Company's service territory from the perspective of customers for various customer classes (at minimum for residential and small commercial customers) and how it will change over time as gas rates increase overtime.
15. Retrieve customer information specific to low- and moderate-income customers to better inform the bill impact of the decarbonization scenarios on these vulnerable customers. Further investigate and consolidate the list of barriers that exist for deploying electrification solutions (e.g., heat pumps) across the Disadvantaged Communities and potential solutions that can help the Company overcome these barriers.
16. Conduct a study to show how fuel blending with RNG and hydrogen would impact a representative customer bill within a Disadvantaged Community or a low-income customer over time and the potential impact on energy assistance programs.
17. Conduct a comprehensive (gas and electric) share of wallet analysis to understand the bill impact of each Scenario on customers' affordability and how potential shifting costs from gas to electric bill would look for each customer class.
18. Develop a more robust view on the role of targeted electrification that could lead to abandonment/retirement of the gas network in certain geographies. Quantifying the number of rebates

or subsidies required to close the financial gap to incentivize electrification in certain regions and among certain customer types that will emerge from this analysis would be a valuable exercise.

19. Further describe the practicality of securing an RNG market share of 7.2% of average potential RNG in the eastern U.S. given the limited RNG supply and high demand at projected price points and proximity to the Company's territories. Develop a view on the potential feasibility of a targeted use of RNG and hydrogen in a limited geography for hard to electrify commercial and industrial customers rather than blending these LCFs with the natural gas supply across the entire system.
20. Conduct an analysis to determine the price point where blending RNG or hydrogen be more expensive than using heat pumps for space heating in residential and small commercial buildings.

Our analysis of the Company ILT Plan and development of this Initial Report resulted in the observations and conclusions summarized above in this Executive Summary and discussed in greater detail within the following sections of this Initial Report. The Company has provided significant amounts of data, which PA continues to review. Further, additional SME meetings have been scheduled. As noted in several places in this report, PA's analysis is continuing with plans to address several areas in more detail in our Preliminary Findings Report.

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 includes 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 ILT Plan. This review is being conducted for the Department pursuant to requirements of the Commission in its Planning Proceeding Order. The Planning Proceeding Order specified that the independent review address specific criteria related to long-term gas plans, including but not limited to:

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

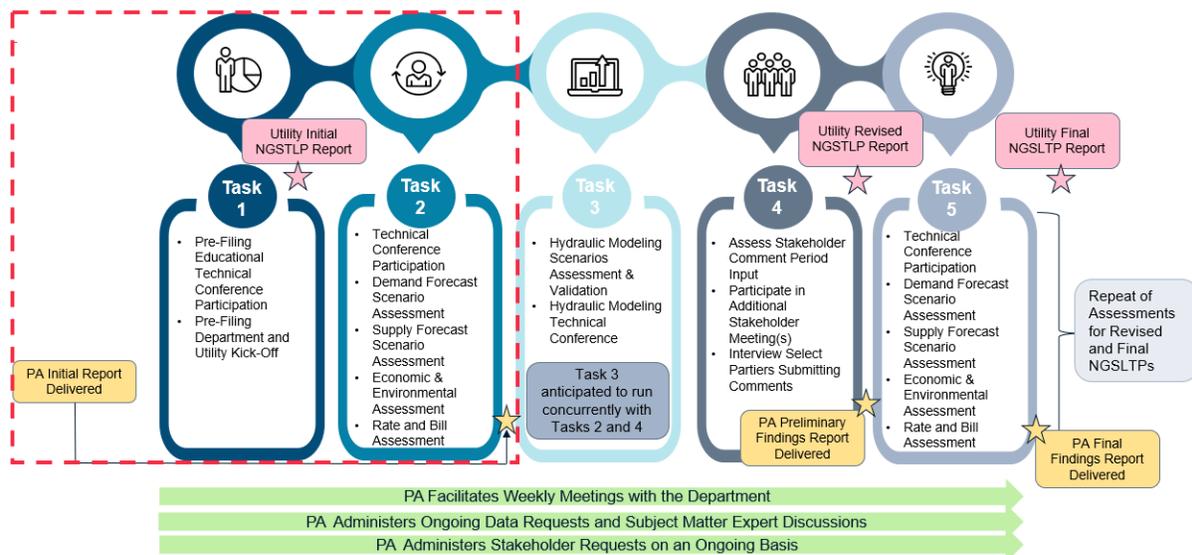
This Initial Report summarizes our initial findings and observations pertaining to the ILT Plan, outlines suggested improvements for the Company to consider and provides additional details on our planned assessment as well as other important considerations for PA as we develop our subsequent Preliminary Findings and Final Findings Reports.

2.1 Scope of Work

PA's initial review of the ILT Plan was conducted over approximately three months. During this time frame, PA submitted and received responses from the Company to over 100 data requests, held several virtual meetings with various SMEs from the Company, and attended the virtual pre-filing and post filing technical 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 and our plan for the remainder of the evaluation process.

Figure 2-1: PA Scope of Work and Schedule



We have organized our Initial 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 ILT Plan which cumulatively provide the basis for PA's overall initial recommendations. PA notes that additional analysis will be conducted as the Company provides additional information in response to data requests, modifies the ILT Plan, and addresses stakeholder feedback over the next several months. This Initial Report outlines the key areas where additional analysis will be completed by PA in preparation of our Preliminary Findings Report. Below is a list of the key topics we will cover:

- Stakeholder Engagement, including:
 - Technical Conferences
 - Data Requests
- Supply Assessment, including:
 - Existing Supply
 - Supply Stack
 - Hydraulic Modeling
- LNG Assessment, including:
 - Greenpoint
 - Holtsville
 - Winter Storm Elliot
- CapEx Assessment, including:
 - General Observations
 - Transmission CapEx
 - New Business CapEx
 - Distribution Improvements CapEx
 - Leak Prone Pipe Replacements CapEx
 - CNG and LNG CapEx
 - On-System CapEx
 - Future of Heat CapEx
- Demand Assessment, including:
 - State and Local Policy

- General Overview
- Annual Average UPC
- Annual Volumes and Design Day Demand
- Clean Energy Programs
- Economic Assessment, including:
 - Bill Impact
 - Disadvantaged Communities
 - Benefit Cost Analysis
- Environmental Assessment, including:
 - GHG Emissions
 - Low Carbon Fuels

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 facilitate a robust stakeholder engagement process. Within this section of our Initial Report, we discuss the stakeholders engaging in the proceeding and technical conferences held to date, all of which we will continue to refine throughout this process. PA includes summaries of the pre-filing technical conference, facilitated by the Department, and subsequent technical conferences facilitated by Staff.

3.1 Technical Conferences

The DPS, customers and stakeholders had the opportunity participate in several Technical Conferences throughout this proceeding. Below we summarize the Technical Conferences held to date. PA participated in each of these conferences.

- May 8th: Pre-Filing Educational Technical Conference
- June 27th: Long-Term Plan Technical Conference
- July 17th: Downstate Joint Proposal and NMPC Rate Case Technical Conference
- August 28th: Clean Energy Programs Technical Conference
- July 30th: Demand Forecast Technical Conference
- September 5th: Low Carbon Fuels Technical Conference

Stakeholders have and will continue to have the opportunity to attend various Technical Conferences, submit data requests and file comments on the various iterations of the long-term plans put forth by the Company. In the following section we discuss the data requests issued to-date.

3.2 Data Requests

Both PA and the stakeholders identified questions for National Grid, which PA then submitted to the Company via email. The Company notifies PA once the responses have been posted to the Company's file sharing website known as DREAM and shares them via email. PA then informs the stakeholders once their responses have been uploaded to DREAM.

Specific comments expected to be filed by Stakeholders will be addressed in future PA reports.

4 Supply Assessment

PA has undertaken its review of several supply and supply-related aspects of the Company's NMPC and DSNY systems, based on information presented in the ILT Plan, the Company's responses to several data requests, and SME discussions. Our initial 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.

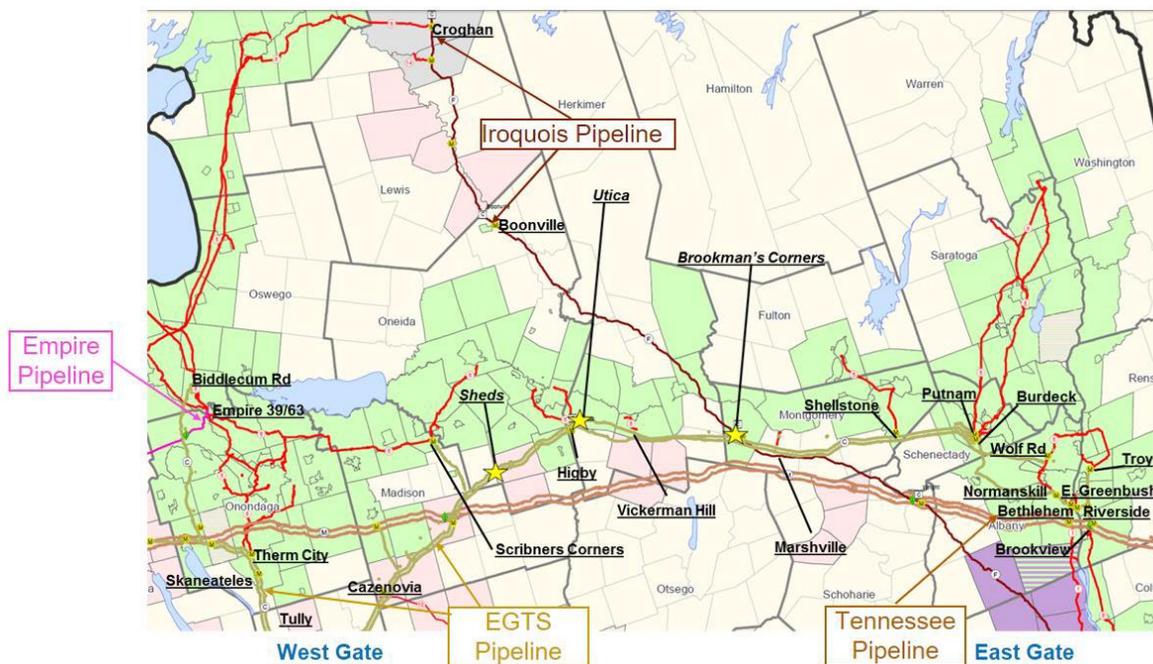
For winter peaking needs, the Company relies on a diverse portfolio of natural gas delivered through different sources and modes of delivery, namely: firm pipeline and storage, LNG, CNG, cogen / capacity release, city gate peaking, and RNG. In the ILT Plan, the Company indicate Design Day Demand will exceed available gas supply capacity in National Grid's Downstate and Upstate service areas, due to increasing Design Day Demand and relatively little spare supply.

PA is continuing to analyze the Company's demand forecasts. Given the importance of reliable supply for meeting customer demand, PA will continue to explore these key supply issues in conjunction with our demand analysis and will include relevant observations in our Preliminary Findings Report.

4.1 Assessment of Existing Supply

National Grid's NMPC territory is similarly 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, Iroquois, and 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.

Figure 4-1: National Grid NMPC Map³¹

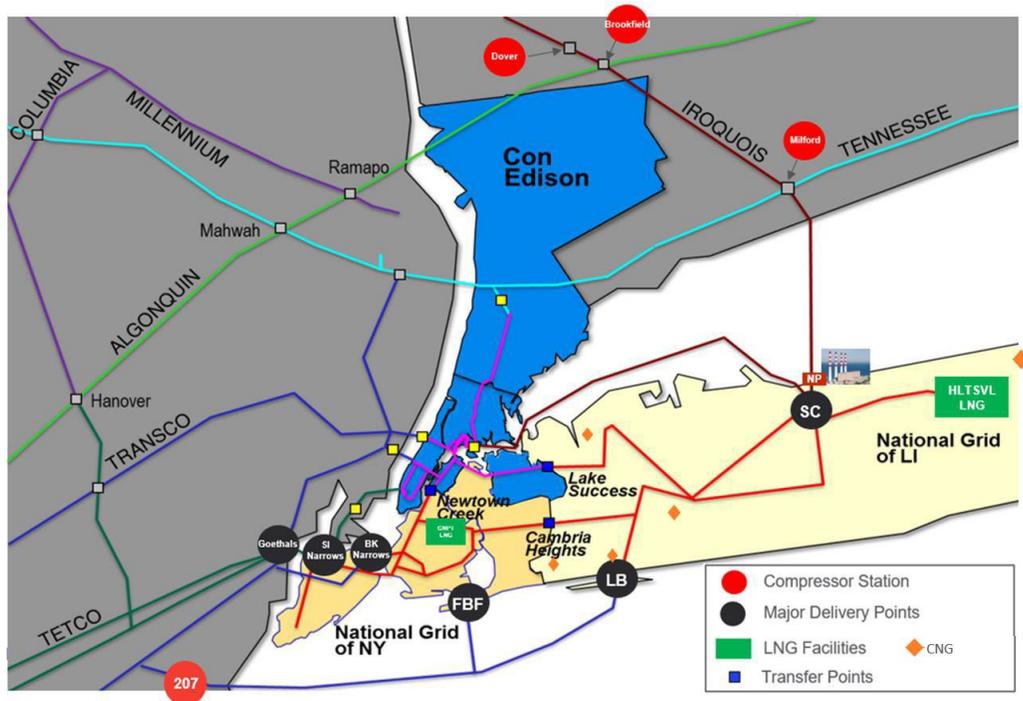


National Grid's DSNY territory, comprised of KEDNY and KEDLI, is served by four interstate pipelines: Transcontinental Gas Pipeline (Transco), Iroquois Gas Transmission (Iroquois), Texas Eastern Transmission Pipeline (TETCO), and Tennessee Gas Pipeline (TGP). These pipelines interconnect either directly through city gates connected to the utilities' delivery systems or indirectly to city gates on Con Edison's distribution

³¹ Source: ILT Plan, Section 2.2.2.

system and delivering gas through jointly owned and operated infrastructure subject to the NYFS Agreement as shown in Figure 4-2.

Figure 4-2: National Grid DSNY Map³²



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 10-year study period. The total contracted supply stack for the upcoming 2024-25 winter season stands at just over 2,957 MDth/d of Design Day capacity in DSNY and just under 1,015 MDth/d of Design Day capacity in NMPC.³³ 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 supply 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.

Figure 4-3: Upstate Design Day Supply Stack³⁴

³² Source: ILT Plan, Section 2.2.2.

³³ Source: Company’s response to PA-012.

³⁴ PA Consulting does not yet know the expiration dates for NMPC cogen peaking / capacity release volumes and has assumed that they are renewed for the study period.

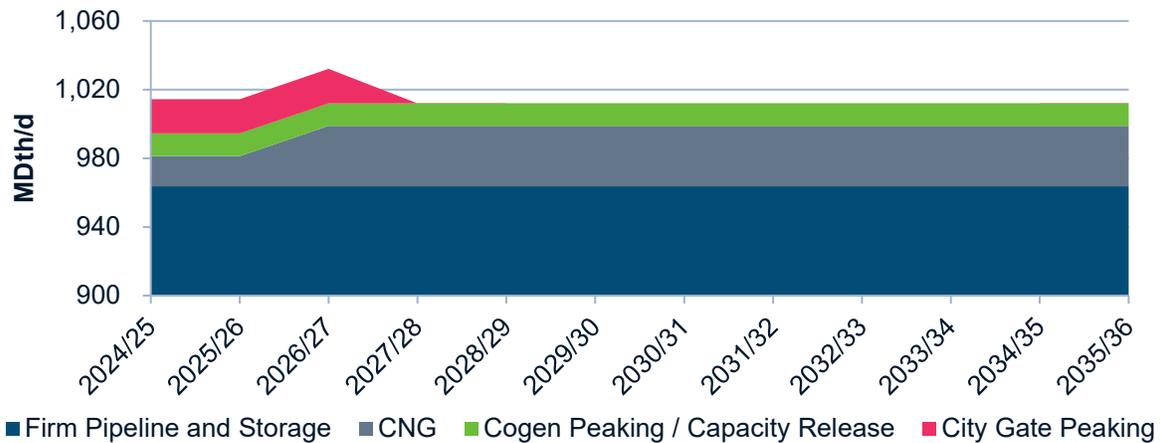
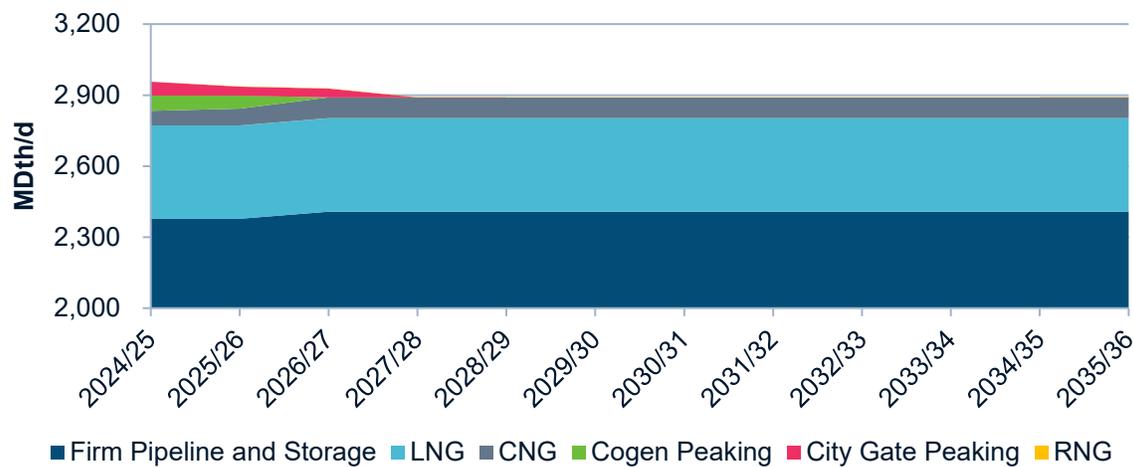


Figure 4-4: Downstate Design Day Supply Stack³⁵



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

4.2.1 Upstate Supply Stack

The Company has projected that a supply-demand gap will emerge in the NMPC area beginning in 2030-31.³⁶ It appears that the potential addition of 60 MDth/d of capacity from Empire in the western part of their service territory would push this shortfall out to 2042-43. The Company has not commented on how the Design Day supply-demand gap would evolve under alternative scenarios outside of the Reference Case. In the coming Preliminary Findings Report, PA will analyze the potential shortfalls in the context of PA’s analysis of the Company’s demand forecast.

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.³⁷ These contracts are held primarily on EGTS, TGP, and Iroquois.

In the ILT Plan, the Company noted that an incremental 60 MDth/d of capacity is available on the Empire Pipeline for delivery at NMPC’s West Gates and that the existing delivery system can receive the incremental volume. Apart from the 60 MDth/d of incremental capacity on the Empire Pipeline that could be acquired, the

³⁵ Source: Company’s response to PA-012.

³⁶ Source: ILT Plan, Section 4.14.2.

³⁷ Source: Company’s response to PA-012.

Company has not identified other opportunities to increase their portfolio of long-term contracts for NMPC, which is 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,³⁸ 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 years or less, and typically do not include renewal provisions though the offtaker (in this case the Company) could negotiate a renewal. The Company indicated 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. 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 intend to rely on them to meet Design Day demand. For these reasons, these contracts are best utilized as a peaking resource. In the ILT Plan, the Company should address the inherent risks of relying on these supplies and the costs they may represent to customers.

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 Energy Transfer Site #2 (ETS2).³⁹ 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 Peaking / Capacity Release Contracts

Capacity release contracts are arrangements by which an entity that holds contracted gas capacity on a pipeline is willing to release that capacity to a separate offtaker, often over a specific period of time within a given year. These contracts can run for multiple years and frequently do not have automatic renewal clauses, meaning both parties to the arrangements must mutually agree on terms for renewal. The NMPC portfolio includes 13.225 MDth/d of cogen capacity upon which NMPC can call.

Company’s De-Contracting / Re-Contracting Approach

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

4.2.2 Downstate Supply Stack

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 – jointly owned and managed by both National Grid and Consolidated Edison. The New York Facilities Agreement governs how the jointly 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 2027-28.⁴⁰ This projected supply-demand shortfall is in the context of the Reference Case only and does not consider how the timing and magnitude of these shortfalls changes in other scenarios. For DSNY, it appears that the Company has not fully considered how certain at-risk components of the DSNY supply portfolio may impact the timing and

³⁸ Source: Company’s response to PA-012.

³⁹ Source: ILT Plan, Section 4.4.2.

⁴⁰ Source: ILT Plan, Section 4.14.2

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 2,377 MDth/d with an expected 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 Supplies” discussion below).⁴¹ 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 purchase 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 58 MDth/d of city gate peaking capacity in their supply portfolio. Of this amount, 38 MDth/d is expiring before 2027-28 and the Company has indicated they will endeavor to renew this volume. The remaining 20 MDth/d of capacity is contracted through March 3, 2031 with extension options through March 31, 2036.

LNG/Greenpoint

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 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 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 that currently represent 61.6 MDth/d of capacity. Table 4-1 describes the characteristics of each CNG facility in the DSNY footprint.

Table 4-1: DSNY CNG Facility Summary

Facility Name	Design Day Capacity (MDth/d)	Contracted?	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	

⁴¹ Source: Company’s response to PA-012

Barrett	17.6	Yes	
Farmingdale	17.6	No	Facility is built and available for dispatch but is not contracted for CNG delivery.

Because the Farmingdale facility is currently in-service and capable of injecting CNG, but lacks contracts for CNG trailer delivery, the technically available CNG Design Day capacity is 61.6 MDth/d for the 2024-25 season. If contracts were in place to deliver CNG trailers to Farmingdale in 2024-25, the available CNG capacity would be 79.2 MDth/d. Once all facilities are upgraded and contracted, the total achievable Design Day output for all facilities will stand at 88 MDth/d.

The ILT Plan appropriately addresses limitations in overreliance on CNG including:

- Reliance on long-distance trucking during adverse weather,
- Skilled labor availability, and
- Logistical challenges related to CNG trailer availability.

However, most of this discussion is related to challenges associated with converting the Greenpoint facility into a CNG injection facility. PA believes it would be valuable to include more detail on the factors that the Company is considering in choosing to no longer pursue the construction of incremental CNG injection sites outside of the five currently in place in DSNY. PA believes that the NGLTP should more fully discuss:

- Reliance on long-distance trucking and the risks that poses during Design Day conditions,
- The ability to contract for additional CNG delivery and what limiting factors are at play,
- The relative cost of contracting for additional CNG when compared against other peaking options (like delivered services), and
- The operational and execution risks associated with calling on CNG to serve during a Design Day event: The Company referenced an example of Con Edison not receiving its expected volume of CNG.

Cogen Peaking Supplies

The DSNY utilities have just over 65 MDth/d of capacity that is provided by cogen facilities. In this report, we identify this capacity as “cogen peaking supplies.” The capacity is released from two separate entities and slated to expire. The Company has indicated that it can either attempt to negotiate a renewal or that it can issue an RFP to replace some of the lost capacity. The Company did not acknowledge the upcoming cogen contract expirations in the ILT Plan nor did they outline the options they have to address the loss of these components of its supply stack. Because the DSNY utilities have relatively little spare supply and, according to the ILT Plan,⁴² may experience a supply-demand shortfall of 31.5 MDth/d in 2027-28, it is critical that the Company conveys all components of their portfolio that may be at risk and the measures they have at their disposal and plan to implement 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.

Iroquois Enhancement by Compression

The Iroquois Enhancement by Compression (Iroquois ExC) project is under development by Iroquois Gas Transmission, LP 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, NYDPS published an assessment concluding that the project is necessary to ensure safe, adequate, and reliable gas service in DSNY.⁴³ The project is still awaiting air permits from NYDEC and from the Connecticut Department of Energy and Environmental Protection (CT-DEEP). FERC’s approval to begin construction is also required. The ILT 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 ILT Plan also indicates that

⁴² Source: ILT Plan Section 4.14.2.

⁴³ [Response Letter to DEC 02.26.2024 Re: Iroquois Enhancement by Compression \(ExC\) Project.](#)

there is a two-year minimum construction lead time between project approval and when Iroquois ExC would be in-service – longer than the eight months of lead time noted on Iroquois ExC’s project website which (as of the publishing of this report) cites that construction could be completed by January 1, 2027 if all necessary permits are available by fall 2025/spring 2026⁴⁴. 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 project best positioned to address the Company’s projected Design Day supply-demand gap in 2027-28. PA recommends that the Company state explicitly if they believe that there are any viable alternatives to Iroquois ExC to bridge the supply-demand gap that it projects in 2027-28 and acknowledge that it is reliant on a project that it is not directly responsible for finalizing. The potential for a supply-demand gap will also be impacted by the demand forecast. As noted in Section 7, PA is continuing its analysis of the demand forecast and will address the gap in more detail in its Preliminary Findings Report. However, explicit identification of viable alternatives, their associated CapEx requirements (if any) and cost characteristics will be critical for PA to complete this analysis.

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:

- Renewal rights associated with the contracts (yearly renewal, rollover agreements, negotiation, etc.),
- Cost and savings to customer,
- Flexibility for future demand variation,
- 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 what type of supply the Company would prefer to retain in order 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 the ILT Plan, 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 Hydraulic Modeling

A key part of PA’s assessment of the ILT Plan 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.⁴⁵ While we have begun our assessment, we recently learned through discussions with National Grid that updated models of the NYFS will be available in mid-September. Therefore, at that point, we paused our review until we can review the new NYFS models and other modeling results collectively with the Company’s SMEs.

4.3.1 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 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. As noted in Section 6, NMPC contemplates an

⁴⁴ [Iroquois ExC Project Website](#)

⁴⁵ Source: Company’s response to PA 1-2.

on-system supply project within the next five years. It appears that hydraulic modeling scenarios provided to PA do not include any scenarios that include such a supply asset.⁴⁶ We will explore the projected need for this project as we continue our assessment of NMPC hydraulic models generally.

4.3.2 Downstate

The KEDLI and KEDNY distribution systems are served in large part 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 the DSNY supply portfolio. Hourly volumes (as modeled) from each supply point vary with the demand forecast for a given winter season. As noted in Section 6, KEDLI contemplates an on-system supply project being placed in service in roughly 18 years. The hydraulic modeling scenarios provided to PA do not include any scenarios that include such a supply asset.⁴⁷ We will explore the projected need for this project as we continue our assessment of DSNY hydraulic models generally.

⁴⁶ The Reference Case CapEx forecast includes investments in an on-system supply project in 2030; the latest winter season for which hydraulic models have been provided is winter 2028-29.

⁴⁷ The Reference Case CapEx forecast includes investments in an on-system supply project through 2043; the latest winter season for which hydraulic models have been provided is winter 2028-29.

4.4 Recommendations to Improve the ILT Plan

Recommendations for the Company to improve the supply components of the ILT Plan are summarized below.

1. Address the inherent risks of relying on delivered services supplies and the costs they may represent to customers.
2. While the ILT Plan does acknowledge the limitations of CNG in the context of replacing existing LNG capacity and notes a wariness to rely too heavily on incremental CNG injection sites, it does not explicitly discuss these risks in the context of using incremental CNG injection sites to meet Design Day demand. PA recommends discussing the limitations of, and risks of overreliance on, additional CNG sites.
3. Delivered services and city gate peaking services are not discussed at length in the ILT Plan and the Company does not acknowledge the limitations, and costs in relying on these types of capacity. PA recommends discussing the risks associated with procuring and relying upon incremental city gate peaking supplies and the heightened costs these types of contracts may represent to ratepayers.
4. The ILT Plan does not explicitly acknowledge that volume of cogen peaking capacity that is at risk in DSNY, how the Company intends to address these shortfalls, or to what degree these contract expirations may influence or alter the Company's projected supply-demand shortfall. PA recommends the Company include this discussion to properly express the degree to which the projected supply-demand shortfall may vary.
5. The Iroquois ExC project is a key supply source across the three scenarios, especially in the near term. PA recommends the Company explicitly explain whether they believe that there are any viable alternatives to the Iroquois ExC project to bridge the supply-demand gap that the Company projects in 2027-28 and emphasize the degree to which KEDLI and KEDNY are reliant on completion of a project over which the Company has no control.
6. The benefits to the DSNY distribution system of the Iroquois ExC project and the Greenpoint Vaporizers 13/14, separately and jointly, should be clearly explained.

5 LNG

PA has begun a review of the Company's LNG infrastructure at Greenpoint (KEDNY), and Holtsville (KEDLI) and associated CapEx based on information presented in the ILT Plan, the Company's responses to several data requests, and SME discussions. In the sections below we provide an overview of each of these LNG plants. We also address the requirements related to Greenpoint that are outlined in the JP approved by the Commission on August 15, 2024, in KEDNY's most recent rate case (Case No. 23-G-0225). Additional observations about the CapEx forecast associated with LNG facilities are included in Section 6.6. We also comment on recent historical CapEx at each LNG facility below and 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 ILT Plan.

5.1 Greenpoint Energy Center

The Greenpoint LNG plant, a major 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 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.

According to Company testimony, refilling the tanks is accomplished through liquefaction during the spring and fall; 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.⁴⁸ See Figure 5-1 for a visual of the Greenpoint Energy Center.

Figure 5-1: Aerial View of Greenpoint Energy Center



⁴⁸ Direct Testimony of Gas Infrastructure and Operations Panel, Case No. 23-G-0225.

5.1.1 Recent CapEx Investments

KEDNY invested more than \$180 million of capital at Greenpoint during the period 2018-23. Table 5-1 summarizes the more significant projects.⁴⁹ PA is in the process of evaluating the scope of these investments, and the extent to which they inform investments included in the CapEx forecast and will provide its observations in our Preliminary Findings Report.

Table 5-1: KEDNY LNG CapEx (FY 2018-23)⁽⁰⁰⁰⁾

Category	Capital Expenditure (\$ million000)
Vaporizer 3 & 4 Replacement	\$54
LNG – Vaporizers 13 & 14 ⁵⁰	\$40
Truck Load / Unload Station	\$26
Salt Water Pump House Upgrade	\$19
Other Projects	\$43
Total CapEx	\$182

5.1.2 Joint Proposal

The Signatory Parties to the JP 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.”⁵¹ National Grid further committed to include in its ILT Plan a specific chapter addressing Greenpoint 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.⁵² The JP further indicates that the Signatory Parties expect each of our reports related to the ILT Plan will include a specific chapter regarding the Greenpoint LNG plant that will include, but not be limited to, an evaluation of the Company’s analyses required by the JP.⁵³ In its recent order in KEDNY’s rate case, the Commission indicated that the ILT Plan “provides the information required under the Joint Proposal.”⁵⁴

In our prior review of Vaporizers 13/14, we concluded that the project would increase the reliability of the Greenpoint facility by providing a backup vaporizer for the downstream low-pressure distribution system that does not currently exist.⁵⁵ PA will assess the Company’s Greenpoint analyses, including the supply, reliability, and CapEx aspects of Vaporizers 13/14, in the coming weeks and expects to comment in detail in our Preliminary Findings Report. We will incorporate our thoughts on the implications of the Design Day demand forecast, hydraulic models of the KEDNY system, and other factors, including the requirements of the JP as those are further evaluated with a view towards offering our opinion as to the role, if any, of the Greenpoint center through 2050.

5.2 Holtsville

⁴⁹ Source: Company’s response to PA 1-26.

⁵⁰ It is PA’s understanding that no Greenpoint 13/14 investments are 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.

⁵¹ Joint Proposal, p. 27.

⁵² Generally, and as stated in National Grid’s May 2024 Report entitled “Non-Pipeline Alternatives: Emerging Opportunities in Planning for U.S. 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.

⁵³ Joint Proposal, p. 27-30.

⁵⁴ August 15, 2024, Order in Case No. 23-G-0225 et. al, p. 76.

⁵⁵ 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.

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 a 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 the spring and fall; 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.⁵⁶

5.2.1 Recent CapEx Investments

KEDLI invested more than \$54 million of capital at Holtsville during the period 2018-23. Table 5-2 summarizes the more significant projects:⁵⁷ PA is in the process of evaluating the scope of these investments, and the extent to which they inform investments included in the CapEx forecast and will provide its observations in our Preliminary Findings Report.

Table 5-2: KEDLI LNG CapEx 2018-23

Category	Capital Expenditure (\$ million)
LNG – Controls System Upgrade	\$14
LNG – AESD System	\$8
LNG – Storage Building	\$7
Holtsville Plant Modernization	\$6
Other Projects	\$19
Total CapEx	\$54

5.3 Winter Storm Elliot⁵⁸

The ILT 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.

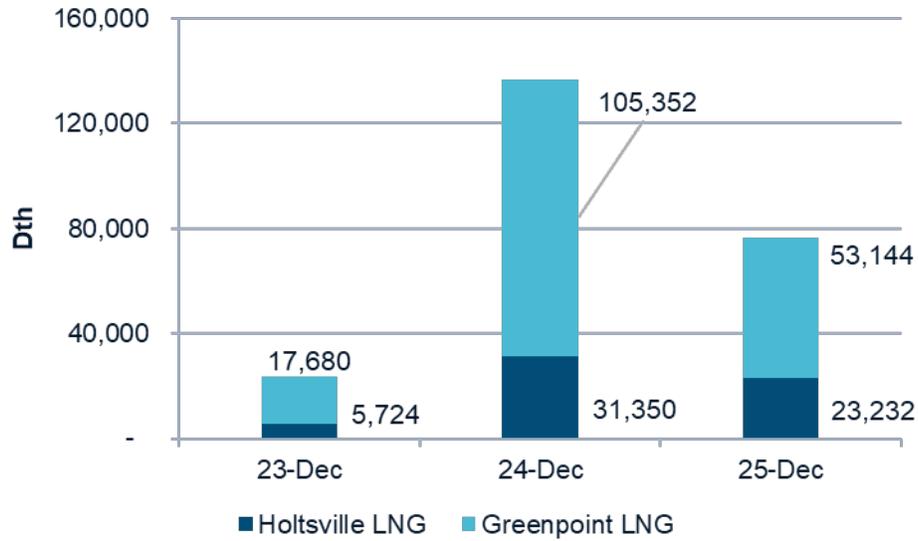
Supply losses occurred on all three interstate pipelines serving DSNY as a result of weather forecast errors, extreme and rapid temperature drops coupled with wind, rain and snow, pipeline compressor issues resulting in reduced delivery pressures at the KEDLI and KEDNY city gates, and producer under 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. Figure 5-2 below summarizes the level of supply provided by the LNG assets in late December 2022.

⁵⁶ Direct Testimony of Gas Infrastructure and Operations Panel, Case No. 23-G-0226.

⁵⁷ Company’s response to PA 1-26; it is PA’s understanding that “AESD” means Automated Emergency Shutdown.

⁵⁸ Source: ILT Plan, Section 4.2.1.

Figure 5-2: LNG Output during Winter Storm Elliott (Dth/day)⁵⁹



During the course of our assessment, PA will evaluate the LNG assets not only from a Design Day supply perspective, but also based on the degree to which the LNG facilities can offset disruptions in pipeline supply.

⁵⁹ Source: National Grid ILT Plan, Figure 4-1.

6 CapEx Considerations⁶⁰

While not specifically discussed in detail in the ILT Plan, it is PA's understanding that National Grid's scenario-based CapEx plans for the period 2024-50 support the objectives of each planning scenario. PA's initial observations of these investment plans are discussed below, particularly as those plans relate to safe and reliable delivery of supply and the ability to meet peak day demand. Our analysis within this section is largely based on the Company's responses to PA 1-26 and PA 1-27. In conversations with Company SMEs the week of September 16th, PA identified a number of updates and additional requests for data to better inform our CapEx analysis. PA recognizes the historical and forecasted CapEx data continues evolve and plans to update our analysis based on the most current information expected to be received following the filing of this Initial Report. We will work to better understand the various categories of investment in the coming weeks; we have requested additional details from the Company on the makeup of the CapEx forecast to better understand its components, and our work will be further informed by discussions with National Grid's subject matter experts. We will also work with National Grid to better understand its recent actual investments and how those may inform the overall forecast.⁶¹

In this Initial Report we will limit our comments to observations about the types of investments required to ensure reliable service for customers; in our Preliminary Findings Report we may also comment on other investment categories based on how those categories of investment influence the overall forecast for a given utility. Finally, in this Initial Report, we will focus primarily on the Reference Case forecasts of the three National Grid utilities. As we gain a better understanding of the key drivers of the other scenario forecasts, we will be better able to opine on how the CEV and AE forecasts differ.

National Grid has organized its CapEx forecasts under twelve categories of investment. We provide a brief description⁶² of those categories here to begin to establish a foundational understanding of the types of projects that are included in each category. As noted above, PA may not evaluate or discuss each category of investment in detail in this report.

- 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.⁶³
- Gas Transmission Asset Programs: investments related to the Company's transmission mains and related infrastructure.
- 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.

⁶⁰ All references to investment type and amounts in this section are based on the Company's responses to PA 1-26 and PA 1-27.

⁶¹ National Grid provided actual capital investments made in 2018-2023 in its response to PA 1-26. We observed that data is organized differently than the forecast information provided in PA 1-27. We have requested National Grid's assistance to help us understand how to translate the historical investments to the categories of investment in the forecasts, which will inform our understanding of investment trends.

⁶² 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. The categories for which we are providing comments in this report have been selected based on (1) their importance to long-term service reliability and (2) their relative contribution to the overall forecast of each LDC; therefore, the categories we discuss below differ by LDC.

⁶³ Source: ILT Plan, p. 144 and 192; Joint Proposal in Case No. 23-G-0225 et al., Section 7, Future of Heat (Filed April 9, 2024).

- 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).
- Meter: purchases of meters to either serve new customers or replace existing meters, including installation costs.
- 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 2024-2050)

6.1 General Observations

6.1.1 NMPC

NMPC’s CapEx forecast through 2050 is reflected in Figure 6-1 below. The forecast includes a system supply project in the Reference Case, with most of the investment occurring in 2029 and 2030; otherwise, the Reference Case forecast trend mirrors the CEV and AE Scenario forecasts through 2033. Annual investments in the early years of the forecast are approximately 20-25% higher in the Reference Case than in the CEV and AE Scenarios through 2030. Beginning in 2034, the CEV forecast outpaces the Reference Case by 60% through 2050. Moreover, the CEV forecast is nearly 2 ½ times that of the AE forecast during the same period. Future of Heat program (further described within Section 6.8) investments in the CEV Scenario are the primary driver of the difference between the CEV and Reference Case. Additionally, the CEV Scenario continues to include investments in customer growth in 2034 and beyond (at approximately 70% of the Reference Case forecast), whereas the AE Scenario includes none.

Figure 6-1: NMPC Total CapEx (2024-50)⁶⁴

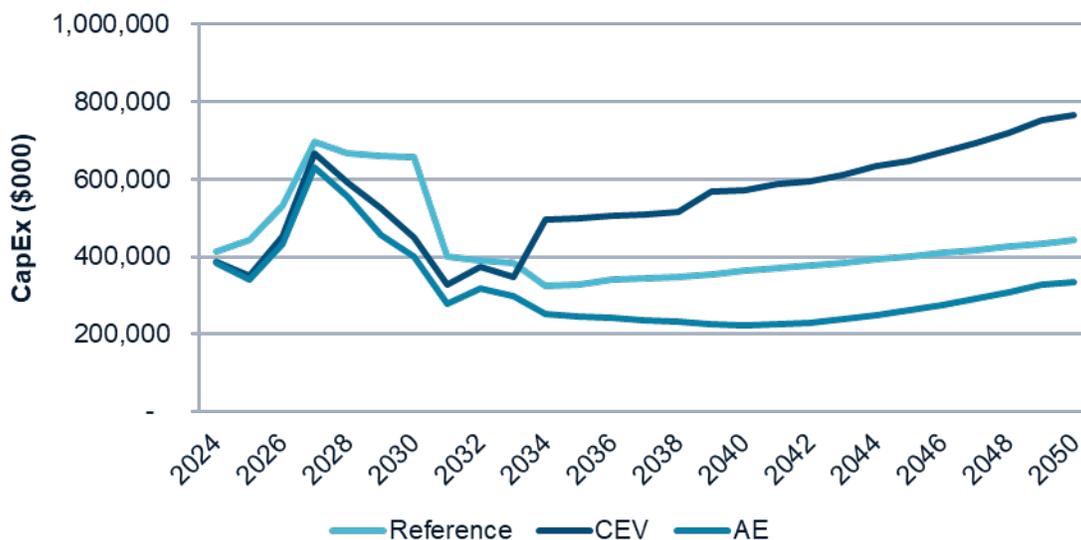
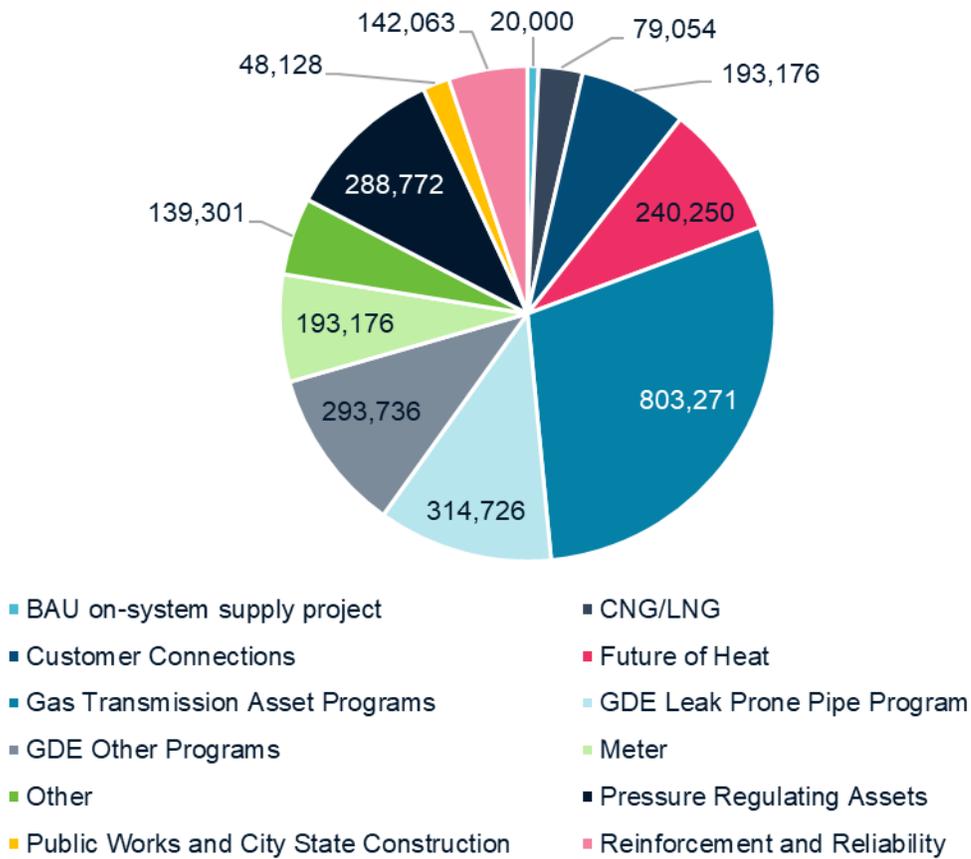


Figure 6-2 and Figure 6-3 below provide a high-level view of NMPC’s CapEx forecast by type of investment under the Reference Case. We have divided the forecast period into two pieces; Figure 6-5 represents the next ten years (2024-28) and Figure 6-6 summarizes the remainder of the forecast period (2029-50). We chose the breakpoint based on the prohibition on fossil fuels including new natural gas connections in any new building under New York’s All-Electric Building Act as of the end of 2028.

⁶⁴ Source: Company’s response to PA 1-27 and PA 1-27 Attachment 1_updated_08.13.2024.xlsx.

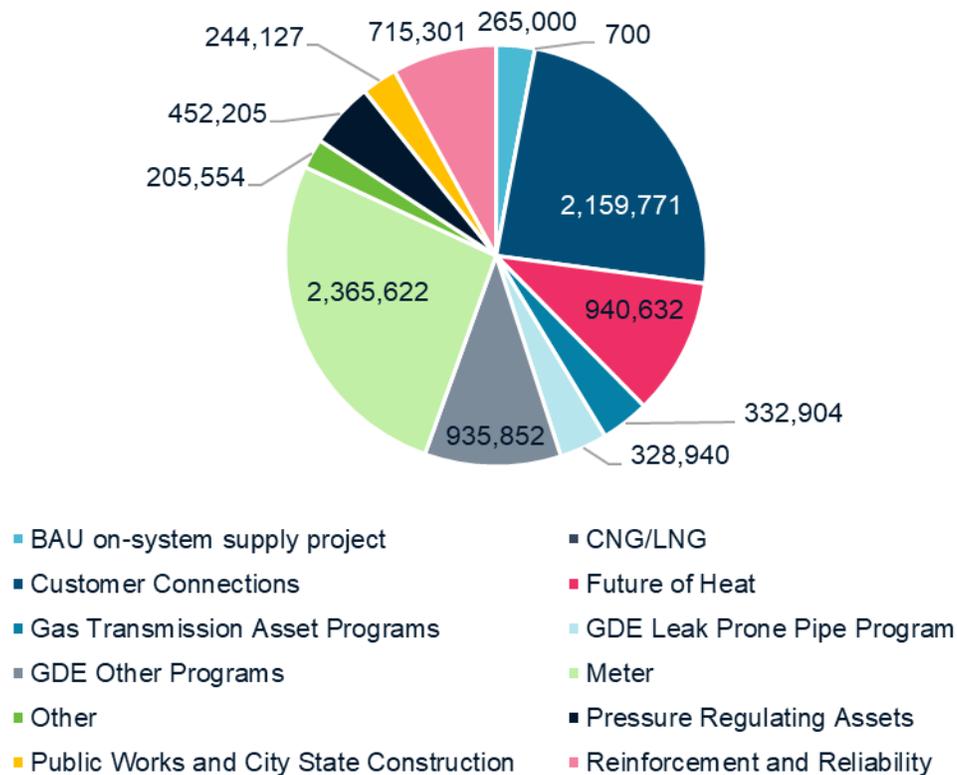
Figure 6-2: NMPC CapEx Forecast (\$000) Reference Case (2024-28)⁶⁵



As depicted in Figure 6-2, the most significant driver of CapEx investments in the next five years is investments in transmission assets (29% of the forecast). Four other types of investment each make up approximately 10% of the forecast for this period: GDE Leak Prone Pipe Program, GDE Other Programs, Pressure Regulating Assets, and Future of Heat investments. Growth (mains and service lines to serve new customers) makes up approximately 7% of the forecast; the average annual Growth CapEx in 2024-28 is approximately \$39 million.

⁶⁵ Ibid.

Figure 6-3: NMPC CapEx Forecast (\$000) Reference Case (2029-50)⁶⁶



The most significant investment category in the 2029–50 Reference Case for NMPC is the purchase and installation of meters – this includes meters for new customers and replacement meters and makes up 26% of the forecast. Another 24% of the forecast consists of investments supporting customer growth, with an average annual investment of \$98 million. Future of Heat investments make up 11% of the forecast. Replacement of leak-prone pipe is forecast to be completed in 2033 and makes up 4% of the forecast for this period.

6.1.2 KEDLI

KEDLI’s CapEx forecast through 2050 is reflected in Figure 6-4 below. The Reference Case contemplates a major system supply project beginning in 2039 and continuing through 2043 (with the majority of the investment being made in 2040-42); this project is reflected as the large spike in total CapEx during those years. Beginning in 2032, the annual investments under the CEV Scenario exceed those in the Reference Case. The annual forecast under the AE Scenario tracks closely with both the Reference and CEV Scenarios through 2027 and then begins to diverge; for example, in 2040 the AE forecast is approximately 50% of the CEV forecast. At a high level, it appears that difference is attributed to lower AE Scenario investments in the replacement of LPP as well as relocation work required by Public Works projects.

⁶⁶ Ibid.

Figure 6-4: KEDLI Total CapEx (2024-50)⁶⁷

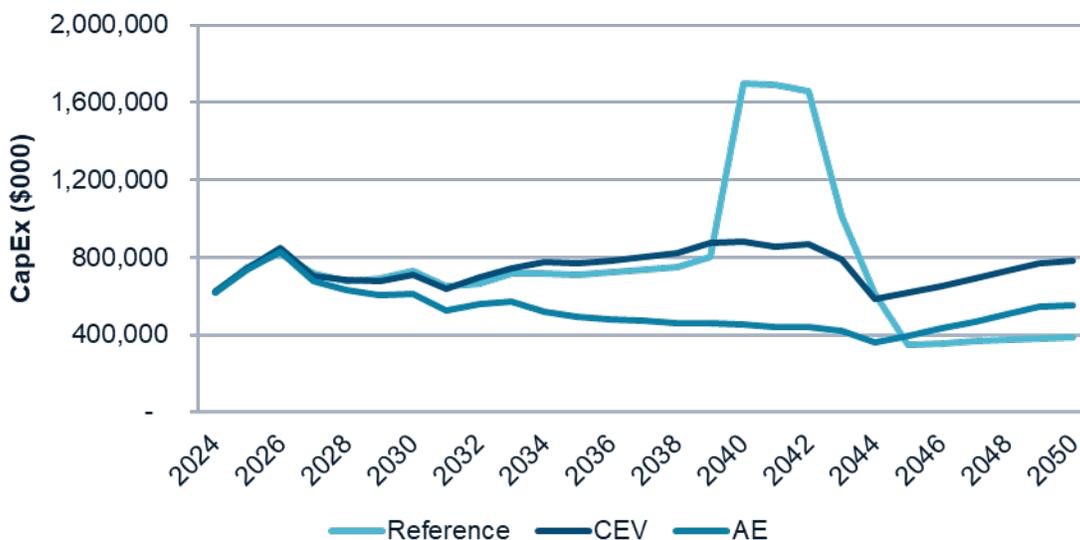
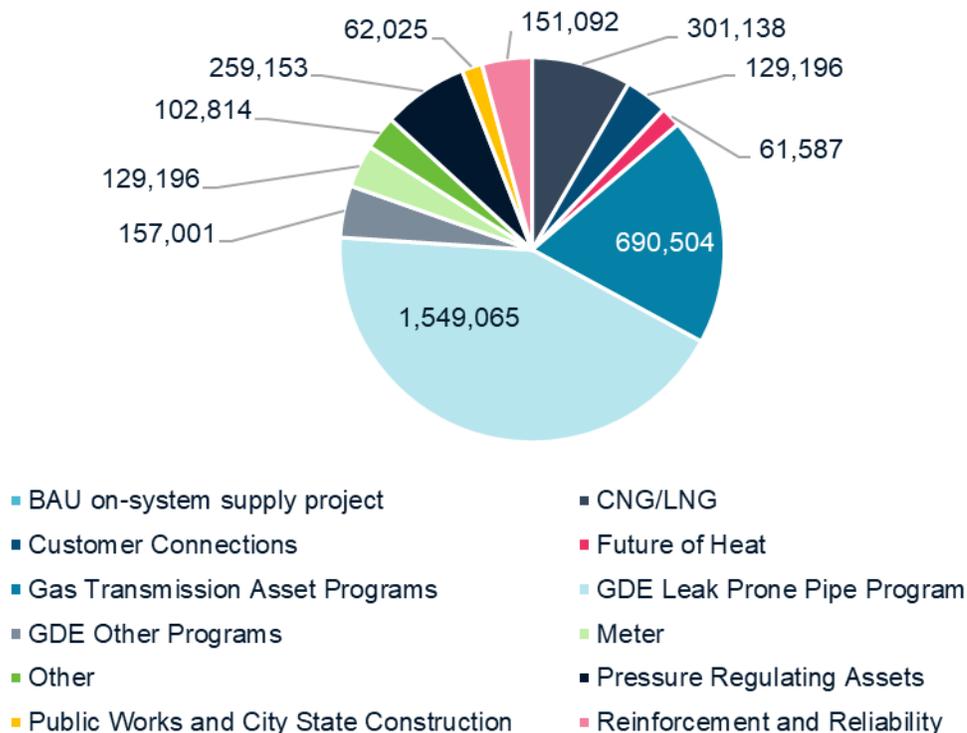


Figure 6-5 and Figure 6-6 below provide a high-level view of KEDLI’s CapEx forecast by type of investment under the Reference Case. We have divided the forecast period into two pieces; Figure 6-5 represents the next ten years (2024-28) and Figure 6-6 summarizes the remainder of the forecast period (2029-50). We chose the breakpoint based on the prohibition on fossil fuels including new natural gas connections in any new building under New York’s All-Electric Building Act as of the end of 2028.

Figure 6-5: KEDLI CapEx Forecast (\$000) Reference Case (2024-28)⁶⁸



As is clearly depicted in Figure 6-5, nearly two-thirds of the total CapEx investments in the next five years consist of eliminating leak-prone pipe from the system⁶⁹ and investments in the transmission system (43%

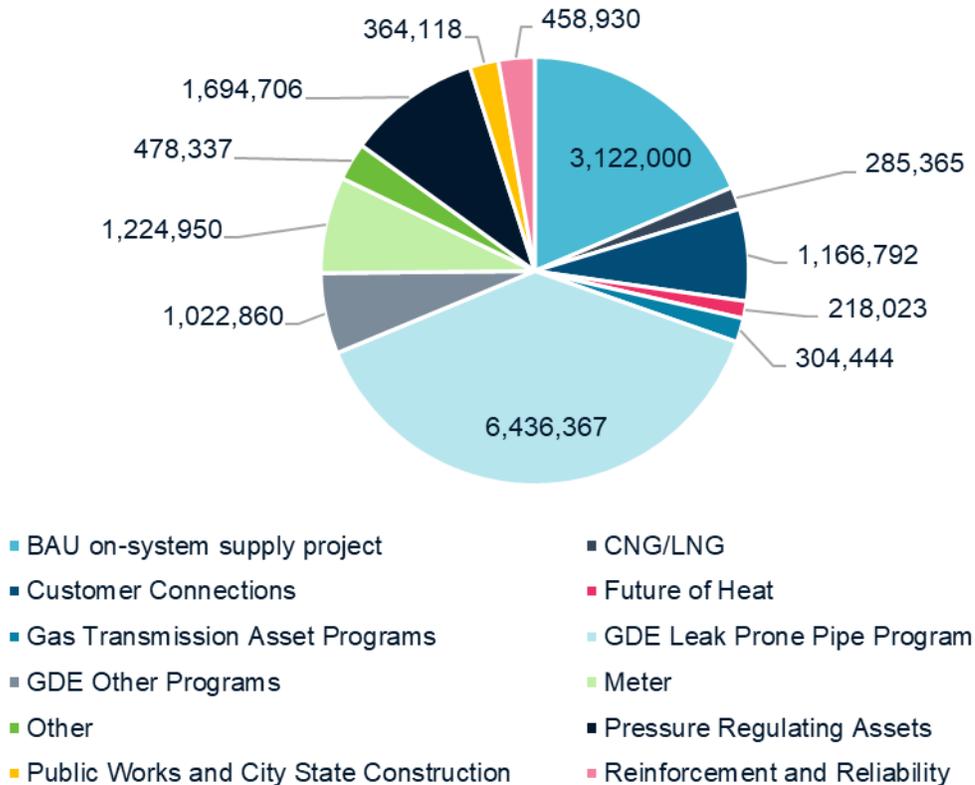
⁶⁷ Ibid.

⁶⁸ Ibid.

⁶⁹ Identified as Gas Distribution Engineering (GDE) Leak Prone Pipe Program.

and 19%, respectively). Investments in CNG/LNG and pressure regulating assets make up another 15% of the forecast for this period. Growth (mains and service lines to serve new customers) makes up approximately 4% of the forecast; the average annual Growth CapEx in 2024-28 is approximately \$26 million.

Figure 6-6: KEDLI CapEx Forecast (\$000) Reference Case (2029-50)⁷⁰



Replacement of leak-prone pipe continues to dominate the Reference Case forecast beginning in 2029, representing approximately 38% of total CapEx through 2050. KEDLI’s forecast reflects completion of that program in 2044. This supply project makes up another 19% of the forecast, with pressure regulating assets making up another 10%. Investments supporting customer growth make up about 7% of the forecast, averaging \$53 million annually.

6.1.3 KEDNY

KEDNY’s CapEx forecast through 2050 is reflected in Figure 6-7 below. Unlike KEDLI, no major system supply project is contemplated. Annual and total forecasted investments in the Reference and CEV Scenarios are relatively similar. At a high level, each category of investment is modestly lower throughout the forecast period in the CEV Scenario (with categorical differences ranging from \$97-\$641 million). The exception, as expected, is in the Future of Heat category where the total investment in the CEV Scenario (nearly \$5.7 billion) far exceeds the \$327 million in the Reference Case. This leads to the CEV Scenario forecast exceeding the Reference Case forecast by nearly \$2.1 billion on a net basis.

While all three scenarios reflect increasing annual investments through 2033, beginning in 2034 the AE Scenario trend shifts to declining annual investments. In 2040, the AE forecast is approximately 48% of the CEV forecast (and approximately 43% of the Reference Case forecast). At a high level, it appears that much of that difference is attributed to lower investments in the replacement of LPP, relocation work required by Public Works projects, and investments under the Future of Heat program, which is further discussed in Section 6.8.

⁷⁰ Source: Company’s response to PA 1-27 and PA 1-27 Attachment 1_updated_08.13.2024.xlsx.

Figure 6-7: KEDNY Total CapEx (2024-50)⁷¹

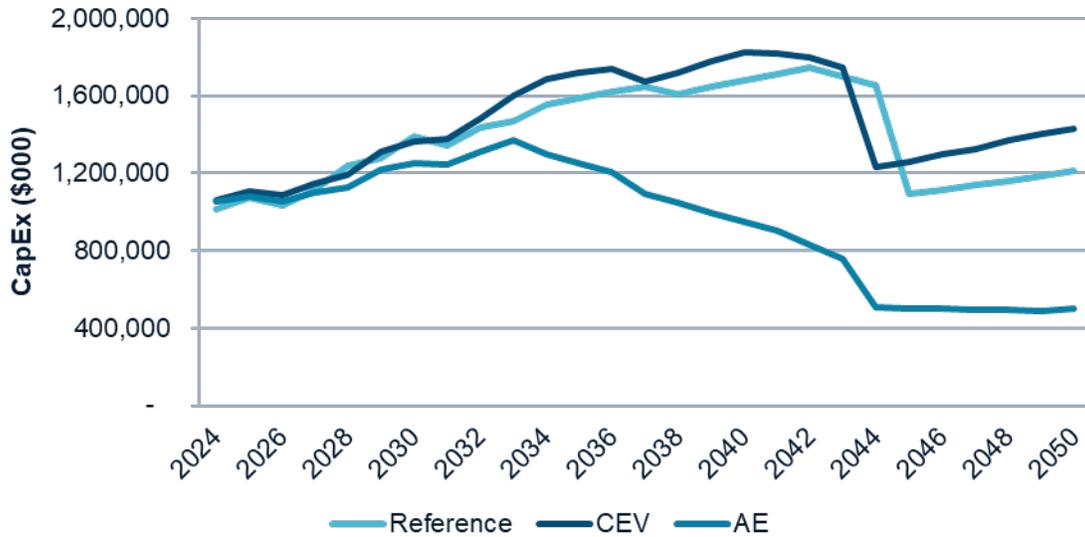
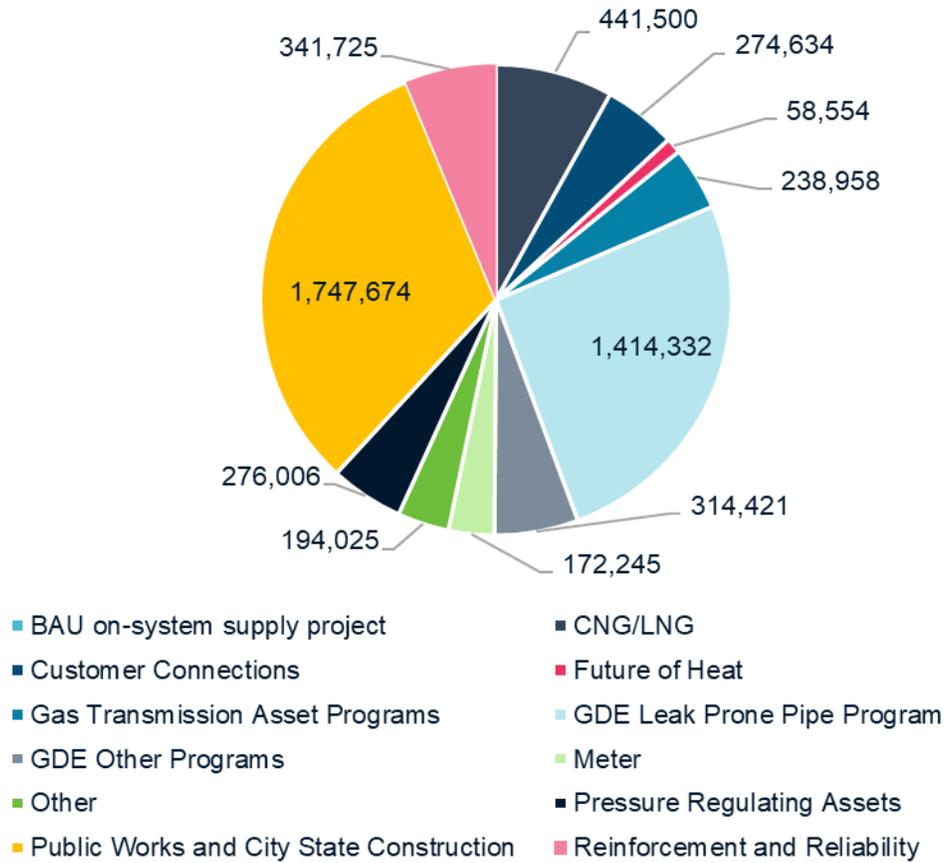


Figure 6-8 and Figure 6-9 below provide a high-level view of KEDNY’s CapEx forecast by type of investment under the Reference Case. We have divided the forecast period into two pieces; Figure 6-8 represents the next ten years (2024-2028) and Figure 6-9 summarizes the remainder of the forecast period (2029-2050). We chose the breakpoint based on the prohibition on fossil fuels including new natural gas connections in any new building under New York’s All-Electric Building Act as of the end of 2028.

Figure 6-8: KEDNY CapEx Forecast (\$000) Reference Case (2024-28)⁷²

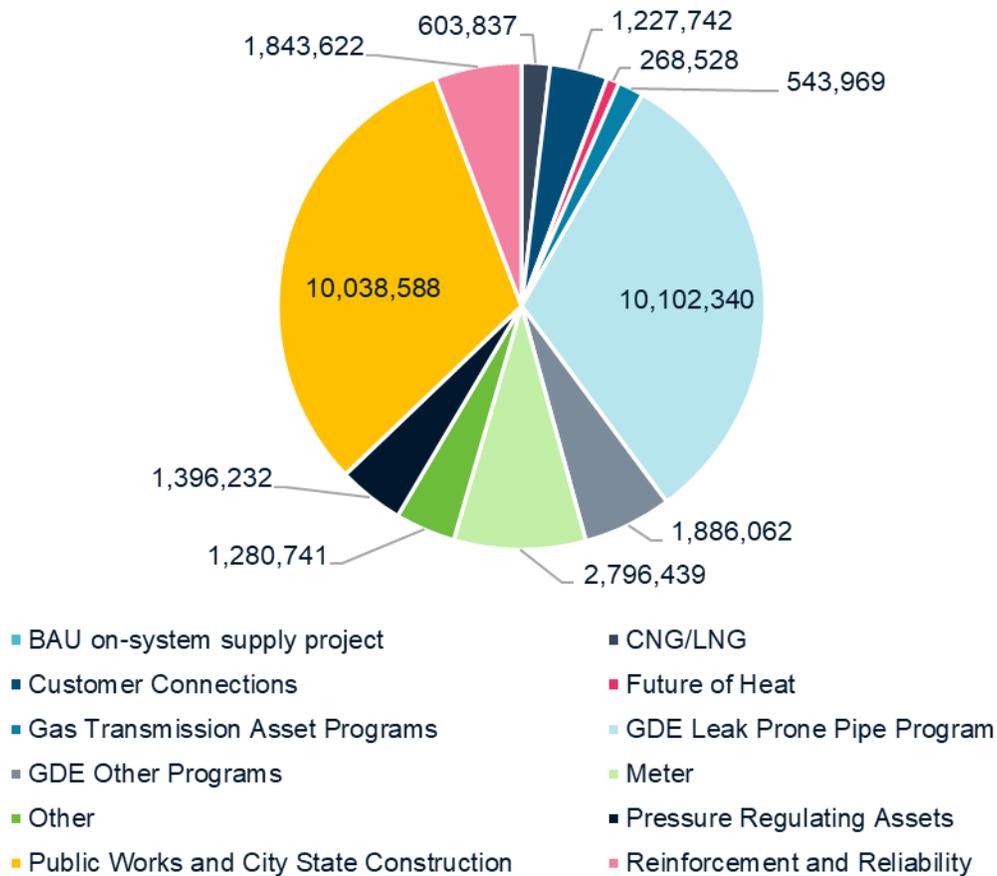


⁷¹ Ibid.

⁷² Ibid.

As depicted in Figure 6-8, the primary drivers of CapEx investments for the Reference Case in the next five years are relocation of gas infrastructure for Public Works and related projects, and elimination of leak-prone pipe from the system⁷³ (32% and 26%, respectively). Investments in CNG/LNG assets make up another 8% of the forecast for this period. Growth (mains and service lines to serve new customers) makes up approximately 5% of the forecast; the average annual Growth CapEx in 2024-28 is approximately \$55 million.

Figure 6-9: KEDNY CapEx Forecast (\$000) Reference Case 2029-50⁷⁴



Public Works and leak-prone pipe replacement investments continue to drive the Reference Case forecast beginning in 2029, collectively representing approximately 63% of total CapEx through 2050. KEDNY’s forecast reflects completion of that program in 2044. Investments supporting customer growth make up about 4% of the forecast, averaging \$56 million annually.

6.2 Gas Transmission Asset Programs

National Grid’s capital forecast for each of the three pathways includes material investments in transmission assets. Based on the timing of significant investments, it appears that much of the focus is on achieving compliance with Federal regulations. The Pipeline and Hazardous Materials Safety Administration (PHMSA) issued a final rule in October 2019 that requires operators of transmission lines to reconfirm the maximum allowable operating pressure (MAOP) of certain of those pipelines in their systems. In the absence of traceable, verifiable and complete records supporting the MAOP, compliance can be achieved by a number of means, including (among other alternatives) re-testing the pipeline, reducing the MAOP of the pipeline, or replacing pipeline segments for which the applicable records are not available.⁷⁵ PHMSA established an interim program milestone requiring that at least 50% of the pipelines requiring reconfirmation be completed by July 3, 2028, with 100% completion required by July 2, 2035.

⁷³ Identified as Gas Distribution Engineering (GDE) Leak Prone Pipe Program.

⁷⁴ Source Company’s response to PA 1-27 and PA 1-27 Attachment 1_updated_08.13.2024.xlsx.

⁷⁵ The complete list of alternatives may be found at [eCFR :: 49 CFR 192.624 -- Maximum allowable operating pressure reconfirmation: Onshore steel transmission pipelines.](https://www.ecfr.gov/current/title-49/chapter-I/subchapter-B/part-192/subpart-192.624)

The transmission pipelines in the Company’s system ensure that required gas volumes are delivered to the various distribution regulator stations throughout the service territory at or above established minimum design pressures. In preparation of our Preliminary Findings Report, PA will assess whether reducing the pressure on any existing transmission system is feasible from a reliability perspective. It is PA’s opinion generally that there is an inherent risk of failure associated with re-testing these pipelines – with the consequences of such failures being particularly challenging in metropolitan areas -- which often have been in service for decades. PA is also aware that the replacement path is not uncommon as operators across the United States address this type of compliance issue. We will further assess this and other programs, as well as the associated drivers of the forecasted investments, as our analysis progresses. We provide additional initial observations for each of the three companies below.

The scope of investments in transmission assets through 2050 is likely to go beyond work required to achieve MAOP Reconfirmation compliance. PA will confirm the makeup of the transmission investments included in the CapEx forecasts and will provide additional observations in its Preliminary Findings Report.

6.2.1 NMPC

The NMPC transmission system consists of approximately 275 miles of main. Figure 6-10 reflects the relative age of the system as of December 31, 2023, and shows that the majority of the system was placed in service in the 1950s, 1960s and 1990s. 100% of the system is coated, cathodically protected steel.⁷⁶

Figure 6-10: NMPC Transmission Mains Mileage by Decade of Installation⁷⁷

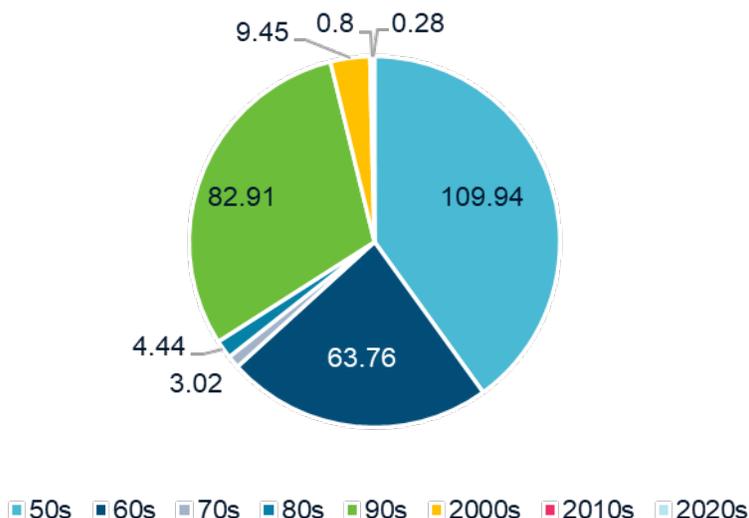


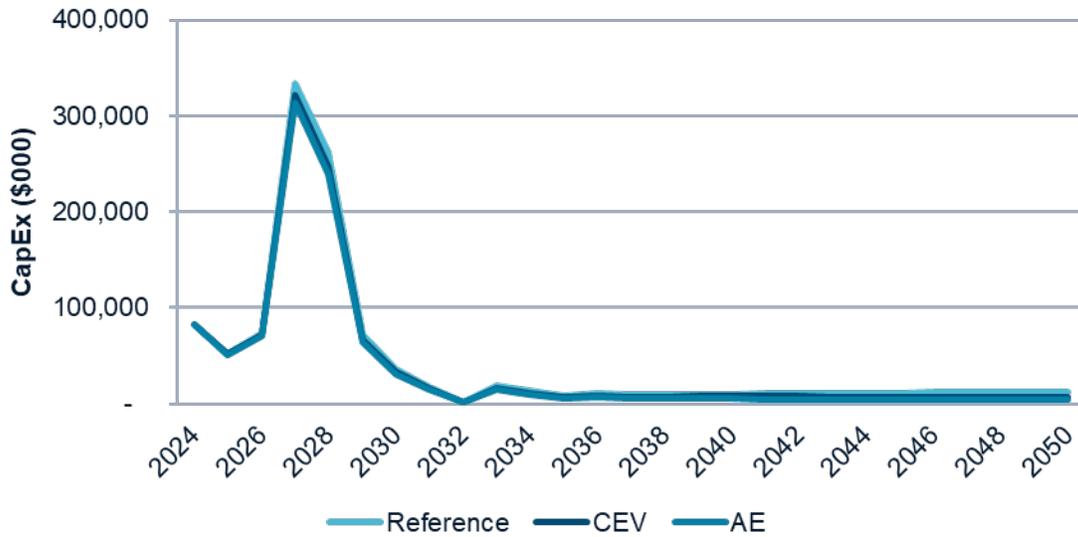
Figure 6-11 shows NMPC’s CapEx forecast through 2050 related to its transmission assets.⁷⁸

⁷⁶ Source: Company’s response to PA 1-6; excludes 0.02 miles of main of unknown vintage.

⁷⁷ Source: Company’s response to PA 1-6.

⁷⁸ Source: Company’s response to PA 1-27.

Figure 6-11: NMPC CapEx (\$000) Gas Transmission Asset Programs (2024-50)⁷⁹

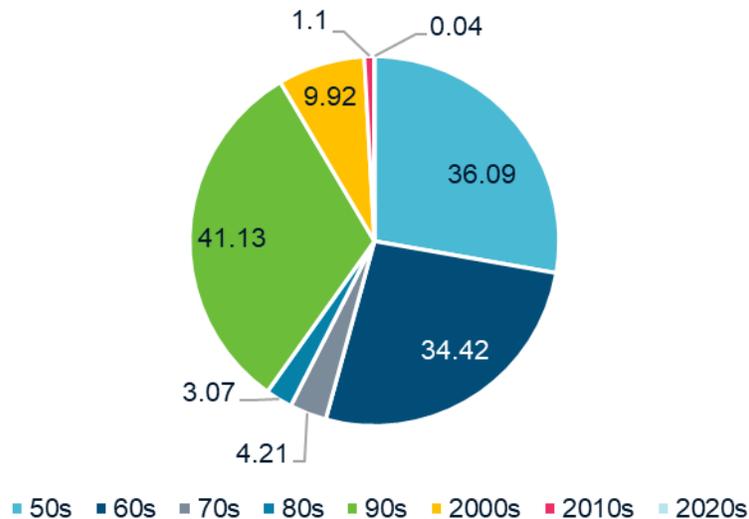


As is clearly shown in Figure 6-11, the projected investments in the transmission system are comparable across all three planning scenarios. Our preliminary conclusion is that MAOP Reconfirmation compliance is driving investments through 2028, with those investments being agnostic to the energy transition path forward. The shape of the curve above may also suggest that the required compliance work will have been substantially, if not fully, completed by the end of 2028. We view this as reasonable since (1) the compliance deadlines (as noted previously) are relatively short-term, and (2) even in circumstances in which gas demand on the NMPC system declines over time, the transmission system will most likely still be required to move gas to customers throughout the KEDLI service territory for many years to come.

6.2.2 KEDLI

The KEDLI transmission system consists of approximately 130 miles of main. Figure 6-12 reflects the relative age of the system as of December 31, 2023, and shows that much of the system was placed in service in the 1950s, 1960s and 1990s. 100% of the system is coated, cathodically protected steel.⁸⁰

Figure 6-12: KEDLI Transmission Mains Mileage by Decade of Installation⁸¹



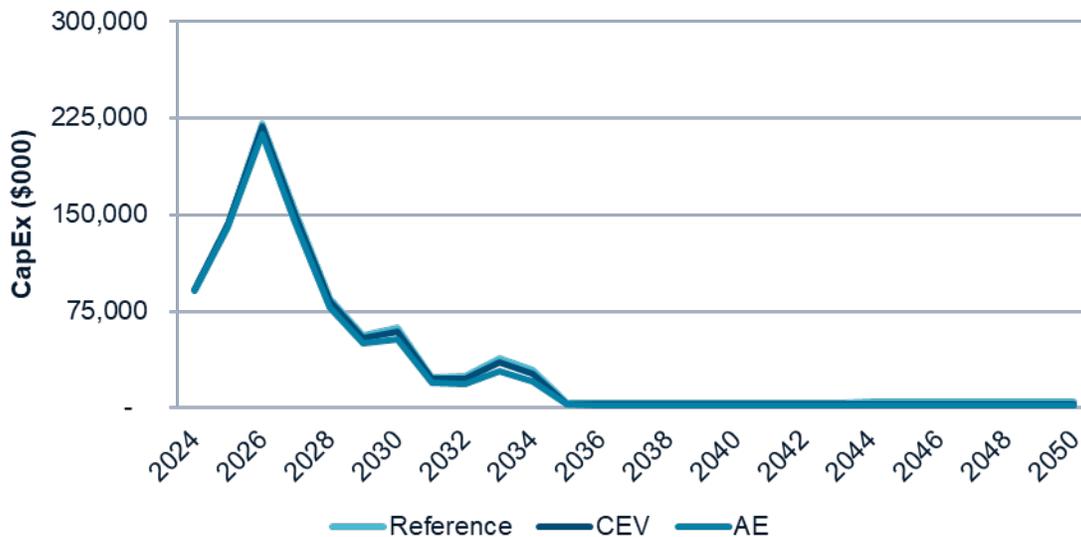
⁷⁹ Source: Company's response to PA 1-27 and PA 1-27 Attachment 1_updated_08.13.2024.xlsx.

⁸⁰ Source: Company's response to PA 1-6.

⁸¹ Ibid.

Figure 6-13 shows KEDLI’s CapEx forecast through 2050 related to its transmission assets.⁸²

Figure 6-13: KEDLI CapEx (\$000) Gas Transmission Asset Programs (2024-50)⁸³



As is clearly shown in Figure 6-13, the projected investments in the transmission system are comparable across all three planning scenarios. Our preliminary conclusion is that a significant portion of these investments are required to achieve MAOP Reconfirmation compliance, with those investments being agnostic to the energy transition path forward. We view this as reasonable since (1) the compliance deadlines (as noted previously) are relatively short-term, and (2) even in circumstances in which gas demand on the KEDLI system declines over time, the transmission system will most likely still be required to move gas to customers throughout the KEDLI service territory for many years to come.

6.2.3 KEDNY

The KEDNY transmission system consists of approximately 70.5 miles of main. Figure 6-14 reflects the relative age of the system as of December 31, 2023, and shows that most of the system was placed in service in the 1950s and 1960s. 100% of the system is coated, cathodically protected steel.⁸⁴

⁸² Source: Company’s response to PA 1-27.

⁸³ Source: Company’s response to PA 1-27 and PA 1-27 Attachment 1_updated_08.13.2024.xlsx.

⁸⁴ Source: Company’s response to PA 1-6.

Figure 6-14: KEDNY Transmission Mains Mileage by Decade of Installation⁸⁵

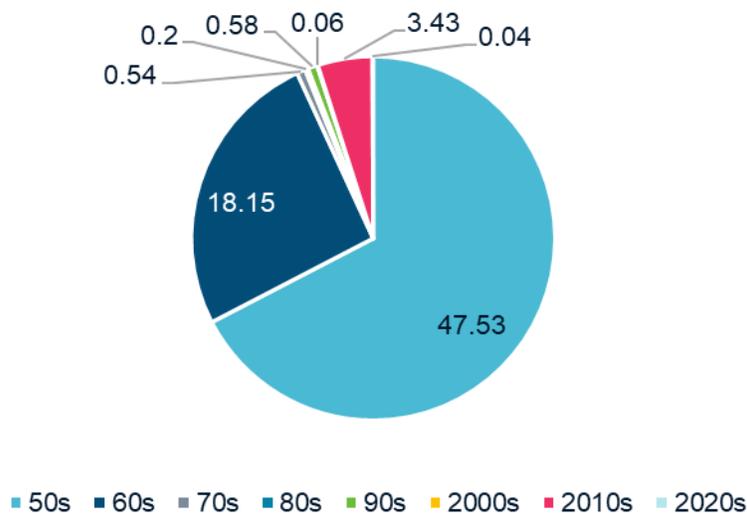
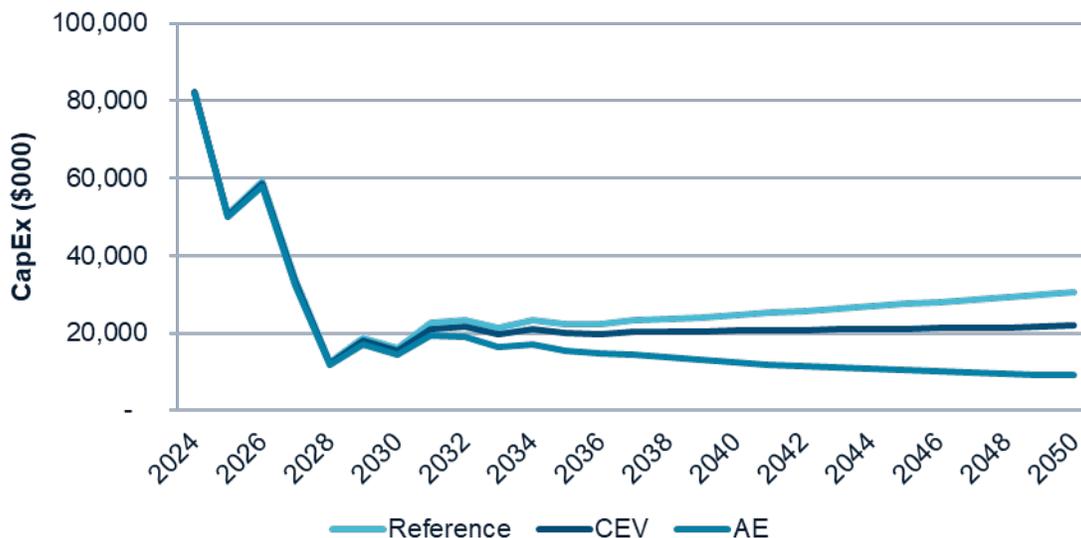


Figure 6-15 shows KEDNY’s CapEx forecast through 2050 related to its transmission assets.⁸⁶

Figure 6-15: KEDNY CapEx (\$000) Gas Transmission Asset Programs (2024-50)⁸⁷



As is clearly shown in Figure 6-15, the projected investments in the transmission system are comparable across all three planning scenarios. However, we also note that planned investment levels begin to diverge beginning in 2028. Our preliminary conclusion is that MAOP Reconfirmation compliance is driving investments through 2027, with those investments being agnostic to the energy transition path forward. The shape of the curve above may also suggest that the required compliance work will have been substantially, if not fully, completed by the end of 2027. We view this as reasonable since (1) the compliance deadlines (as noted previously) are relatively short-term, and (2) even in circumstances in which gas demand on the KEDNY system declines over time, the transmission system will most likely still be required to move gas to customers throughout the KEDNY service territory for many years to come. We will investigate additional details regarding this forecast in the coming weeks to better understand the nature of investments, and reason(s) why the forecast varies by planning scenario beginning in 2028, in the coming weeks.

6.3 Investments in Customer Growth

⁸⁵ Source: Company’s response to PA 1-6.

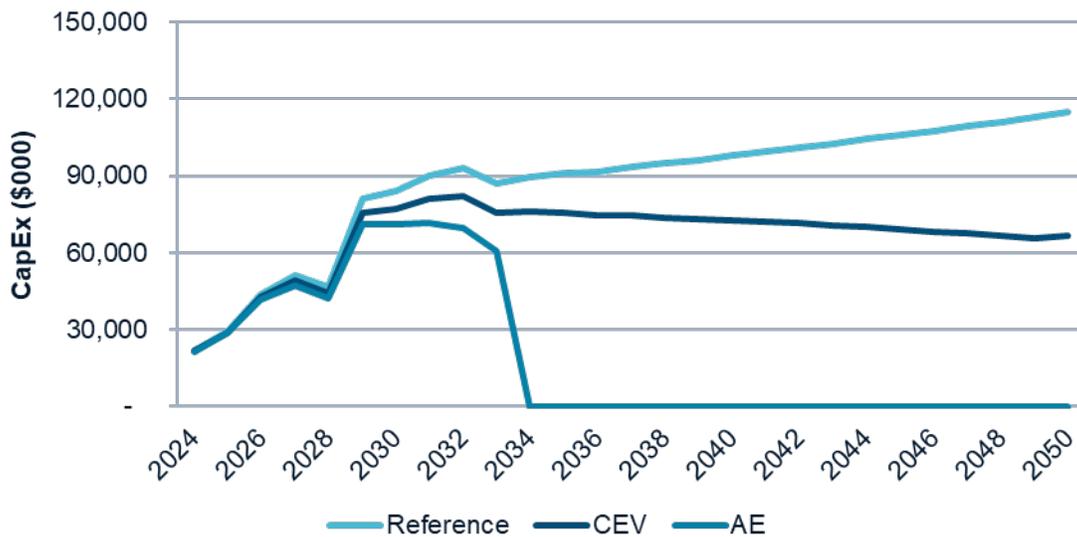
⁸⁶ Source: Company’s response to PA 1-27.

⁸⁷ Source: Company’s response to PA 1-27 and PA 1-27 Attachment 1_updated_08.13.2024.xlsx.

National Grid’s CapEx forecasts include investments required to add new customers to the distribution system. Figure 6-17, Figure 6-18, and Figure 6-16 below reflect similar curve shapes for each of the planning scenario forecasts for each of the three companies, as well as the assumption that, near-term, anticipated customer growth will be unaffected by the decarbonization path National Grid pursues. Modestly lower annual investments under the AE Scenario begin in 2028, and by 2034 there would be no investments to connect new customer to the gas system. We note that under the Reference Case, even with prohibitions on gas connections to new buildings, annual investments in customer growth grow throughout the forecast period. The same can be said with respect to the CEV Scenario, with customer connections continuing after 2034 at approximately 70% of the level forecast in the Reference Case through 2050. Our current assumption is that these investments are related to customer conversions; we will continue to assess the drivers of these investments as our analysis proceeds.

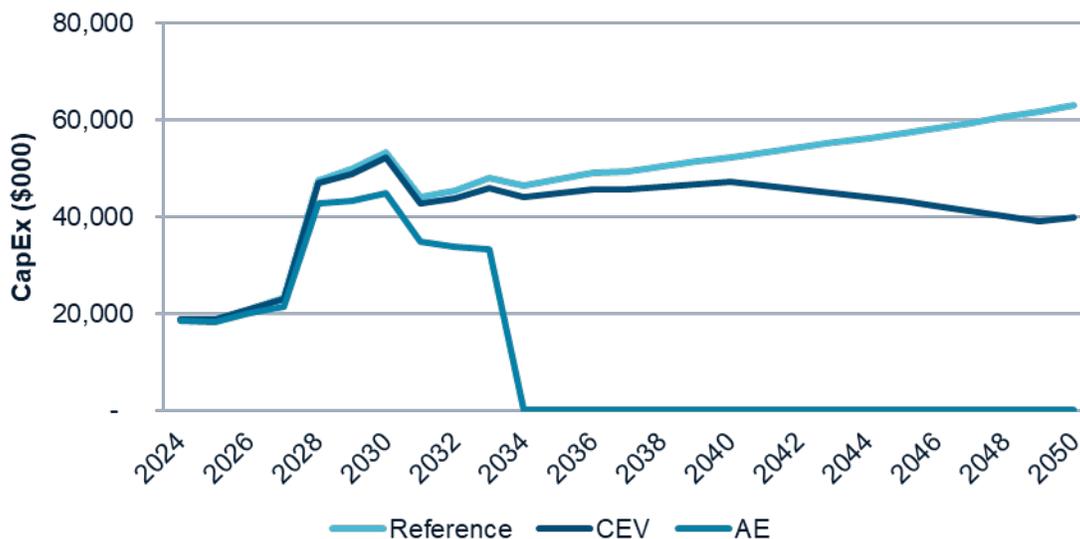
6.3.1 NMPC

Figure 6-16: NMPC CapEx (\$000) Customer Connections (2024-50)⁸⁸



6.3.2 KEDLI

Figure 6-17: KEDLI CapEx (\$000) Customer Connections (2024-50)⁸⁹

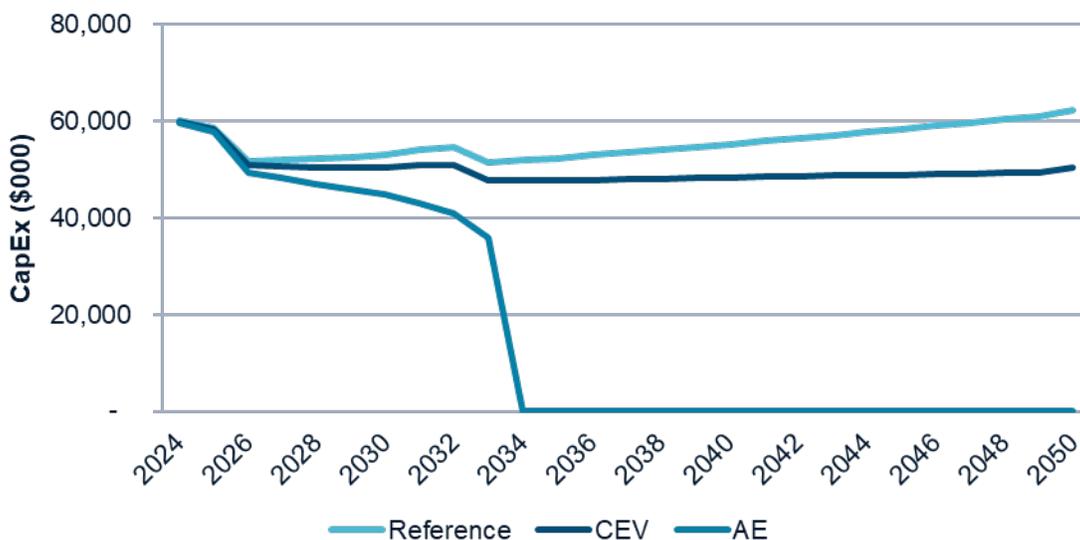


⁸⁸ Ibid.

⁸⁹ Ibid.

6.3.3 KEDNY

Figure 6-18: KEDNY CapEx (\$000) Customer Connections (2024-50)⁹⁰



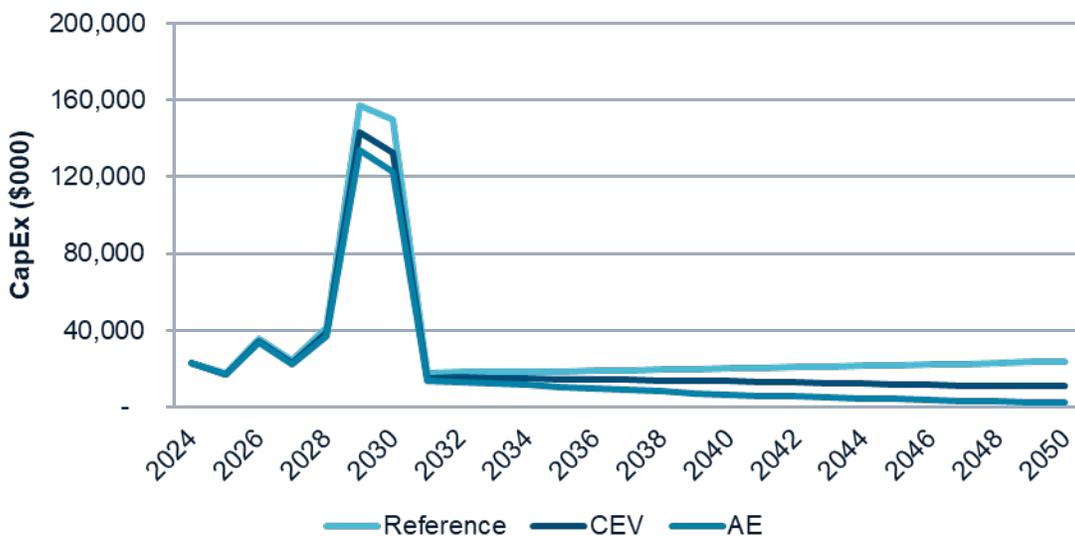
6.4 Distribution System Reinforcement and Reliability

Operators of natural gas distribution systems routinely model gas flows on those systems to ensure that reliable service can be maintained under the most extreme conditions. To the extent demand for natural gas grows over time, periodic reinforcements of the system must be considered, consistent with a Company Design Day planning criteria. At a high level, we would expect there to be a correlation between the scope and pace of customer growth and the scope and need for reinforcements.

6.4.1 NMPC

As shown in Figure 6-19 below, NMPC is projecting a significant uptick in reinforcement CapEx beginning in 2028 and continuing through 2030, regardless of the planning scenario.

Figure 6-19: NMPC CapEx (\$000) Reinforcements and Reliability (2024-50)⁹¹

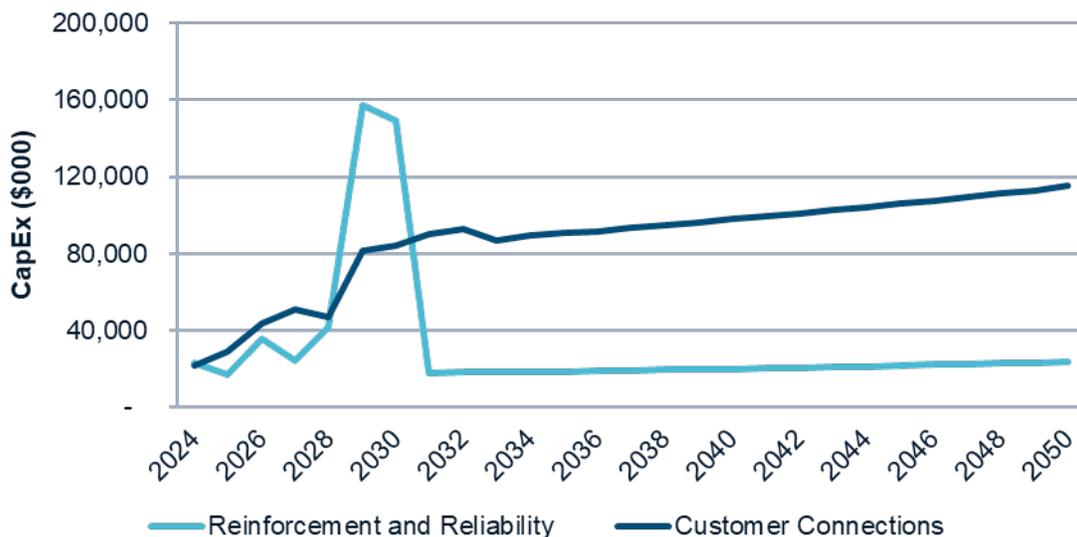


⁹⁰ Ibid.

⁹¹ Ibid.

Figure 6-20 below reflects a Reference Case forecast where reinforcements may appear to lag customer connections in the early years of the forecast, then the significant uptick occurs over a three-year period which the forecast data suggests essentially provides most of the system’s reinforcement requirements throughout the forecast (based on the relatively low – and relatively flat – reinforcement forecast beginning in 2031). Given the significance of the reinforcement investments in 2028-30, we are confident that NMPC has developed one or more specific projects driving those investments,⁹² but are unclear whether those projects are directly related to forecasted customer growth. We will investigate the reinforcement project details and implications of the demand forecast in preparation of our Preliminary Findings Report.

Figure 6-20: NMPC Reference Case CapEx (\$000) Reinforcements vs. Customer Connections (2024-50)⁹³



6.4.2 KEDLI

As shown in Figure 6-21 below, KEDLI’s reinforcement forecast in the Reference Case generally reflects steady growth from 2024 over time, apart from a spike in 2025 and 2026. We observe trends in each planning scenario that are similar to customer growth trends discussed previously. PA will continue to investigate specific drivers of these investments in conjunction with our on-going assessment of the KEDLI demand forecast.

⁹² Section 4.11 of the ILT Plan indicates that, annually, the Company determined the reinforcement projects and associated costs that need to be constructed over the following five years to support forecasted customer demand, and that program costs are estimated for subsequent years six through ten, and any known large-scale projects are identified. (emphasis added).

⁹³ Source: Company’s response to PA 1-27 and PA 1-27 Attachment 1_updated_08.13.2024.xlsx.

Figure 6-21: KEDLI CapEx (\$000) Reinforcement and Reliability (2024-50)⁹⁴

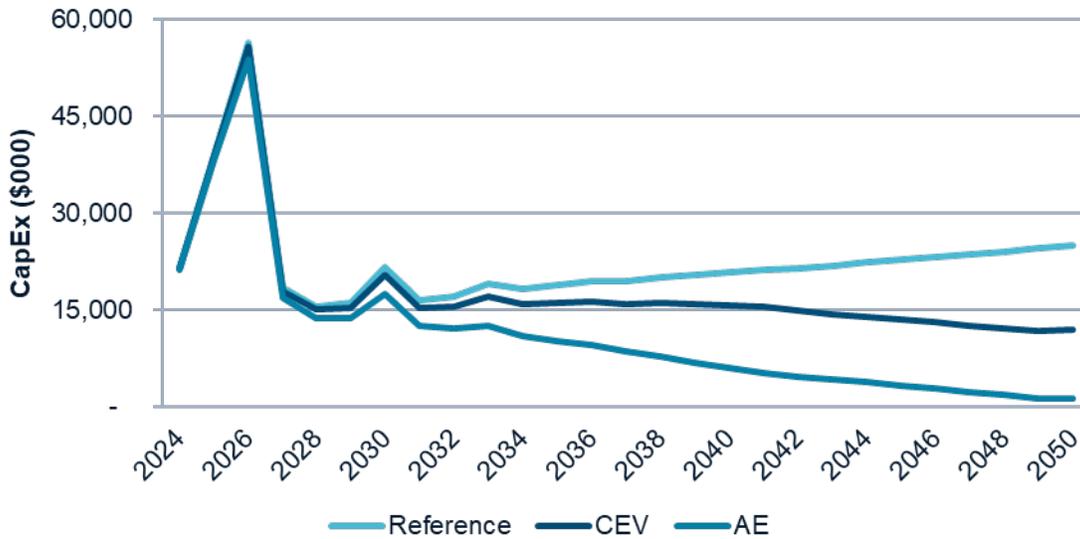


Figure 6-22 below compares KEDLI's reinforcement and customer growth CapEx under the Reference Case. We observe an uptick in reinforcements in 2025 and 2026, followed by an uptick in customer connections in 2028. At a high level that trend is reasonable, as it provides the impression that the Company is planning for known growth. We will evaluate the CapEx forecast in these years to confirm the nature of the planned reinforcements and the potential implications for variations in customer growth beginning in 2028.

Figure 6-22: KEDLI Reference Case CapEx (\$000) Reinforcements vs. Customer Connections (2024-50)⁹⁵



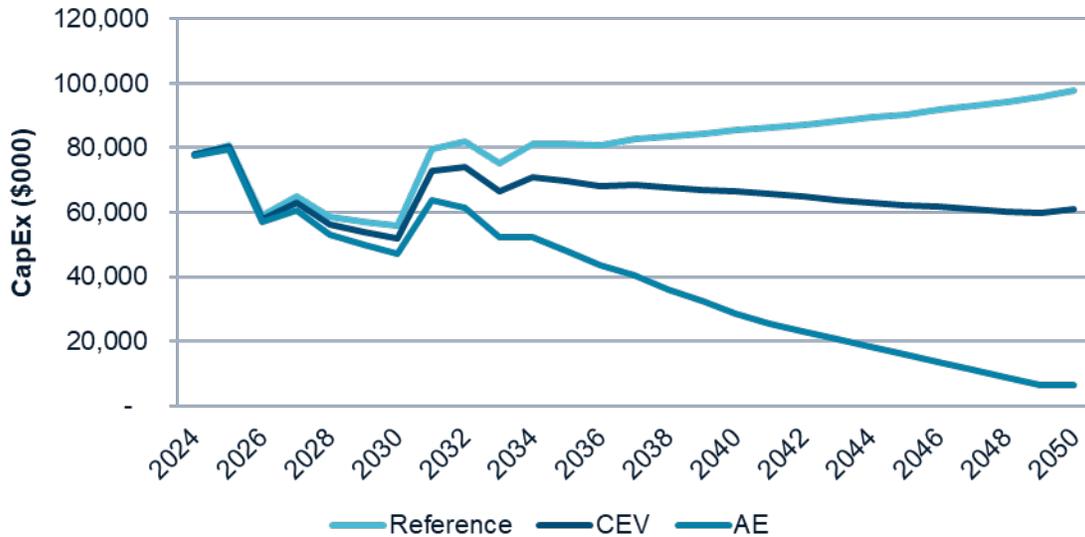
6.4.3 KEDNY

As shown in Figure 6-23 below, KEDNY's reinforcement forecast in the Reference Case between 2024 and 2050 reflects steady growth over time, except for material dip beginning in 2026 and continuing through 2030. Figure 6-23 below demonstrates these trends.

⁹⁴ Ibid.

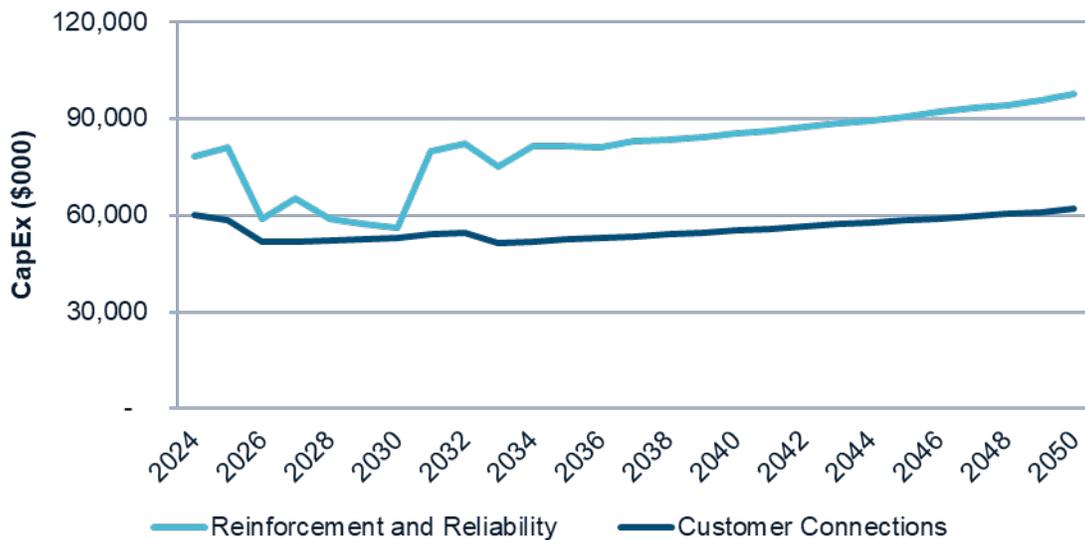
⁹⁵ Ibid.

Figure 6-23: KEDNY CapEx (\$000) Reinforcement and Reliability (2024-50)⁹⁶



We observe trends in each planning scenario that are similar to customer growth trends discussed previously. For example, as shown in Figure 6-24 reinforcement and customer growth trends in the Reference Case mirror one another (again, except for the dip in 2026-30). PA will continue to investigate specific drivers of these investments and the implications of declining investments and the associated slowing of new customer connections, and the implications on the Design Day forecast.

Figure 6-24: KEDNY Reference Case CapEx (\$000) Reinforcements vs. Customer Connections (2024-50)⁹⁷



6.5 Leak Prone Pipe Replacement Programs

Like many natural gas utilities in the United States, National Grid has undertaken a program for the proactive retirement of gas mains and service lines that have demonstrated a relatively high risk of leakage. The Commission continues to be supportive of these programs; in its recent order in the Downstate rate case, the Commission rejected “certain parties’ arguments that, in light of the CLCPA, the capital budgets contain excessive levels of funding for investments in traditional gas infrastructure, including [...] the Company’s LPP programs [...]”⁹⁸ We provide our initial observations about the status of these programs below. PA is familiar

⁹⁶ Ibid.

⁹⁷ Ibid.

⁹⁸ Commission Order in Case No. 23-G-0225, et.al, p. 72.

with these programs and their objectives and supports their continuation. However, to the extent segments of the LDC distribution systems are decommissioned over time the total amount of CapEx required for LPP CapEx may be lower as is reflected in the CEV and AE Scenario forecasts. We also note that for each LDC, the forecasts reflect completion of the LPP Replacement Programs one year later in the Reference Case than in the CEV and AE Scenarios. We recommend that the Company explain that rationale in their Revised Long-Term Plan.

National Grid includes the following material types in its definition of LPP:⁹⁹

- Bare steel, unprotected (i.e., not cathodically protected),
- Coated steel, unprotected,
- Cast iron/wrought iron,
- Ductile Iron, and
- Copper.

6.5.1 NMPC

The NMPC distribution system includes approximately 377 miles of LPP main in service as of December 31, 2023.¹⁰⁰ NMPC has eliminated an average of at least 39 miles of LPP main per year since 2018.¹⁰¹ We note that NMPC's current rate plan required removal of a minimum of 195 miles (in total) of LPP main in calendar years 2021-2024, and NMPC is proposing to retire at least 128 miles (an average of 32 miles per year) in 2025-28 in NMPC's currently pending rate case (Case No. 24-G-0323). Our review of NMPC's recent Gas Distribution System Annual Reports to PHMSA suggests that a total of approximately 87 miles of non-plastic LPP main was eliminated in 2021, 2022 and 2023. We are not able to ascertain from these reports how many miles of plastic LPP were removed from service.

Figure 6-25 reflects how NMPC's inventory of LPP main has declined in the most recent five years.¹⁰² We note that there are instances below where the LPP mains inventory has increased year over year. We understand the 2023 increase was caused by a data correction to the amount of unprotected bare steel after an internal review of cathodic protection records. In our experience, it is not uncommon that companies sometimes discover information that leads them to correct prior errors in their facility data. For example, a utility may find that mains that were thought to be cathodically protected bare steel are in fact not protected. As noted earlier, adjustments such as these to annual reports to PHMSA are not unique.

⁹⁹ Source: Company's response to PA 1-7. Additionally, PA observes that in various documents filed in rate cases, National Grid also considers certain types of plastic as leak-prone, such as the material type Aldyl-A plastic, a pre-1985 vintage installation. We will confirm with National Grid and modify our observations as necessary in our Preliminary Findings Report.

¹⁰⁰ Source: Company response to PA 1-6 and PA 1-7.

¹⁰¹ PA is unable to determine from annual reports submitted to PHMSA (response to PA 1-6) how much plastic LPP has been eliminated; the 39 miles indicated here represents non-plastic material types. The GIOP Direct Testimony in Case No. 24-G-0323 indicates that NMPC has approximately 377 miles of LPP main in its system as of December 31, 2023. Based on the annual report to PHMSA for 2023, there are 370 miles of non-plastic LPP main in service, which implies there are 7 miles of plastic LPP in the system. We will confirm these conclusions with NMPC and provide updates in our Preliminary Findings Report, if necessary.

¹⁰² Response to PA 1-6. NMPC also reported more than 138,000 non-plastic LPP service lines in service at the end of 2023. While NMPC has been systematically retiring LPP services, it appears that more than 1,500 cast iron service lines were identified in 2019 that had not been previously reported. NMPC has eliminated approximately 1,200 non-plastic LPP service lines per year since the end of 2019.

Figure 6-25: NMPC Miles of LPP Main in Service as of December 31 (2018-23)¹⁰³

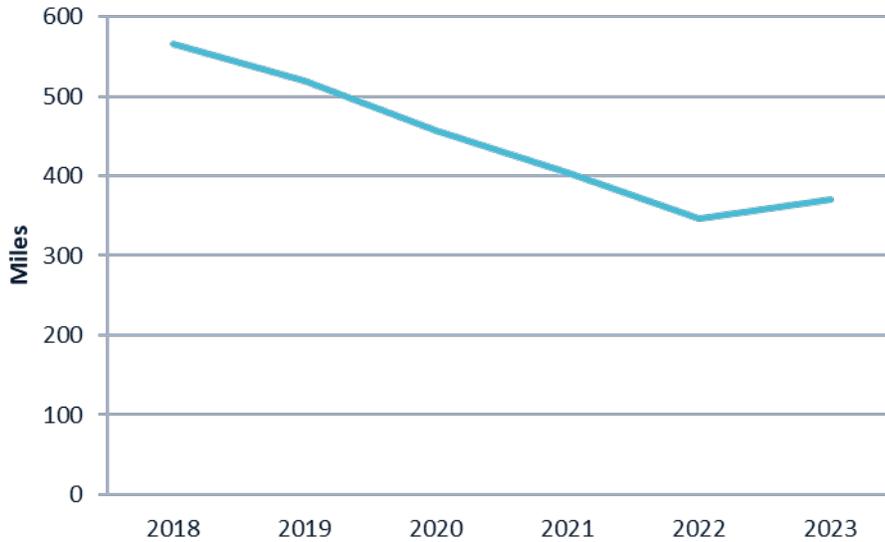
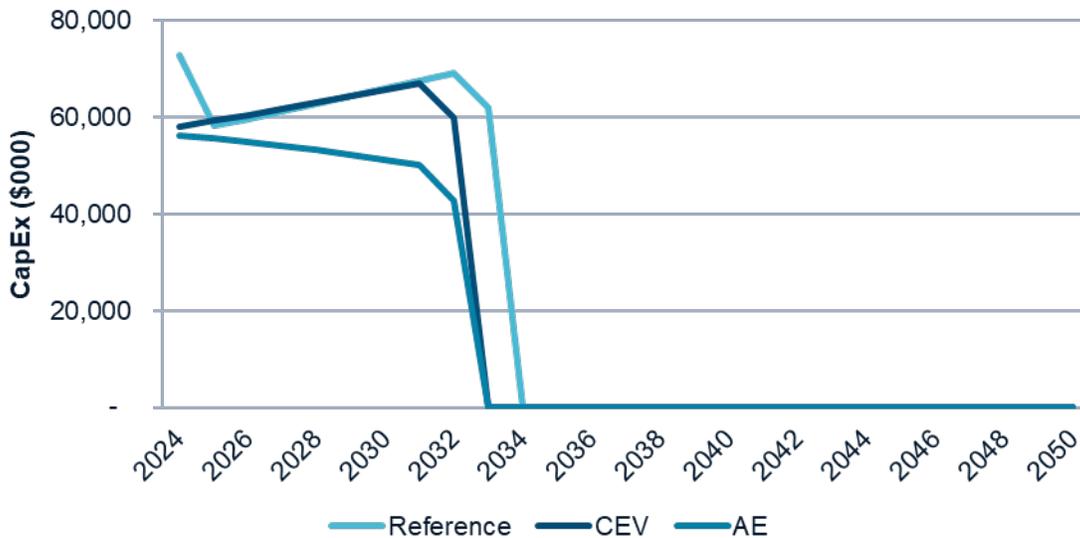


Figure 6-26 below reflects the anticipated completion of NMPC’s LPP replacement program in 2033 which will require retirement of 37 miles of LPP main per year (on par with the recent pace of replacement noted above). At this stage of our assessment, PA believes the lower program investments under the AE Scenario reflect a strategic “shrinking” of the distribution system, negating the need to replace leak-prone assets that would be retired under that planning scenario. Notably, the ILT Plan at pages 16 and 18 indicates that the costs under the CEV and AE scenarios exclude the cost of decommissioning the gas network. Accordingly, PA will investigate whether those decommissioning costs are included in the CEV and AE CapEx forecasts, as well as the investment category in which they are included.

Figure 6-26: NMPC CapEx (\$000) GDE LPP Program (2024-50)¹⁰⁴



¹⁰³ Source: Company’s response to PA 1-27 and PA 1-27 Attachment 1_updated_08.13.2024.xlsx.

¹⁰⁴ Ibid.

6.5.2 KEDLI

KEDLI reported to PHMSA approximately 2,516 miles of LPP main in service as of December 31, 2023.¹⁰⁵ KEDLI has eliminated an average of approximately 112 miles of LPP main per year since 2018. We note that the JP filed in Case No. 23-G-0226 calls for KEDLI to remove a total of 379 miles of LPP main in calendar years 2024-26. Figure 6-27 outlines how KEDLI's PHMSA reported inventory of LPP main has declined in the most recent five years.¹⁰⁶

Figure 6-27: KEDLI Miles of LPP Main in Service as of December 31 (2018-23)¹⁰⁷

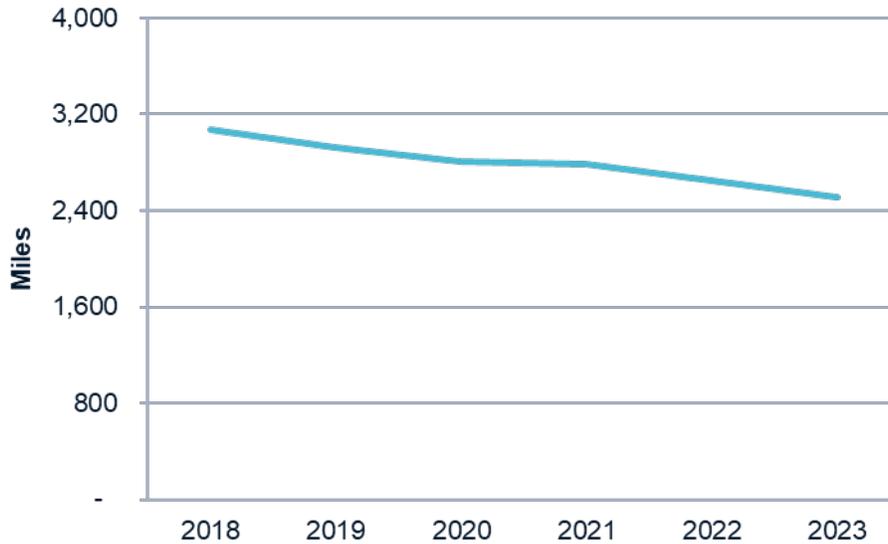


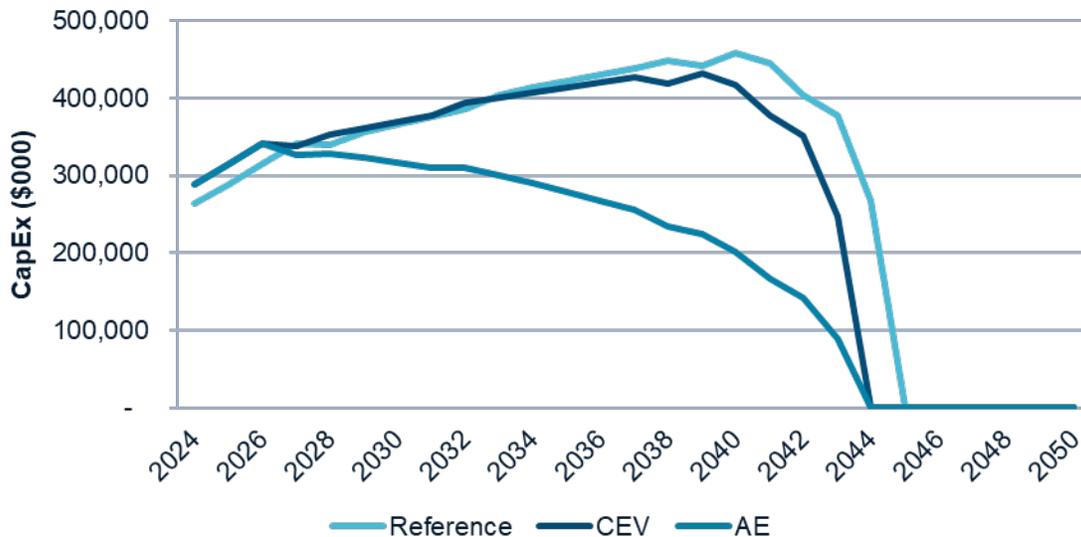
Figure 6-28 below reflects the anticipated completion of KEDLI's LPP replacement program in 2044, requiring a modest increase to the recent annual pace of replacement noted above. At this stage of our assessment, PA believes the materially lower program investments under the AE Scenario reflect a strategic "shrinking" of the distribution system, negating the need to replace leak-prone assets that would be retired under that planning scenario. Notably, the ILT Plan at page 18 indicates that the costs under the AE scenario exclude the cost of decommissioning the gas network. Accordingly, PA will investigate whether those decommissioning costs are included in the AE forecast, as well as the investment category in which they are included.

¹⁰⁵ Source: Company response to PA 1-6 and PA 1-7. PA understands this does not include the material type Aldyl-A plastic pre-1985 installation, which the Company considers a leak prone pipe. In our Preliminary Findings Report, PA will revise this to include Aldyl-A, upon receipt of this requested data.

¹⁰⁶ Source: Company's response to PA 1-6. KEDLI also reported nearly 75,000 LPP service lines in service at the end of 2023, having eliminated approximately 1,000 per year since the end of 2018.

¹⁰⁷ Source: Company's response to PA 1-27 and PA 1-7 Attachment 1.xlsx.

Figure 6-28: KEDLI CapEx (\$000) GDE LPP Program (2024-50)¹⁰⁸



6.5.3 KEDNY

KEDNY reported to PHMSA approximately 1,423 miles of LPP main in service on December 31, 2023.¹⁰⁹ KEDNY has eliminated an average of approximately 28 miles of LPP main per year since 2018. We note that the JP filed in Case No. 23-G-0225 calls for KEDNY to remove a total of 152 miles of LPP main in calendar years 2024-26, an acceleration of the average annual removal rate.

Figure 6-29 shows how KEDNY’s PHMSA reported inventory of LPP main has declined in the most recent five years.¹¹⁰ We note that there are instances below where the LPP mains inventory has increased year over year. In our experience, it is not uncommon that companies sometimes discover information that leads them to correct prior errors in their facility data. For example, a utility may find that mains that were thought to be cathodically protected bare steel are in fact not protected. Adjustments such as these to annual reports to PHMSA are not unique.

¹⁰⁸ Source: Company’s response to PA 1-27 and PA 1-27 Attachment 1_updated_08.13.2024.xlsx.

¹⁰⁹ Source: Company response to PA 1-6 and 1-7. PA understands this does not include the material type Aldyl-A plastic pre-1985 installation, which the Company considers a leak prone pipe. In our Preliminary Findings Report, PA will revise this to include Aldyl-A, upon receipt of this requested data.

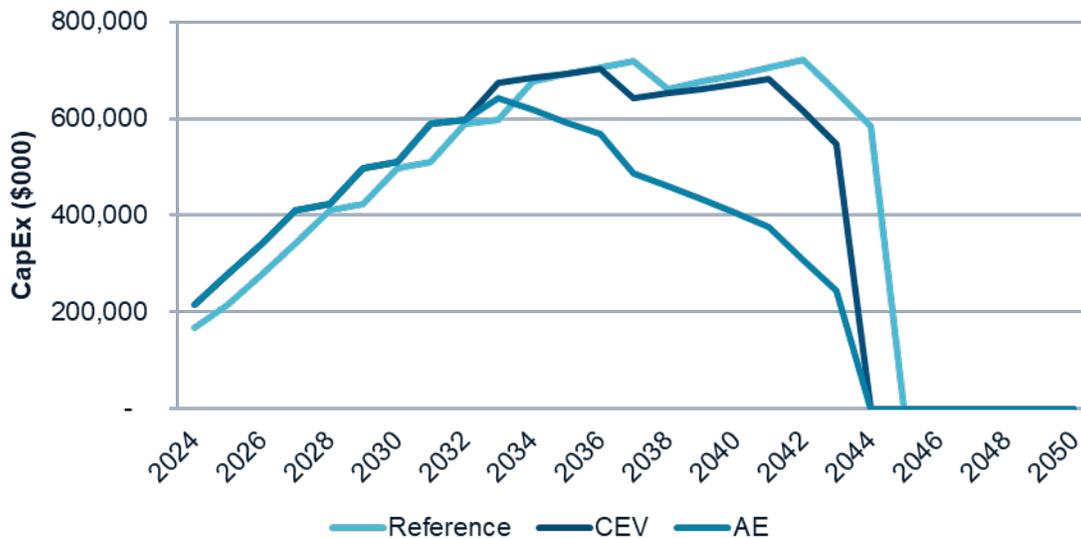
¹¹⁰ Source: Response to PA 1-6. KEDNY also reported more than 106,000 LPP service lines in service at the end of 2023, having eliminated approximately 4,850 per year since the end of 2018.

Figure 6-29: KEDNY Miles of LPP Main in Service as of December 31 (2018-23)¹¹¹



Figure 6-30 below reflects the anticipated completion of KEDNY’s LPP replacement program in 2044; it appears that timeline will require a significant increase in the annual pace of replacement noted above (to nearly 68 miles per year). At this stage of our assessment, PA believes the lower program investments under the AE Scenario reflect a strategic “shrinking” of the distribution system, negating the need to replace leak-prone assets that would be retired under that planning scenario. Notably, the ILT Plan at page 18 indicates that the costs under the AE scenario exclude the cost of decommissioning the gas network. Accordingly, PA will investigate whether those decommissioning costs are included in the AE forecast, as well as the investment category in which they are included.

Figure 6-30: KEDNY GDE LPP Program (2024-50)¹¹²



6.6 CNG and LNG Investments

Each of the National Grid utilities includes investments in CNG and/or LNG assets in their respective CapEx forecasts. As with all CapEx categories, PA will investigate the particular drivers of each forecast and develop its opinion in the context of anticipated demand growth, maintenance capital requirements, and hydraulic

¹¹¹ Source: Company’s response to PA 1-27 and PA 1-7 Attachment 1.xlsx. PA understands this does not include the material type Aldyl-A plastic pre-1985 installation, which the Company considers a leak prone pipe.

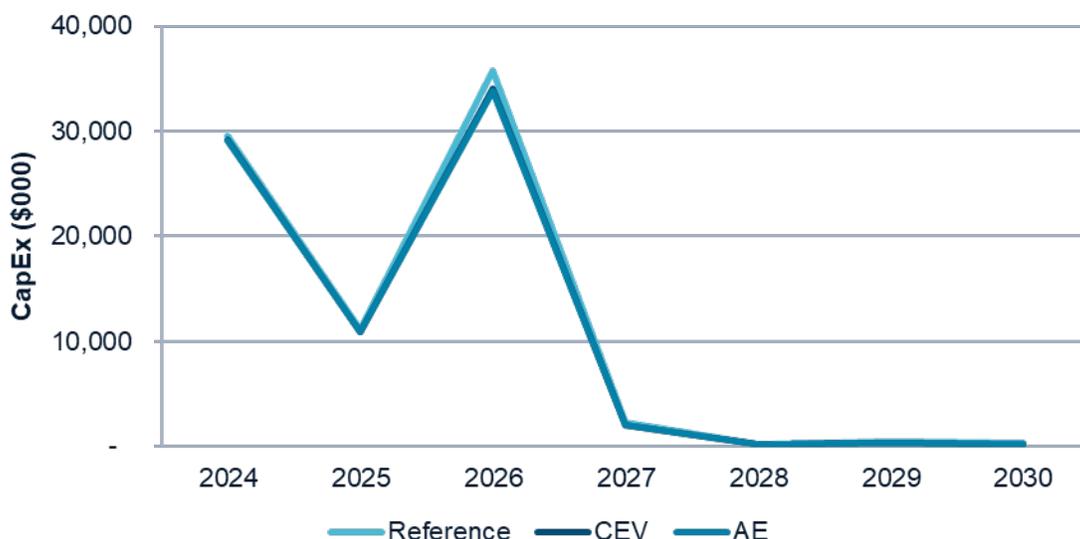
¹¹² Source: Company’s response to PA 1-27 and PA 1-27 Attachment 1_updated_08.13.2024.xlsx.

models of the gas delivery systems under different Design Day demand conditions.¹¹³ Among other things, we are unable at this stage of our assessment to identify the level and nature of proposed future "CNG" and "LNG" investments separately. We also provide comments on Greenpoint and other DSNY LNG facilities in a separate section in this report.

6.6.1 NMPC

NMPC is forecasting CNG investments in the near term under all three planning scenarios.¹¹⁴ Based on the ILT Plan, we believe that the peaks in investments in 2024 and 2026 reflected in Figure 6-31 below are associated with work at the existing Moreau CNG facility and construction of a new CNG facility near Troy, respectively.¹¹⁵ The requirement for a new CNG facility will be evaluated in the context of safety and reliability implications and our assessment of NMPC's demand forecast in preparation of our Preliminary Findings Report. Minimal annual CapEx is planned after 2026, and no CapEx is anticipated thereafter through 2050. We will confirm with NMPC that no maintenance CapEx requirements should be anticipated during that 20-year plus timeframe.

Figure 6-31: NMPC CapEx (\$000) CNG/LNG (2024-50)¹¹⁶



6.6.2 KEDLI

As shown in Figure 6-32 below, KEDLI is forecasting very similar annual investments in CNG and LNG assets through 2030 regardless of the planning scenario. We note that the ILT Plan highlights the Holtsville Plant Modernization Project which will include a detailed internal inspection of the LNG storage tank and also overhaul various tank related systems. Our initial observation is that recurring investments in LNG facilities such as those included in the ILT Plan are reasonable and will explore the details of how these investments inform the CapEx forecast.¹¹⁷ Several upgrades are identified as necessary to ensure the continuation of service from this facility. We do observe that the CEV and AE scenario forecasts include much lower annual investments than the Reference Case beginning in the mid-2030s. We will investigate the assumptions leading to these lower forecasts, as it appears at this stage of our assessment that these assets are expected to be in service for many years to come.

¹¹³ ILT Plan at p. 46 identifies several projects at Greenpoint and Holtsville that are described as "upgrade", "refurbishment" and "modernization". We will work to link those project descriptions to specific CapEx investments included in the forecast and will provide more detailed observations in our Preliminary Findings Report.

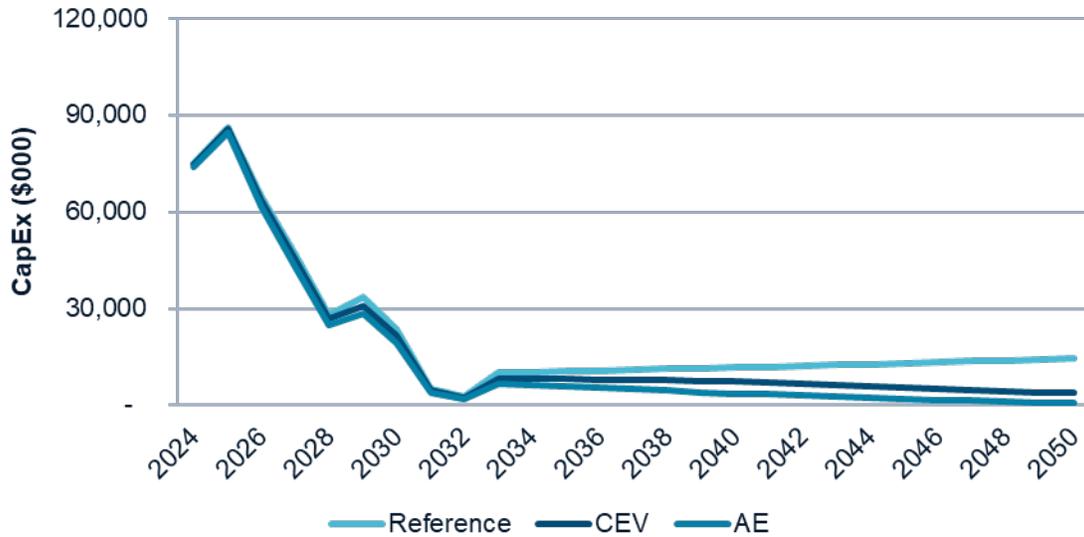
¹¹⁴ NMPC does not have any LNG facilities.

¹¹⁵ Source: ILT Plan, p. 47.

¹¹⁶ Source: Source: Company's response to PA 1-27 and PA 1-27 Attachment 1_updated_08.13.2024.xlsx.

¹¹⁷ For the avoidance of doubt, our observations for KEDNY's LNG assets are the same.

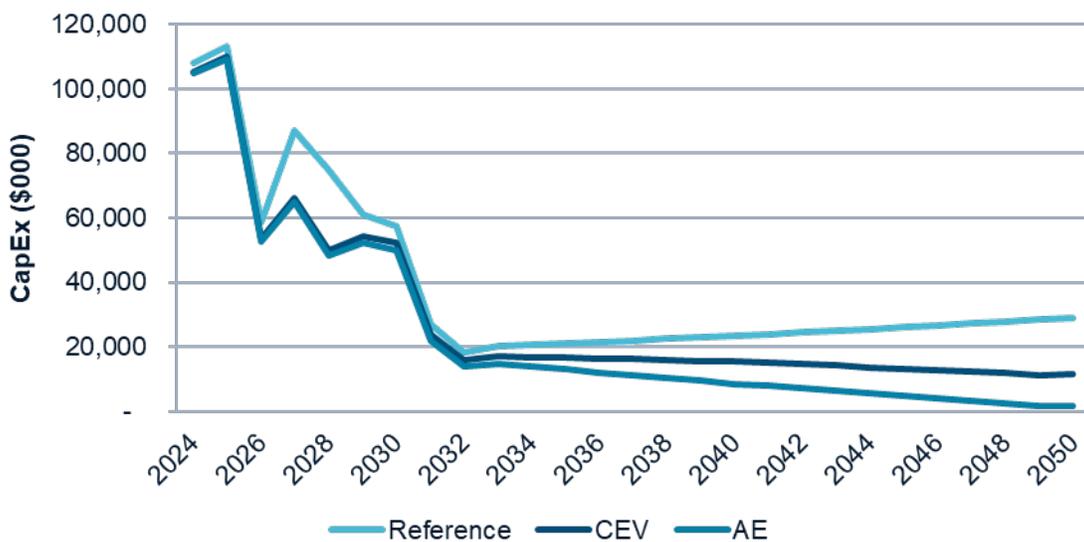
Figure 6-32: KEDLI CapEx (\$000) CNG/LNG (2024-50)¹¹⁸



6.6.3 KEDNY

As shown in Figure 6-33 below, KEDNY is forecasting very similar investments in CNG and LNG assets through 2030 regardless of the planning scenario, with the exception of a Reference Case spike in 2026-29.

Figure 6-33: KEDNY CapEx (\$000) CNG/LNG (2024-50)¹¹⁹



6.7 On-System Supply Investments

Both NMPC and KEDLI have identified investments in the Reference Case forecast that would increase the amount of supply available to their respective distribution systems on a Design Day. It is PA’s understanding that no particular projects have been identified; rather, the amounts included in the forecasts are, in National Grid’s judgment, representative of the magnitude of investment that may be required. Identified in the forecasts as “BAU¹²⁰ on-system supply project,” the associated dollars are reflected in Figure 6-34 and Figure 6-35 below:

¹¹⁸ Source: Company’s response to PA 1-27 and PA 1-27 Attachment 1_updated_08.13.2024.xlsx.

¹¹⁹ Ibid.

¹²⁰ PA assumes BAU means “business as usual”, which seems reasonable under the Reference Case forecast.

Figure 6-34: NMPC CapEx (\$000) Reference Case On-System Supply (2024-50)¹²¹

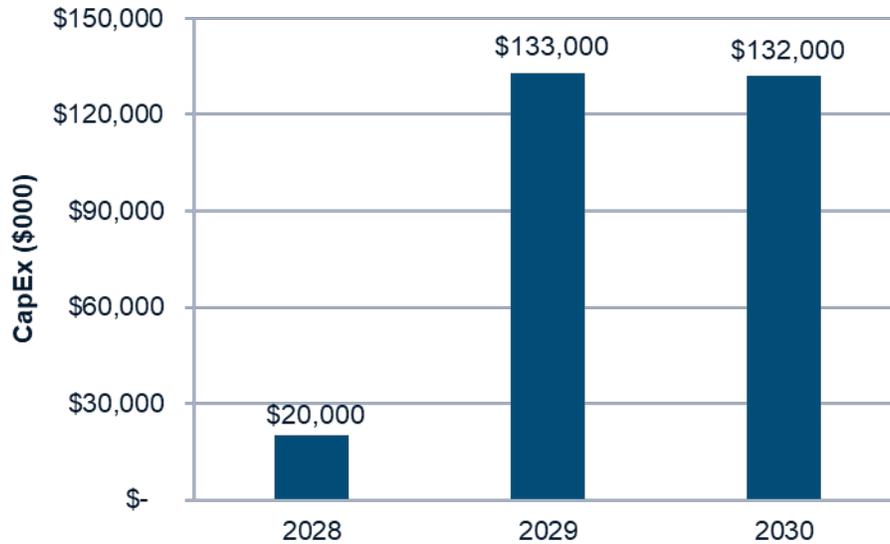
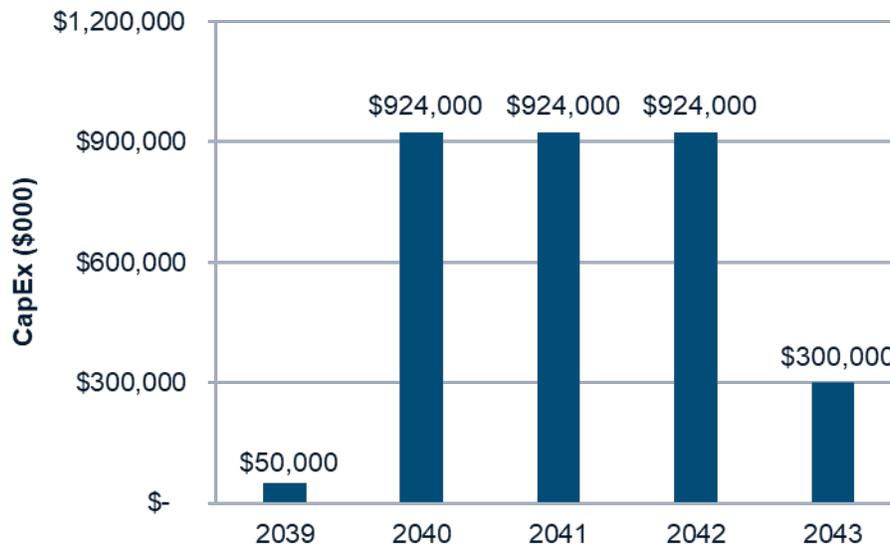


Figure 6-35: KEDLI CapEx (\$000) Reference Case On-System Supply (2024-50)¹²²



No CapEx for “BAU on-system supply” is included in the CEV or AE Scenario forecasts supporting the ILT Plan. However, the ILT Plan does highlight on-system projects.¹²³ Two projects in NMPC are included, the first of which appears to be designed to accommodate receipt of additional upstream pipeline capacity and is scheduled to be fully in service by winter 2027-28; meaning that the “BAU” project in the forecast cannot be this particular project. The second project is referred to as an “East Gate Reliability Assessment”.¹²⁴ Funding for this project has been requested in NMPC’s pending rate case in Fiscal Years 2026 through 2029; the project consists of an evaluation of options to address a forecasted supply shortfall.¹²⁵ Once again, the timing associated with this project is not consistent with the “BAU” project in the forecast.

One significant project in DSNY is identified in the ILT Plan, entailing the installation of 23 miles of 24-inch main in Nassau and Suffolk Counties along with a new regulator station. The projected in-service date for this

¹²¹ Source: Company’s response to PA 1-27 and PA 1-27 Attachment 1_updated_08.13.2024.xlsx.

¹²² *Ibid.*

¹²³ Source: ILT Plan, Section 4.14.3.2.

¹²⁴ Source: ILT Plan, Section 4.16.1.

¹²⁵ Exhibit GIOP-3, page 34, Case No. 24-G-0323.

project is prior to winter 2031-32. Again, this timing is not consistent with the “BAU” project identified in the CapEx forecast.

PA recommends that the Company explain in detail, in their Revised Long-Term Plan, how the on-system projects identified in the ILT Plan are reflected in the CapEx forecasts.

PA will focus on and develop its own observations about projections of customer growth and will evaluate hydraulic models of KEDLI’s and NMPC’s pipeline delivery systems in order to form an opinion about the potential need for on-system supply investments, as well as the scope and scale of those investments, at the two utilities. We will also investigate additional details about the Company’s plans for on-system projects overall.

6.8 Future of Heat Investments

National Grid has included in its CapEx forecast investments under its “Future of Heat” program. The ILT Plan describes examples of Future of Heat infrastructure as “network geothermal, hydrogen, and RNG interconnection”.¹²⁶ The recent order in the Downstate rate case indicates that “[t]he Joint Proposal calls for NPAs that reduce demand and avoid system reinforcements; an NPA feasibility analysis of service requests requiring main extensions; a customer outreach and education plan focused on new service line installation and replacement, with stakeholder engagement.”¹²⁷ The JP, which was approved as part of the rate case order, includes a section on Future of Heat and identifies NPAs that are related to avoided investments in LPP replacement, system reinforcement, main extensions, and new or replacement service lines as part of the Future of Heat framework.¹²⁸ Our initial observation is that the Company has attempted to identify the level of Future of Heat investments necessary under each planning scenario, with (as expected) much more significant investment under the CEV and AE Scenarios as compared to the Reference Case. Importantly, the sharp increase in Future of Heat investments in the CEV and AE Scenarios must be viewed, at least in part, as offsets to the lower CapEx related to (e.g.) investments in LPP Replacement Programs, Customer Connections, and Reinforcement and Reliability included in the Reference Case. It is important that all parties understand how the costs of Future of Heat programs influence the Company’s overall investment strategy and customer bill impacts. Table 6-1 below summarizes the Company’s forecasted CapEx related to Future of Heat.

Table 6-1: National Grid CapEx (\$million) – Future of Heat (2024-50)¹²⁹

Future of Heat CapEx	
Reference	\$1,788
CEV	\$17,364
AE	\$10,795

PA will further evaluate the assumptions the Company made in developing their Future of Heat CapEx forecasts in the coming weeks.

¹²⁶ Source: ILT Plan, p. 192.

¹²⁷ Commission Order in Case No. 23-G-0225 et.al., p. 100.

¹²⁸ JP in Case No. 23-G-0225 et.al., Section 7.

¹²⁹ Source: Company’s response to PA 1-27 and PA 1-27 Attachment 1_updated_08.13.2024.xlsx.

6.9 Recommendations to Improve the ILT Plan

Recommendations for the Company to improve the investment components of the ILT Plan are summarized below.

1. The ILT Plan does not quantify or discuss the level of CapEx the Company anticipates under any planning scenario, other than providing a list of LNG Plant Maintenance projects in Section 4.4.1. Stakeholders should be provided with information about the investments that ultimately drive the bill impacts included in the ILT Plan.
2. Details identifying the major projects and programs included in the investment categories making up the Company's CapEx forecasts should be included in the RLT Plan. As an example, the nature and scope of on-system supply projects should be clearly explained.
3. The Company should explain why the LPP replacement programs at each NMPC, KEDNY and KEDLI are forecasted to be completed one year later in the Reference Case CapEx forecasts than in the CEV and AE Scenario forecasts.

As noted in this section, PA's analysis is ongoing. Therefore, additional recommendations related to CapEx and the Company's system investments will be provided in our Preliminary Findings Report.

7 Demand Assessment

PA has reviewed the demand and load forecast as presented in the ILT Plan, the responses to a number of related data requests, and participated in technical conferences and SME discussions. Our initial observations are summarized within the sub-sections below. Initially, PA observes several drivers of downward pressure on customer counts and/or UPC driven by the following dynamics, influencing 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 and falling UPC - propelled by a combination of technological change, state and federal policy evolution, and local laws.

In the following sections, we further discuss our initial observations, beginning with a summary of three critical state and local laws influencing future customer counts and/or UPCs, in Section 7.1. In Sections 7.2.1 and 7.2.1, discuss macroeconomic indicators, followed by a discussion of heating fuel trends, the customer base composition and forecasted customer counts. Next, we discuss our observations on Annual Average UPCs for select customers. We next examine the annual volumes sales and peak day demand scenarios presented within the ILTP 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.

PA will continue to explore the critical demand aspects of the ILT Plan, including further Company analyses, stakeholder comments, and policy considerations in preparation of our Preliminary Findings Report.

7.1 State and Local Policy

In the ILT Plan, National Grid anticipates a key driver of customer base growth from customers exempt from to state and local laws requiring electrification or prohibiting the installation 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** prohibits 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 prohibit oil-to-gas conversions.
2. **Local Law 154** prohibits the installation of natural gas systems or equipment in newly constructed buildings under seven stories in New York City starting in 2024. This does not restrict or prohibit oil-to-gas conversions.
3. **Local Law 97** imposes GHG emission limits on large buildings in New York City.

All-Electric Building Act

Starting in 2026, New York will require new buildings to be zero-emission, effectively banning natural-gas hookups. The state's budget will ban 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. CA and WA have similar measures but have done so through administratively adopted building codes. NYC, however, already has a ban 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 97

LL97 was passed in April 2019 by the New York City 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).¹³⁰ The law applies to most buildings over 25,000 square feet and is up to the building owners to meet compliance. 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 New York City's total building area.¹³¹

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 CO₂- 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 2030.¹³²

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. New York City'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 154

LL154 was passed in December 2021 and aims to significantly limit fossil fuel service connections in new or gut renovated buildings in New York City. 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 New York Department of Buildings.

Specifically, and importantly, buildings covered under the law would be prohibited 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 customer connections to ConEd's steam system, given new or significantly renovated buildings that would connect to district steam would not be combusting fuel directly within their premises. This interpretation (and favorable treatment of district steam) would align with the more favorable GHG emissions coefficient of district steam, and the ability to incrementally decarbonize the centralized steam system, relative to direct consumption of natural gas and fuel oil.

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 Upstate and Downstate macroeconomic and heating fuel trends influencing future customer counts and/or UPC. As described above, state and local legislation prohibiting 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. As we continue our detailed assessment, PA will develop 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.

¹³⁰ Source: [Local Law 97 of 2019 \(nyc.gov\)](#).

¹³¹ Source: [Covered Buildings, NYC Sustainable Buildings](#).

¹³² Source: [Compliance, NYC Sustainable Buildings](#).

7.2.1 Upstate

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 7-2 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 2023.¹³³ 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 Non-heating Residential customers 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: Upstate Historical Customer Base¹³⁴

	Res. – Non-Htg	Res. – Htg	Commercial	Industrial	Other	Total
2015	29,515	527,684	45,948	174	300	603,620
2016	28,878	533,590	46,345	180	298	0.42%
2017	28,089	540,228	46,647	181	290	615,436
2018	27,288	546,473	46,901	183	288	621,133
2019	26,776	550,544	47,201	183	286	624,990
2020	25,752	553,255	47,306	180	271	626,763
2021	25,253	558,719	47,641	179	271	632,063
2022	24,674	562,398	47,796	183	271	635,323
2023	24,224	565,224	47,788	187	271	637,694

Macroeconomics

Based on PA's initial analysis of data from Moody's Analytics,¹³⁵ we observe the NMPC region's economy experienced a noticeable setback since the advent of Covid. 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: NMPC's Macroeconomic Landscape: Average Annual Growth Rates 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,¹³⁶ 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

¹³³ Roughly 4% - a little over 24k - of Residential customers are non-heating customers.

¹³⁴ Source: Company's response to PA 1-47 Attachment 2.xlsx

¹³⁵ 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.

¹³⁶ Down from 2.68 persons per Household in 1990 to 2.54 by 2000 and 2.38 just before Covid. PA projects that will settle at around 2.33 by 2040.

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's Macroeconomic Landscape: Average Annual Growth Rates¹³⁵

	Households	Population	Employment	Real GMP	Housing Stock - SF	Housing Stock - MF	Housing Starts
2010-2015	0.42%	-0.08%	0.55%	1.33%	0.35%	0.30%	8.45%
2015-2020	0.17%	0.19%	-1.12%	1.13%	0.35%	0.42%	-7.55%
2020-2025	0.29%	-0.18%	1.64%	1.39%	0.35%	0.23%	11.47%
2025-2030	-0.04%	-0.20%	-0.02%	2.05%	0.62%	0.40%	-1.36%
2030-2035	-0.03%	-0.27%	-0.11%	1.74%	0.48%	0.38%	-4.69%
2035-2040	-0.21%	-0.31%	-0.18%	1.53%	0.33%	0.32%	-4.28%
2045-2050	-0.30%	-0.37%	-0.22%	1.37%	0.24%	0.28%	-2.92%

Heating Fuels

PA analyzed data for *Selected Housing Characteristics* obtained from Census' American Community Survey (ACS).¹³⁷ A review of the heating fuel types within the NMPC service territory finds that while natural gas remains the favored primary heating fuel – accounting for 60% of occupied homes in 2022, that share has been declining steadily over the past few years. Given that there were over 23,000 new housing units constructed since 2017,¹³⁸ one can deduce that 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.

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 as of 2022), but their accelerating decline (an average of around 3,100 per year since 2018) is being absorbed by a combination of container gas, electricity (heat-pumps) and natural gas. PA considers this a critical phenomenon 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 will be important analyses to make an adequate assessment of the Company's load forecast. We will present a more detailed analysis in our Preliminary Findings Report.

¹³⁷ For this analysis, the NMPC territory is characterized by the following counties: Albany, Jefferson, Madison, Oneida, Onondaga, Oswego, Rensselaer, Saratoga, Schenectady, and Warren.

¹³⁸ According to ACS that number rose from ~851,000 in 2017 to ~874,000 in 2022.

Figure 7-1: NMPC Residential Space Heating Fuels % of Homes

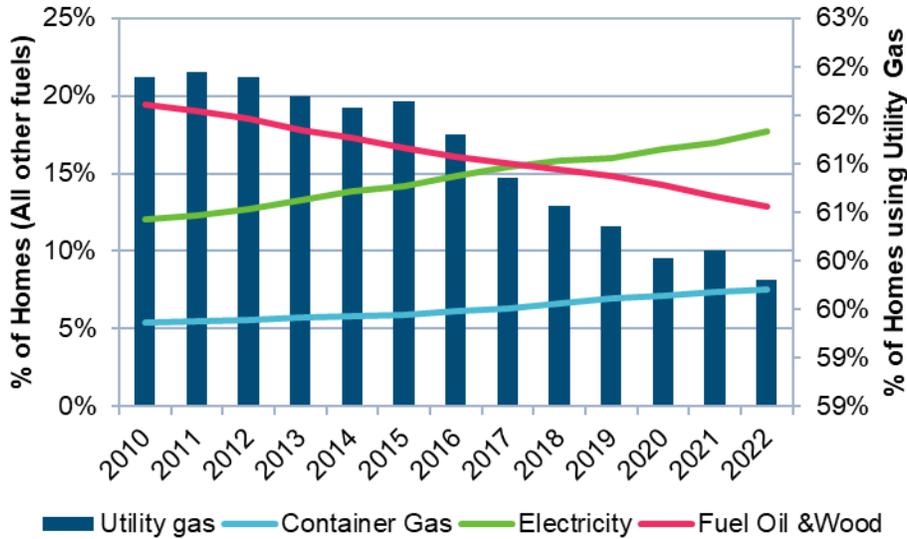
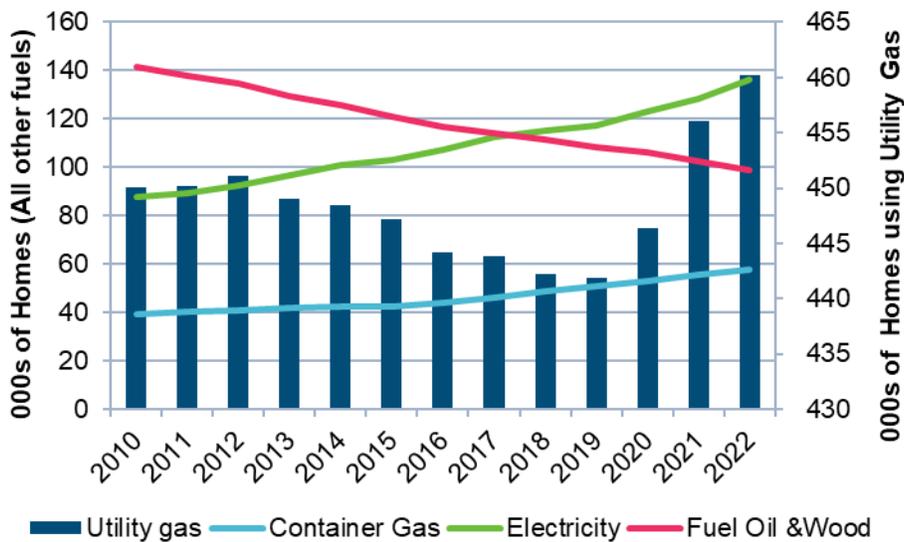


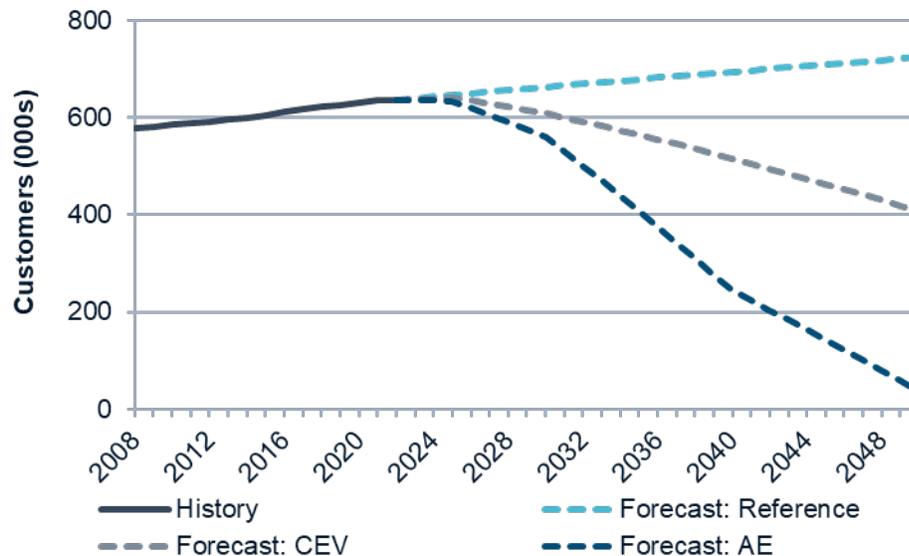
Figure 7-2: NMPC Residential Space Heating Fuels Number of Homes (000s)



Customer Count Forecasts

To quantify the implications of ongoing demographic patterns, PA reviewed the current and forecasted customer counts for the Residential (SC1), Commercial (SC2 & SC7) and Industrial (SC3) and Other (SC5 & SC8) customer classes, as provided in response to PA’s data requests. To date we have analyzed those customers classes for which the Company has provided data in the context of what PA considers are the major factors influencing both historical as well as future customer counts including but not limited to regional macroeconomic variables, housing patterns, existing fuel-use patterns, fuel conversions, etc.

As illustrated by Figure 7-3, by the end of 2023 NMPC served 639,728 customers, experiencing a growth rate of roughly 4,070 meters (customers) per year or 0.67% per year over the 2008-23 period. By 2050, the Reference Case meter (customer) count is forecasted to be 724,921 meters, growing at a lower rate of 3,155 meters per year or 0.46% per year on average. However, the CEV and AE scenarios anticipate a decline in customer growth. The CEV 2050 customer count of 407,336 amounts to an average annual change at the rate of -1.65%. In the AE scenario, the combined impact of EE savings and end-use electrification reduce the overall count to 35,435 by 2050, reflecting an average annual growth rate of -10.14%.

Figure 7-3: NMPC Customer Counts: Historical and Scenario Forecasts (2008-50)¹³⁹

It is PA's understanding that the Reference Case, which also serves as the 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 different levels of the combined impact of policy-induced mandates, decarbonization measures, relatively aggressive EE gains, etc. This approach suggests that if assumptions regarding drivers and customer dynamics related to the momentum of fuel-conversions changes and the Reference Case forecast were to be revised, the CEV and AE scenario forecasts would see corresponding adjustments. Each of the major customer classes is discussed in more detail below.

Residential Customers (SC1)

Historically, over the 2015-23 period, Residential customers grew, on average, at a rate of 4,000/year or at 0.71% per annum. In the Reference Case forecast, the terminal count in 2050 is 668,592 with average annual increments just under 3,000/year or at an average annual growth rate of 0.47%.

An initial study reveals a very close relationship between the customer base and the region's Households – suggesting that the slowing/declining population growth will have a natural downward influence on the organic change in the former. Even though ACS data points to a growing customer base due to new construction and fuel-switching, it is PA's initial view that after incorporating the latest available Moody's macroeconomic forecast (especially regional Population and Households) and layering on a projection of fuel conversion related additions (based on data from ACS¹⁴⁰ for the target area), the annual growth rate and overall forecast might be lower. A detailed discussion based on an empirical analysis that includes an assessment of electrification-induced impacts on residential customers will be presented in our Preliminary Findings Report.

Commercial Customers (SC2 & SC7)

Over the 2015-23 period, Commercial customer counts grew from 46,630 to 48,525 – an average annual increment of 237 or 0.50% per annum. In the Reference Case the 2050 count rises to 54,274 or an average annual increment of 193, implying an annual growth rate of 0.37%. PA initially observes several factors that suggest a considerably lower level and implied growth rate. Even after allowing for some natural growth due to establishment of new businesses in the territory, especially in the short term as Households continue to grow, the absence of organic population growth in the mid to long term points to the notion that a gain in Commercial customer ranks can ostensibly be due only to fuel conversions. We intend to further analyze the

¹³⁹ Source: Company's response to PA 1-33.

¹⁴⁰ American Community Survey data is drawn from Selected Housing Characteristics (DP04) - <https://data.census.gov/table?q=DP04>.

close historical relationship between Residential and Commercial customer growth patterns and factor in macroeconomic influences, for discussion within our Preliminary Findings Report.

In our Preliminary Findings Report, PA will also develop a detailed assessment of the NMPC scenario forecasts for the each of the customer classes, based on the trends exhibited by this historical data, macroeconomic drivers, and observable fuel-conversion patterns, among other factors.

7.2.2 Downstate¹⁴¹

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 below by Table 7-3, the KEDNY markets covered approximately 1.28 million customers in 2023 with 94% in the Residential category (43.7% being non-heating 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 Non-heating Residential customers. Non-heating Residential customers have fallen from over 590,000 in 2015 to just over 560,000 in 2023 – an average decline of over 2,100 customers per year since 2018, is a key dynamic.

Table 7-3: KEDNY Historical Customer Base¹⁴²

	Res. – Non-Htg	Res. – Htg	Commercial	Multi-family	Other	Non-firm DR	Total
2015	590,493	581,580	49,866	17,476	285	3,157	1,242,858
2016	587,294	591,717	50,280	17,850	349	2,994	1,250,483
2017	571,584	608,078	50,701	18,226	351	2,803	1,251,743
2018	570,680	615,029	51,168	18,589	357	2,611	1,258,435
2019	568,652	623,084	51,446	18,858	358	2,420	1,264,816
2020	564,462	632,028	51,619	19,053	360	2,328	1,269,849
2021	559,124	636,876	51,677	19,284	394	2,225	1,269,579
2022	561,590	641,951	51,700	19,519	432	2,117	1,277,308
2023	560,067	646,199	51,598	19,724	426	1,974	1,279,988

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% in 2023. While the 2023 share of non-heating customers is relatively small at 12.4% (as compared to KEDNY), PA observes yet again the key dynamic of a decline in non-heating customers. As shown in Table 7-4 below, Non-heating Residential customers fell from 111,000 in 2015 to 77,600 in 2023.

Table 7-4: KEDLI Historical Customer Base¹⁴²

	Res. – Non-Htg	Res. – Htg	Commercial	Multi-family	Other	Non-firm DR	Total
2015	111,005	407,204	57,591	1,614	11	196	577,620
2016	107,617	417,584	58,241	1,632	11	189	585,274
2017	99,637	431,232	58,752	1,647	11	179	591,457

¹⁴¹ In this Initial Report, PA has reviewed customer and usage dynamics for KEDLI and KEDNY in the aggregate, as we assess the components of the customer and load forecasts, KEDLI and KEDNY will be assessed, with results presented, individually.

¹⁴² Source: Company's response to PA 1-47 Attachment 1.xlsx.

2018	95,245	441,293	59,151	1,675	12	177	597,552
2019	91,199	452,174	59,623	1,705	11	173	604,884
2020	87,065	462,195	59,902	1,726	13	173	611,074
2021	84,489	470,772	60,468	1,744	13	173	617,660
2022	81,071	479,322	60,435	1,752	13	172	622,765
2023	77,625	487,786	60,607	1,759	14	166	627,956

Macroeconomics

As previously discussed for NMPC, COVID-19 resulted in a series of shocks to the DSNY economy that has led to a profound transformation in consumer behavior and gas demand patterns. 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 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 7-5 and Table 7-6 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 too 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 7-5 and Table 7-6 below, the latest (July 2024) forecast from Moody's Analytics supports the Population decline trends in KEDNY and KEDLI 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 too by the end of this decade – thus implying a gradual (organic) contraction in the customer base.

Table 7-5: KEDLI's 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%
2045-2050	-0.31%	-0.40%	-0.28%	1.33%	0.10%	0.15%	-3.06%

Table 7-6: KEDNY's 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%
2045-2050	-0.30%	-0.32%	-0.38%	1.44%	-0.05%	0.44%	-1.95%

Heating Fuels

KEDLI

A review of ACS data for the KEDLI counties¹⁴³ 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% in 2022¹⁴⁴ as represented by the red line in Figure 7-4¹⁴⁵ and Figure 7-5 below.

Most critically, gas is not expected to continue increasing as a fuel for space heating. Even though the share of gas has risen from 40% in 2010 to 50% in 2022, as shown in Figure 7-4, evidence shows that glidepath is tapering recently. As a corollary, FO still occupies a considerable share – 38% in 2022 as evidenced by the pink line in Figure 7-4. As shown in Figure 7-5, there remain well over 350,000 households that continue to use this high-emitting heating fuel. While this demonstrates a challenge to the Company with respect to achieving decarbonization targets, it also presents a considerable opportunity since there is a large portion of the populace that can potentially switch to heat pumps.

¹⁴³ The KEDLI territory is characterized as the combination of Nassau and Suffolk counties.

¹⁴⁴ 2022 is the most recent year for which this ACS data is available.

¹⁴⁵ The corresponding change for KEDNY was from 4.8% to 9.9%.

Figure 7-4: KEDLI Residential Space Heating Fuels % of Homes

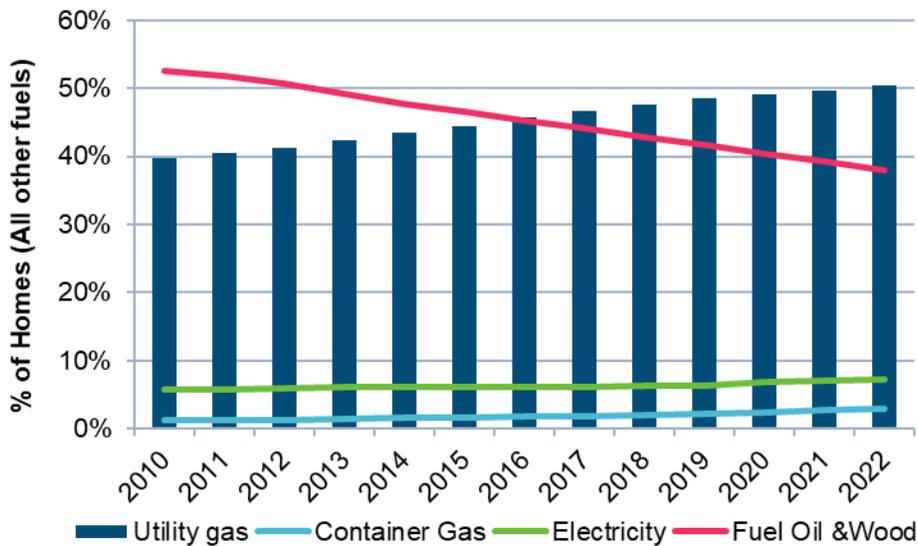
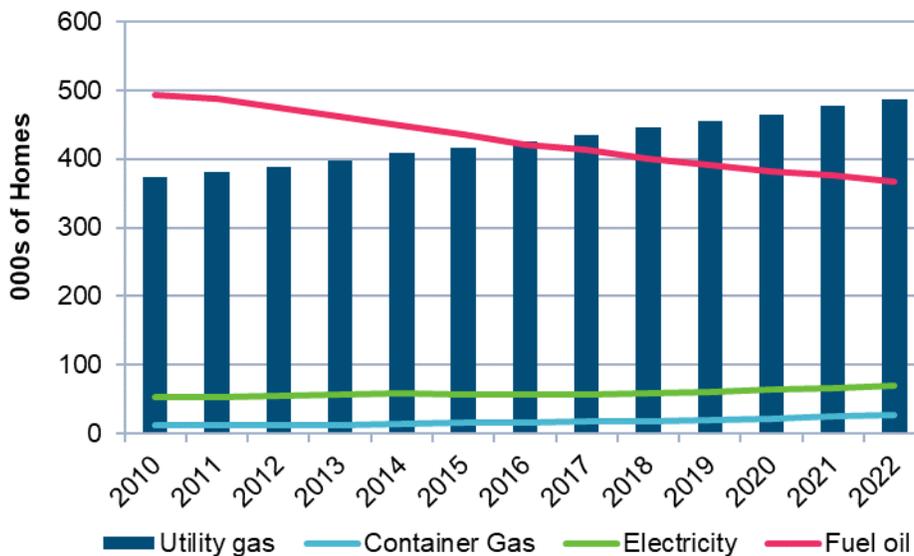


Figure 7-5: KEDLI Residential Space Heating Fuels Number of Homes (000s)



KEDNY

A review of ACS data for KEDNY¹⁴⁶ indicates that gas is the primary heating fuel accounted for 76% the housing units. 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 decade¹⁴⁷ - an indication that gas customers might be capturing a part of the fuel-switching, at least in the medium term, but with an increasing portion going to electrification. The recent upturn in both the numbers and share of homes relying on electricity adds support to that trend.

Given the impending impact of local laws curbing the use of fossil fuels in new construction starting 2026, the focus of an assessment of the load forecast shall be on the electrification trends embodied in the KEDNY

¹⁴⁶ The KEDNY territory is characterized as the combination of Kings County (Brooklyn), Richmond County (Staten Island) and 60% of Queens County.

¹⁴⁷ 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.

forecast. Based on the ACS data, the 2010-22 period saw an average of 16,000 customers adopt electricity as the primary heating fuel as shown in Figure 7-6 and Figure 7-7. 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. PA will analyze the Company’s projections further as well as the ensuing impact on gas usage in preparation of our Preliminary Findings Report.

Figure 7-6: KEDNY Residential Space Heating Fuels % of Homes

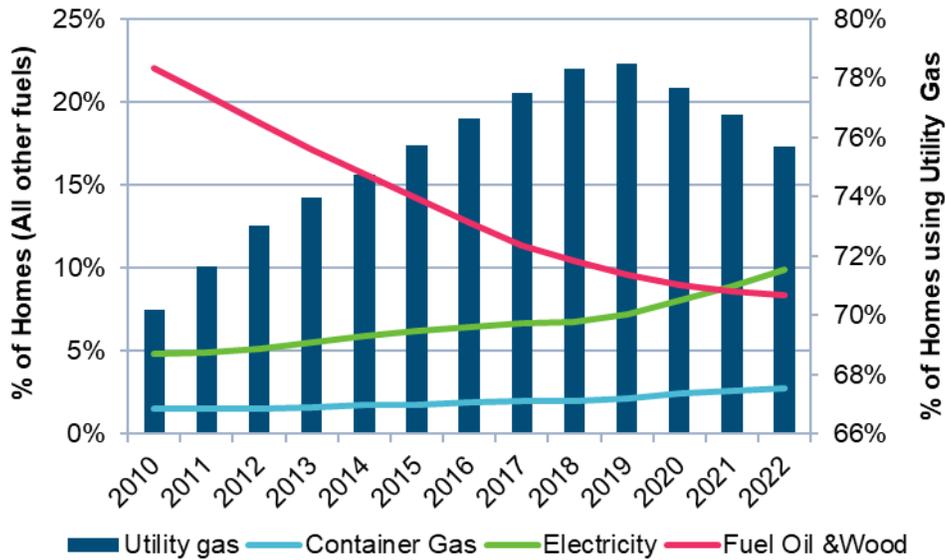
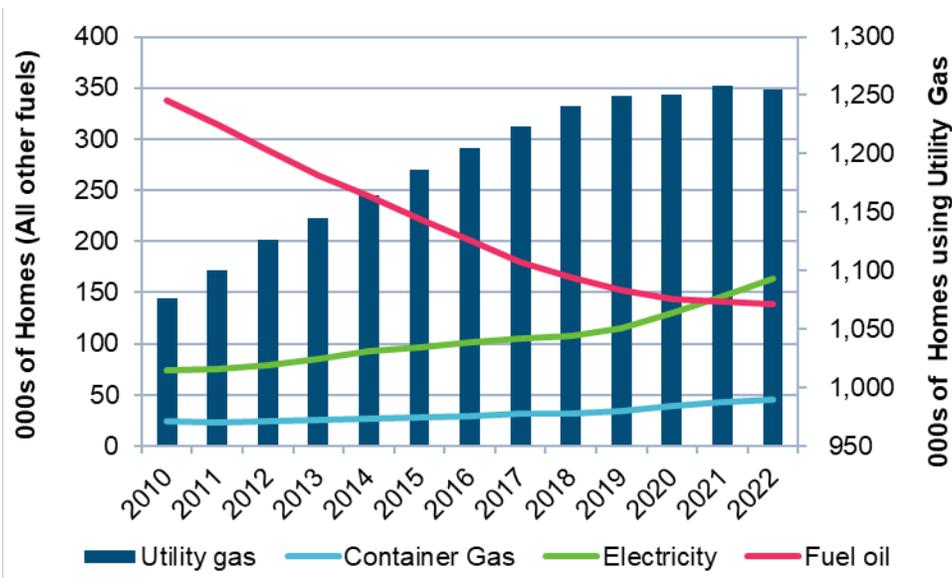


Figure 7-7: KEDNY Residential Space Heating Fuels Number of Homes (000s)



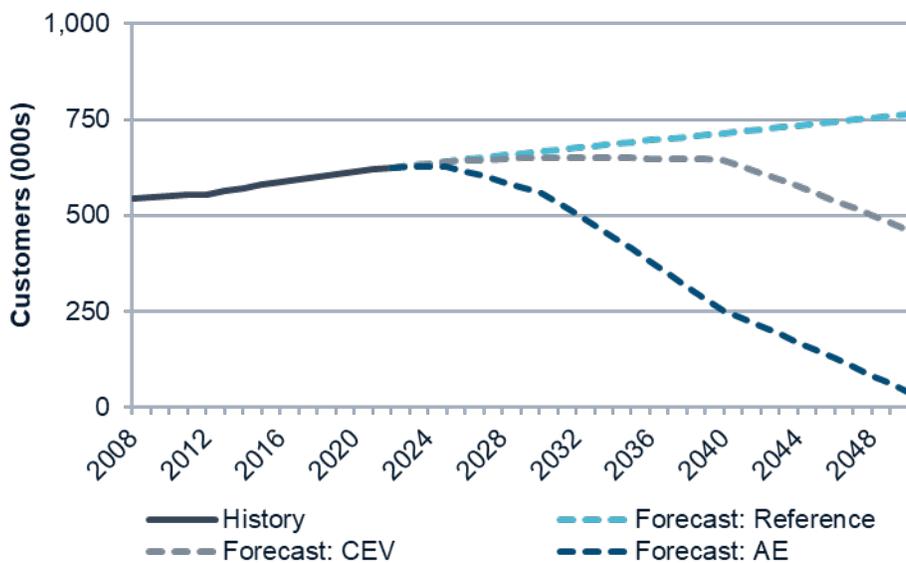
Customer Count Forecasts

It is PA’s understanding that the Reference Case, which also serves as the 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 different levels of the combined impact of policy-induced mandates, decarbonization measures, relatively aggressive EE gains, etc.

KEDLI

Figure 7-8 below illustrates that at the end of 2023, KEDLI had almost 628,000 customers and that count had grown from 543,262 in 2008 at an average annual rate of 1.00%. In the Reference Case, the Company’s forecast grows to 763,497 by 2050, indicating an average annual growth rate of 0.72%. Customer counts in the CEV start to trend lower than the Reference Case around 2030, with a steeper decline starting in 2041. The AE customer count forecast begins decreasing from the Reference Case level around 2027, which makes sense given the policy changes restricting new connections. However, the decline changes trajectory in 2041 too. PA will continue to review and assess these post 2041 trends, going forward.

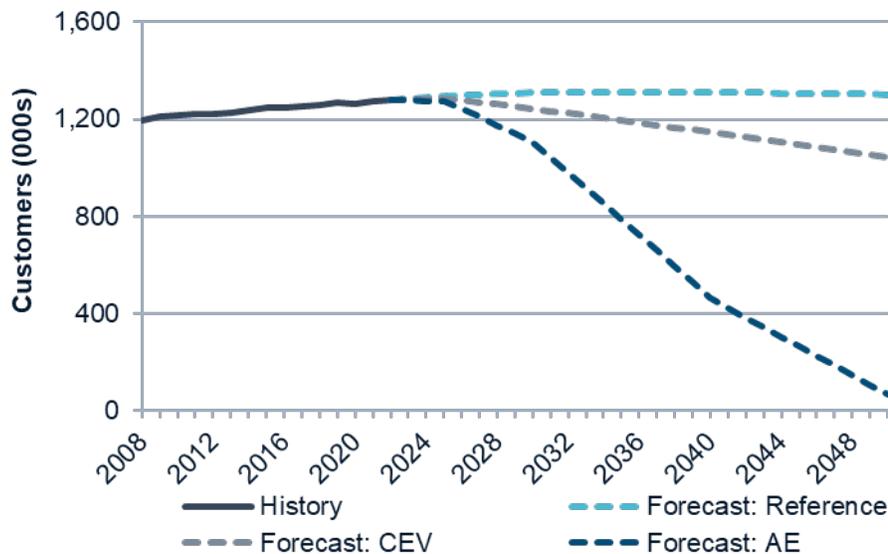
Figure 7-8: KEDLI Historical and Scenario Customer Forecasts¹⁴⁸



KEDNY

Figure 7-9 illustrates that at the end of 2023, the KEDNY territory had a total of 1.28 million customers, having grown at an average annual rate of 0.47% since 2008. In the Reference Case, the customer base grows from the 2022 level of just under 1.28 million to 1.30 million by 2050, an average annual growth rate of 0.07% - implying a slowing of growth in the overall customer base, especially after 2030. In the CEV scenario, the 2050 level falls to 1.04 million and under the AE Scenario, the number drops drastically to roughly 65,000. Similar to KEDLI, the AE forecast trajectory changes in 2041.

¹⁴⁸ Source: Company’s response to PA 1-33.

Figure 7-9: KEDNY Historical and Scenario Customer Forecasts¹⁴⁸

PA understands that fuel-conversions and new construction over the next few years will add to the customer base but based on an initial assessment, PA believes that the KEDNY Residential Heating (RH) customer forecast might be a bit on the high side when considering the forecasted decline in the regional Household growth rate. PA considers the KEDNY commercial and Multi-family customer forecasts to be reasonable.

7.3 Annual Average UPC

The Company's ILT Plan demand forecast includes both total annual retail sales (or volumes) and Design Day levels derived from the annual retail sales forecasts. Total annual sales 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, KEDNY and KEDLI. The retail sales forecast is subsequently adjusted for DSM factors, losses, etc. to arrive at an annual wholesale forecast which is then translated into Design Day demand. Given the relatively minor magnitudes of the adjustments, there is a high correlation between the annual retail sales and the adjusted baseline and ultimately the Design Day. Therefore, the premise underlying our analysis is that a given percentage change in the former leads to approximately the same percentage change in the latter.

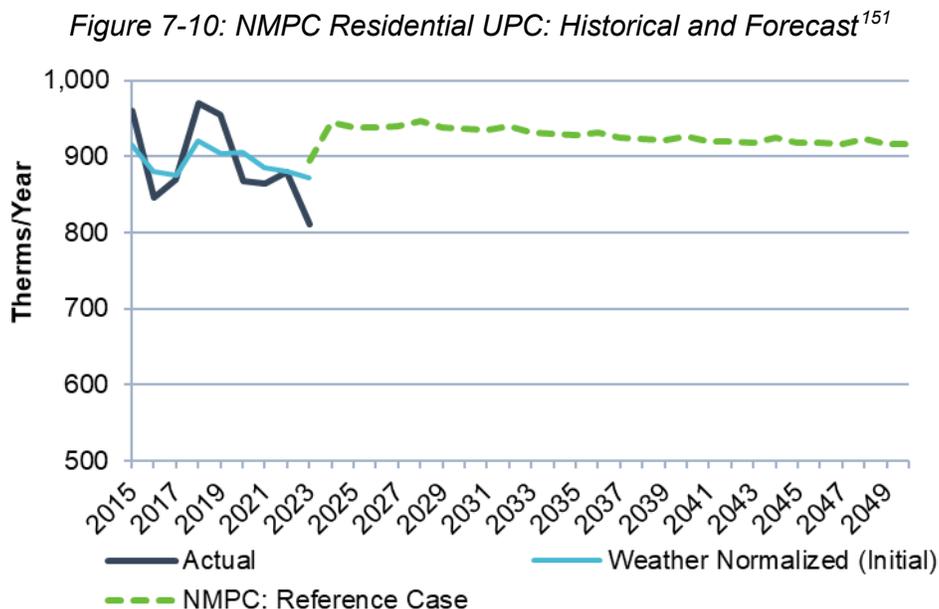
In assessing the Company's Reference Case, PA's objective will not be to develop an independent load forecast based on a technically rigorous methodology akin to National Grid's forecast development process but rather to analyze the market data, the economic environment, and other factors to assess the Company's forecasts. As discussed in the prior section, our analysis will examine the implications on customer counts of the changing socio-economic backdrop for NMPC, KEDNY and KEDLI. In addition, we will examine fuel switching from other fuels to gas (and electric), heat pump adoption and heating degree day trends, among other factors to assess the implications for UPC. Our analysis of customer counts and UPC will be combined to present a view on annual sales and Design Day demand. Our analysis will start with the Reference Case and then address implications for the CEV and AE scenarios. We have begun our UPC analysis with historical and forecast data received in response to PA 1-47 and prepared the following figures based upon this data. Over the course of our fact-check process, National Grid has recommended use of data provided in response to PA 4-89, which is presented in a different format than the data provided in response to PA 1-47. Additionally, PA learned that the Company's the June 2024 Update will be used in development of the Company's revised NGLTP. PA recognizes that the sales forecast continues to evolve and plans to update our analysis of sales and UPC based on the Company's June 2024 Update. PA will work with the Company to obtain the latest sales and UPC data in a format appropriate for analysis in preparation of our Preliminary Findings Report.

In the sections below, PA presents some initial observations on the Company's UPC forecasts for each LDC. Our observations will be refined as we continue our analysis of recent trends, macroeconomic trends, electrification, heating degree days and other factors impacting UPC (and ultimately volumes and Design Day demand).

7.3.1 Upstate

PA reviewed weather normalized UPCs for the Residential and Commercial customer classes, as provided in response to PA 1-47 and PA 1-33. Our initial observations are summarized below.

As shown in Figure 7-10 below, PA's analysis observes an incongruity between the recent historical trend and the starting point of the forecast of Residential UPC in the Reference Case¹⁴⁹ (as shown by the green dotted line). We understand the Company's forecast was developed in early 2023, implying that 2022 is the last historical year incorporated in its modeling. However, incorporation of 2023 actual data into the historical actual results (as shown by the dark grey line) results in a significant step change up for the first year of the forecast.¹⁵⁰ Given the uncertainty involved in the speed and extent of the post-Covid recovery, we observe that inclusion of 2023 data can be useful in the load forecasting effort. This leads us to surmise that the current Reference Case forecast could exaggerate the implied total volumes, and, hence, the Design Day forecast across all scenarios.



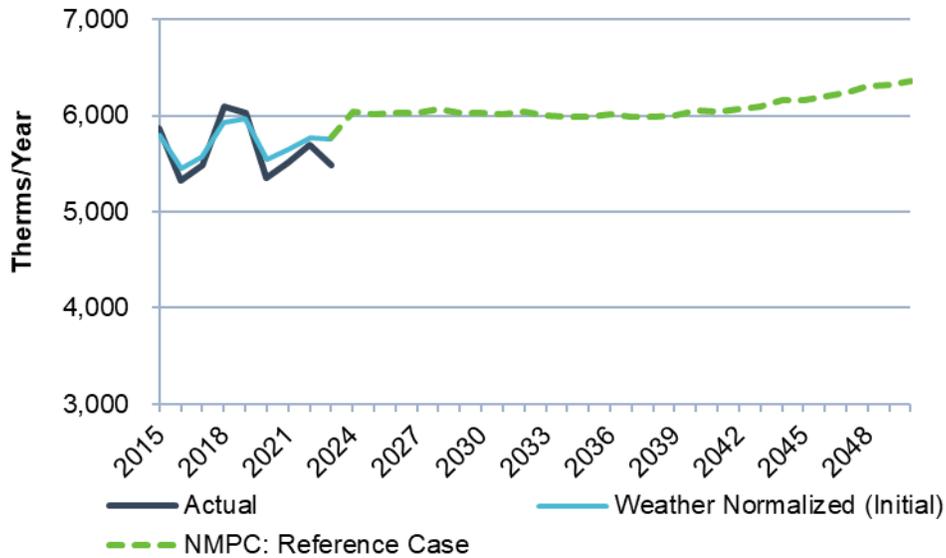
Like the Residential category, when including 2023 actual data, the Commercial UPC forecast also reflects a step-change relative to historical trend that ought to be reviewed and adjusted. Based on information provided to PA, the shift in the trajectory that occurs after 2030 and leads to a steady rise in Commercial UPCs as shown in Figure 7-11, below can be attributed to energy efficiency initiatives reaching a peak around 2035. Subsequently, the Company advises the organic rise in the average usage per Commercial customer more than offsets any energy efficiency impacts.

¹⁴⁹ Since it is PA's understanding the CEV and AE forecasts were developed based on the underlying econometric model, referred to as the unadjusted baseline forecast in the Companies' methodology description. As noted earlier in the report, National Grid will be updating its sales forecasts to reflect the June 2024 Update. Therefore, it is possible UPC forecasts for those scenarios may also need to be adjusted.

¹⁵⁰ The actual (dark grey) line in these figures represents actual UPC. Weather normalized UPC for 2023 has not been analyzed at this point in PA's evaluation.

¹⁵¹ Source: Company's response to PA 1-47 and 1-33.

Figure 7-11: NMPC Commercial UPC: Historical and Forecast¹⁵¹



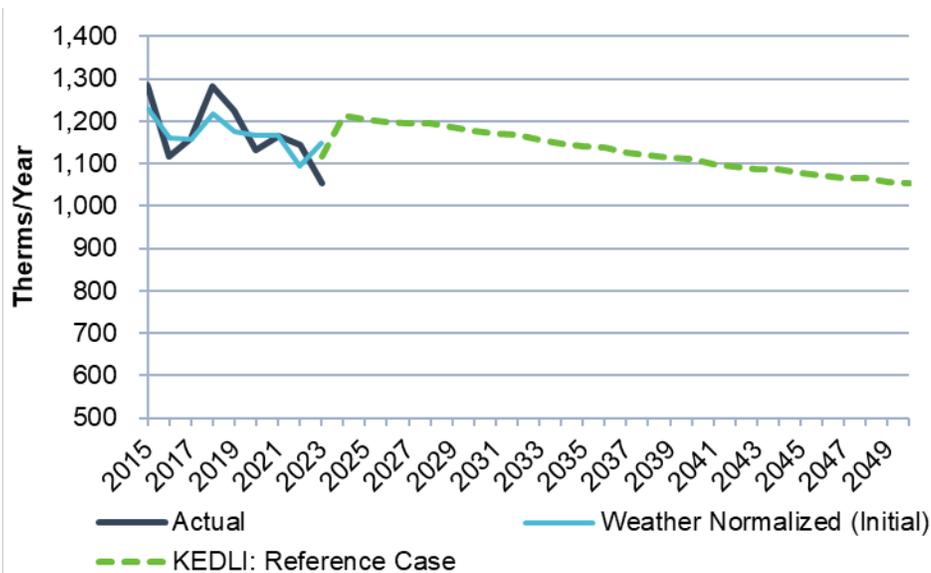
7.3.2 Downstate

PA Reviewed weather normalized UPCs for the key KEDLI and KEDNY customer classes as provided in response to PA 1-47 and PA 1-33. Our initial observations are summarized below.

KEDLI

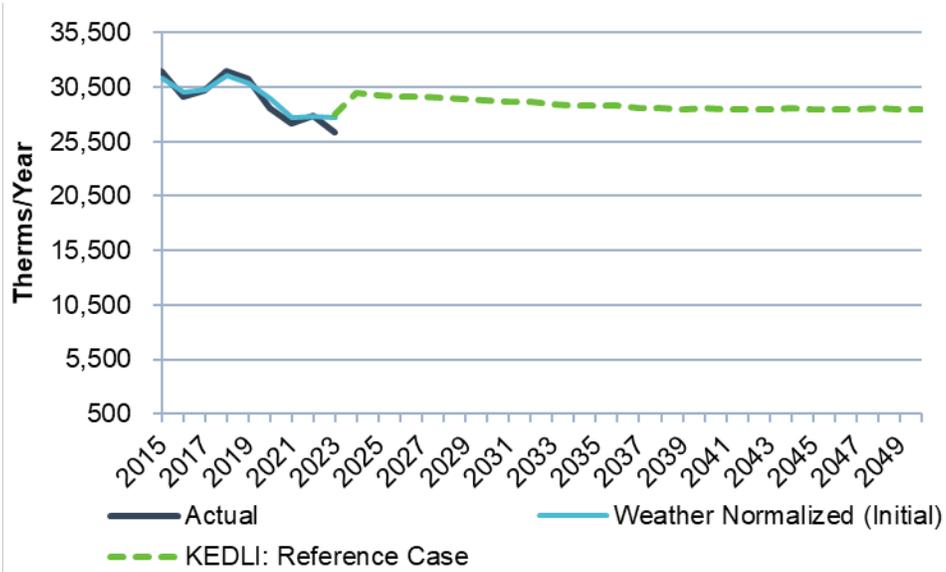
As shown in Figure 7-12, PA observes historical UPC data for Residential (Heating) customers in the KEDLI territory exhibits a negative trend – reflecting energy efficiency impacts due to a combination of updated appliances, improved shell efficiency, etc. However, PA also observes that when 2023 actual data is included, a discrepancy exists between recent trends and the initial several years of the Company’s Reference Case forecast which could warrant an adjustment in the forecast. Therefore, it is possible UPC forecasts for those scenarios may also need to be adjusted. This initial discrepancy is more prominent when 2023 data is considered. As noted earlier in the report, National Grid will be updating its sales forecasts to reflect the June 2024 Update.

Figure 7-12: KEDLI Residential (Heating) UPC – Historical and Forecast¹⁴⁸



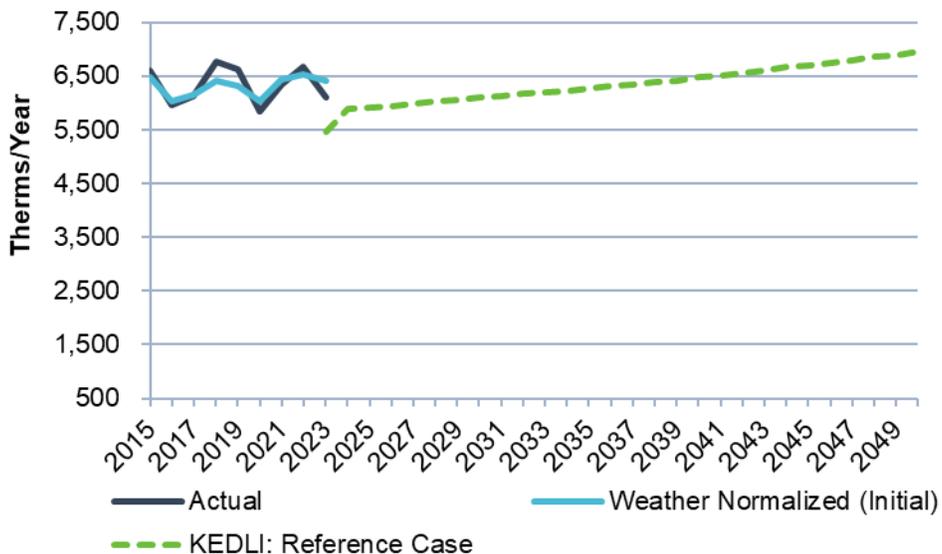
Like the Residential (Heating) segment, the historical data for the Multi-family category also demonstrates a declining UPC trend, illustrated below in in Figure 7-13. PA again observes that when 2023 actual data is included, a discrepancy exists between recent trends and the initial several years of the Company’s Reference Case forecast which could warrant an adjustment in the forecast. This initial discrepancy is more prominent when 2023 data is considered. Additionally, we observe a glidepath that is relatively flat and inconsistent with what seems a secular downward trend.

Figure 7-13: KEDLI Multi-family UPC – Historical and Forecast¹⁴⁸



Below, in Figure 7-14 PA observes an indication of a gentle positive trend in Commercial UPC. While the forecast appropriately embodies that, as noted in the other classes, a discrepancy exists between 2023 actual data and the first year of the Reference Case, which warrants a review. As the forecast stands currently, it understates the Commercial UPC.

Figure 7-14: KEDLI Commercial UPC – Historical and Forecast¹⁴⁸

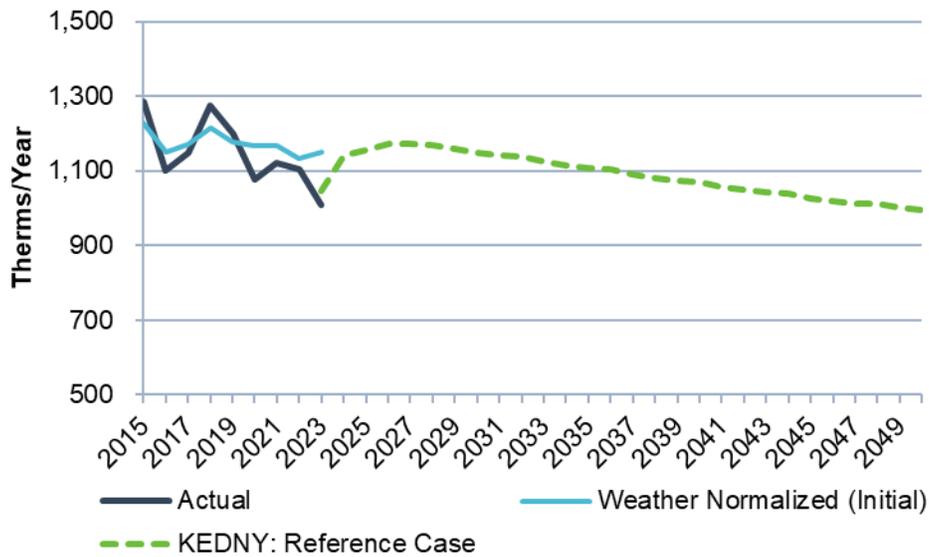


KEDNY

As shown in Figure 7-15, PA observes that when 2023 actual data is included, a discrepancy exists between recent trends and the initial several years of the Company’s Reference Case forecast which could warrant an adjustment in the forecast. This initial discrepancy is more prominent when 2023 data is considered. As noted earlier in the report, National Grid will be updating its sales forecasts to reflect the June 2024 Update.

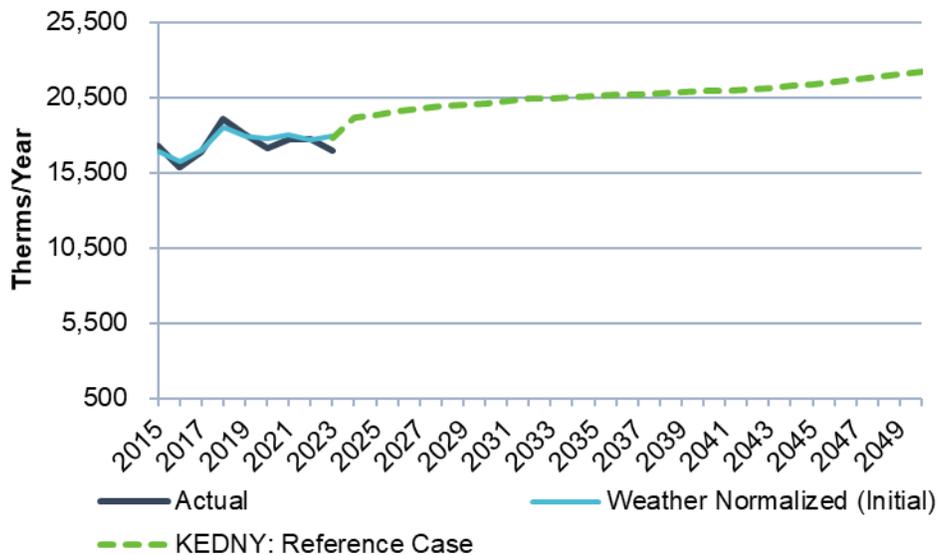
However, we initially find the general glidepath of the forecast reasonable and consistent with our expectations.

Figure 7-15: KEDNY Residential (Heating) UPC – Historical and Forecast¹⁵¹

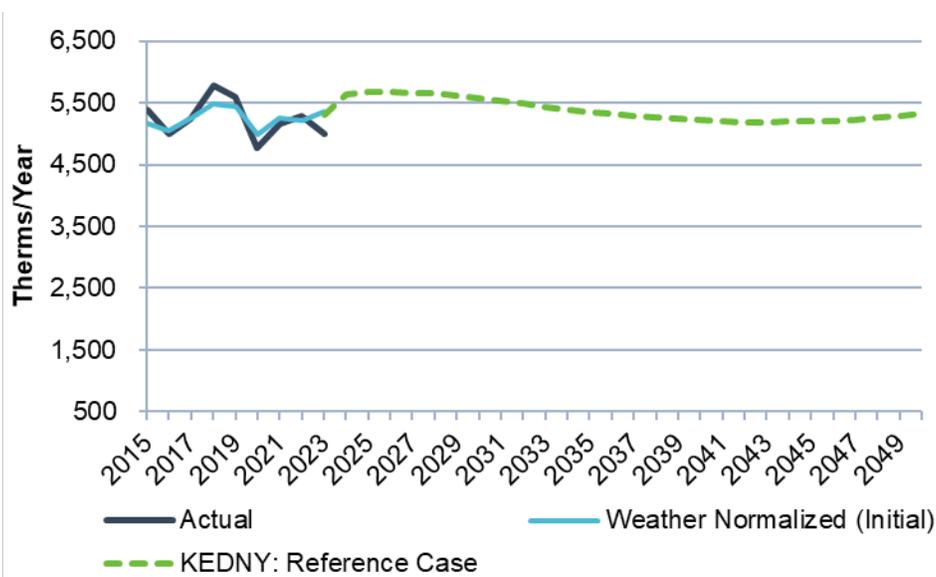


Based on an initial analysis of historical Multi-family UPC, PA finds an ostensibly flat trend. However, the Reference Case forecast not only starts at a point inconsistent with recent history, but it also has a positive slope as illustrated in Figure 7-16. The observation initially appears inconsistent with recent history and the future expected impact from factors such as electrification and heating degree days.

Figure 7-16: Multi-Family UPC – Historical and Forecast¹⁵¹



PA observes Commercial UPC in the initial years of the Reference Case forecast is also not fully consistent with the historical trend, especially when 2023 actual data is considered (as reflected by the dark grey line), as shown in Figure 7-17.

Figure 7-17: KEDNY Commercial Buildings UPC – Historical and Forecast¹⁵¹

7.4 Annual Volumes and Design Day

Within Section 3.21 of the ILT Plan, the Company describes the annual gas load forecast process, which entails the preparation of a retail, wholesale, and Design Day volume forecasts for each service territory. This section describes that the retail monthly volume or sales forecast is meter-level forecasted usage, typically used for rate-setting purposes. Building upon the retail forecast is the wholesale forecast with daily usage that also reflects the amount of gas needed to satisfy the retail forecast, as measured at city gates, and adjusted to account for loss within the system. The Design Day forecast is also daily usage and reflects demand on the coldest, Design Day conditions.

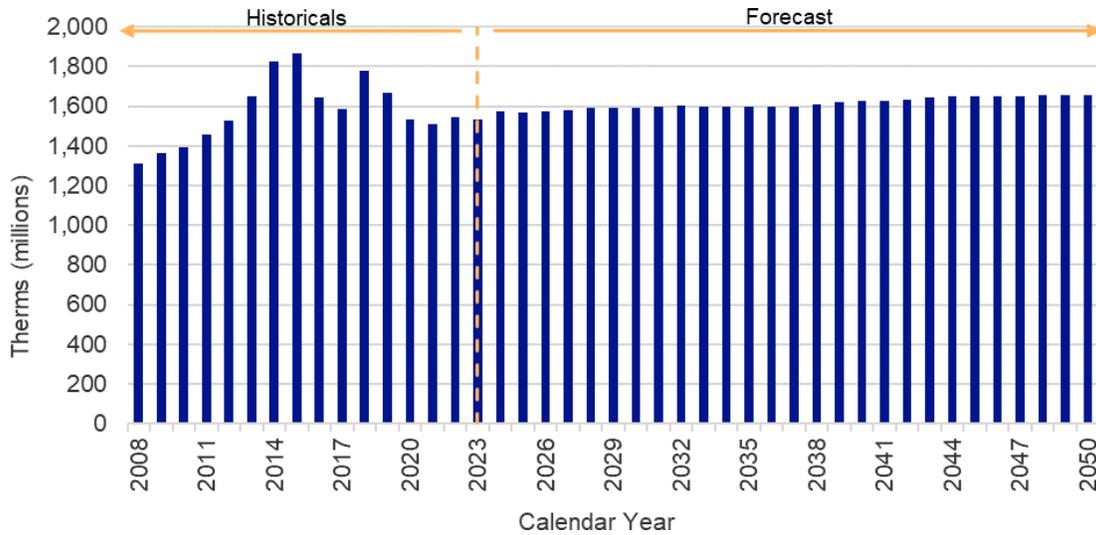
PA understands Reference Case volumes are developed using a bottom-up approach that starts with annual forecasts of meter counts, customers, and UPCs for each customer segment separately for NMPC, KEDNY and KEDLI. The retail sales forecast is subsequently adjusted for DSM factors, losses etc. to arrive at a wholesale volume forecast which is then translated into Design Day demand. Given the relatively minor magnitudes of the adjustments, there is a high correlation between the annual retail sales and the adjusted baseline wholesale volume and ultimately the Design Day forecasts. Therefore, the premise underlying our initial analysis focused on retail sales (as compared to Design Day) is that a given percentage change in the former leads to approximately the same percentage change in the latter. Additional nuances of translating annual retail volumes forecasts into Design Day volumes will be considered in development of our Preliminary Findings Report.

The following sections describe our initial observations on NMPC and DSNY Reference Case annual retail volumes and Design Day demand.

7.4.1 Upstate

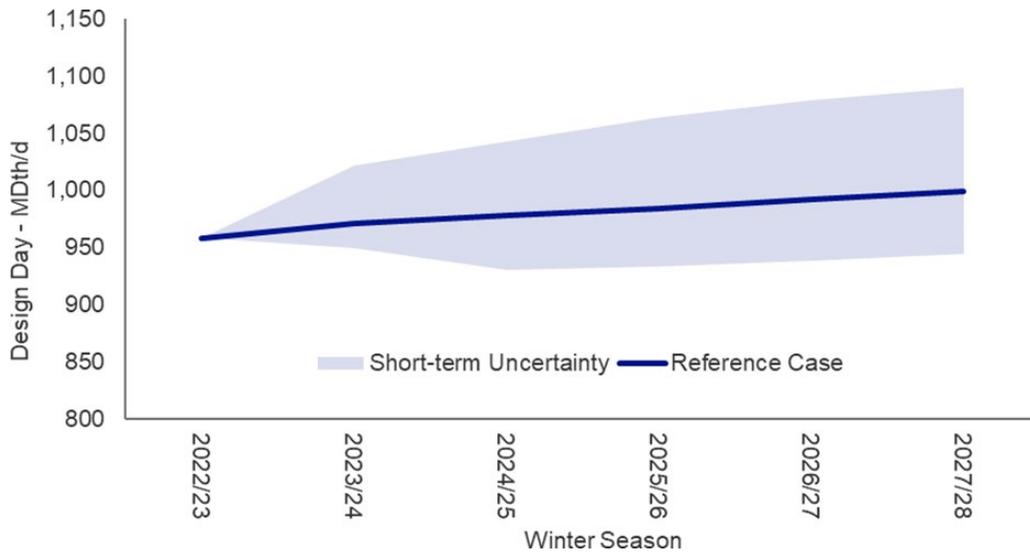
As presented in Figure 7-18 (Figure 3-5 of the ILT Plan), forecasted Reference Case annual retail volumes are expected to grow at rate of 450 MDth per year, or 0.3% per year, from 2023 to 2050.

Figure 7-18: NMPC Historical and Reference Case Annual Volumes (2008-50)¹⁵²



In the ILT Plan, forecasted wholesale Design Day volumes are expected to grow to 1,121 MDth/day in winter 2049-50, a rate of 6 MDth/day per year or a compound annual rate of 0.5% per year. The ILT Plan identifies that in order to address this uncertainty in the main planning scenario for Design Day, a band of uncertainty is presented around the Reference Case. This band is constructed based on past modeling errors and sensitivities in the post-modeling adjustment impacts. Under this analysis, the uncertainty around the Reference Case is approximately plus 9% to negative 5% by winter 2027-28 as illustrated in Figure 7-19.

Figure 7-19: NMPC Design Day Demand (Winter 2022/23 – 2027/28)



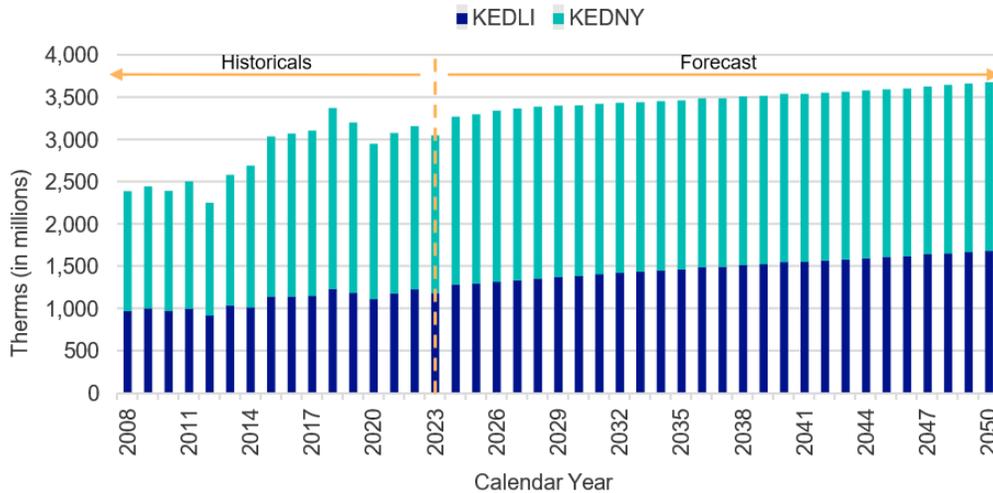
As previously discussed, PA plans to further assess the Design Day forecast and provide our assessment of the underlying uncertainties in preparation of our Preliminary Findings Report.

7.4.2 Downstate

Figure 7-20 (Figure 3-2 of the ILT Plan) shows the historical and forecasted Reference Case volumes separately for KEDLI and KEDNY. Historical annual volumes of 305,900 MDth are projected to grow at a rate of 1.6% per year or, 4,410 MDth per year by 2050.

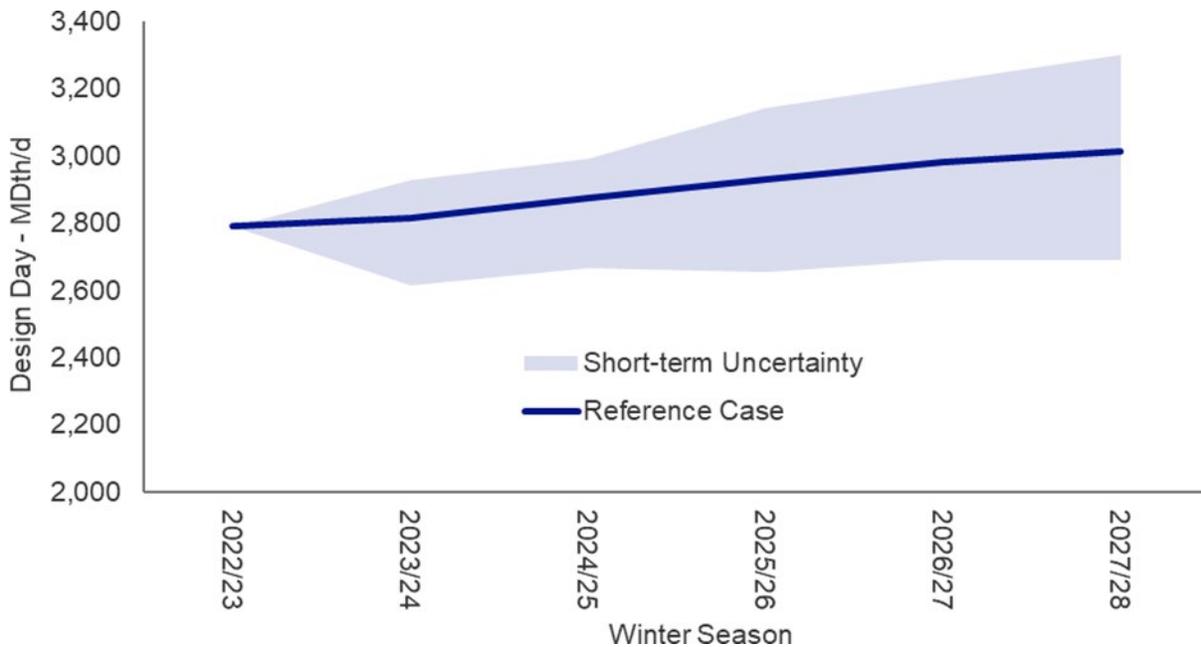
¹⁵² Source: ILT Plan, Figure 3-5.

Figure 7-20: KEDLI and KEDNY Historical and Reference Case Annual Volumes (2008-50)¹⁵³



The ILT Plan describes historical wholesale Design Day growing at a rate of 46.5 MDth/day per year or 1.9% per year from 2008 to 2023. The Reference Case anticipates annual growth of 28.1 MDth/day per year or 0.9 percent per year from winter 2023-24 to 2049-50. Figure 3-3 of the ILT Plan, Figure 7-21 below, depicts DSNY Reference Case Design Day forecast and uncertainty bands intended to consider uncertainties related to variations in modelling, the economy, and demand-side management. Under this analysis, the uncertainty around the Reference Case is approximately 10% by winter 2027-28.

Figure 7-21: DSNY Reference Case Design Day Demand (Winter 2022/23 – 2027/28)



In summary, as discussed above in this section 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, changes in heating degree days, among other factors. We have made several initial observations that suggest the annual retail volumes and Design Day forecast are over-stated.

¹⁵³ Source: ILT Plan, Figure 3-2.

- We interpret New York City's mandates (embodied in Local Law 154¹⁵⁴) aimed at electrifying most newly constructed and substantially retrofitted buildings as potentially consequential moves that will impact gas demand by limiting new customer growth in the Residential, Commercial and Multi-Family customer classes in KEDNY and part of the KEDLI territory.¹⁵⁵
- The latest economic and demographic forecasts imply a future market landscape that suggests a less optimistic environment for customer growth.
- Incorporation of 2023 actual volume data suggests upward step-changes in the UPC forecast for several customer classes.
- As noted above, sound arguments exist for lowering the UPC forecast for the KEDLI Multi-Family customer class and the KEDLI meter count forecast for the Residential Heating customer class.
- As discussed elsewhere in this report electrification trends, improving heat pump economics and decreases in heating degree days will also impact customer counts, UPCs, volumes and Design Day demand.

The combined impact of these observed potential deficiencies is expected to show an overstatement of customers, UPC and volumes. PA recommends the Company's update their forecasts to reflect these factors, especially the impact of adding actual 2023 results. PA is continuing to evaluate these trends and will provide additional observations and recommendations in our Preliminary Findings Report. While most of our analysis to date pertains to the Reference Case, given that the CEV and AE forecasts build off the Reference Case, many of these factors could impact these other two scenarios.

7.5 Clean Energy Programs

As discussed above, the trajectory of gas demand throughout the forecast period will impact total retail volumes/sales and Design Day demand. It will also impact customer bills and affordability of the three scenarios presented in the ILT Plan as discussed in Section 8. The Company's have a large DSM portfolio, focused on EE, electrification of heating and other appliances, and NPAs. The impact of these factors on retail volumes and Design Day demand is expected to increase over time, especially when combined with the expected reduction in customer growth due to macroeconomic trends and public policy. PA is developing a comprehensive assessment of annual retail volumes/sales and Design Day demand that considers all these factors. In this section we provide some initial observations on EE and Electrification.

7.5.1 Energy Efficiency

The Company highlights EE as a core element of their DSM portfolio, encouraging customers to install energy efficient equipment and advanced building weatherization and controls. The Company offers EE programs to a variety of customer classes and since the beginning of their programs in 2016, the programs have achieved approximately 13.6 MDth of annual savings through 315,000 participants, roughly 12% of the Company's total customers over the past 8 years.¹⁵⁶ The Company's energy savings by region can be seen in Figure 7-22 and Figure 7-23.

¹⁵⁴ The Law amends the administrative code of the city of New York, in relation to the use of substances with certain emissions profiles and directs the Commissioner of Buildings to deny construction documents and permits in connection with a building that would require the combustion of these substances, with some exceptions (See <https://legistar.council.nyc.gov/LegislationDetail.aspx?ID=4966519&GUID=714F1B3D-876F-4C4F-A1BC-A2849D60D55A&Options=ID%7CText%7C&Search=combustion>).

¹⁵⁵ KEDLI's territory includes portions of Queens County that fall in New York City limits and are therefore affected by the impacts due to Local Law 154.

¹⁵⁶ Source: ILT Plan, p. 72.

Figure 7-22: NMPC Annual Energy Savings (2016-23)¹⁵⁷

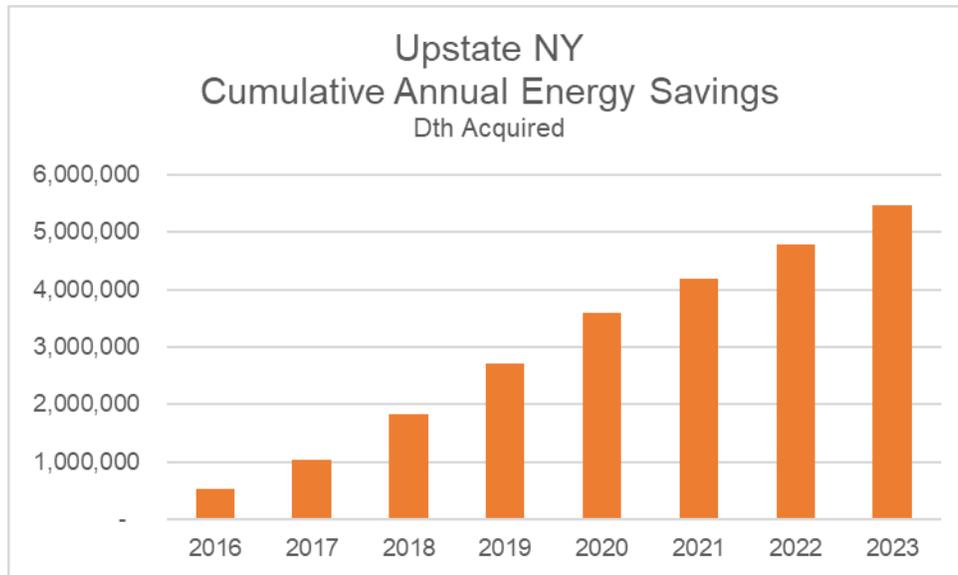
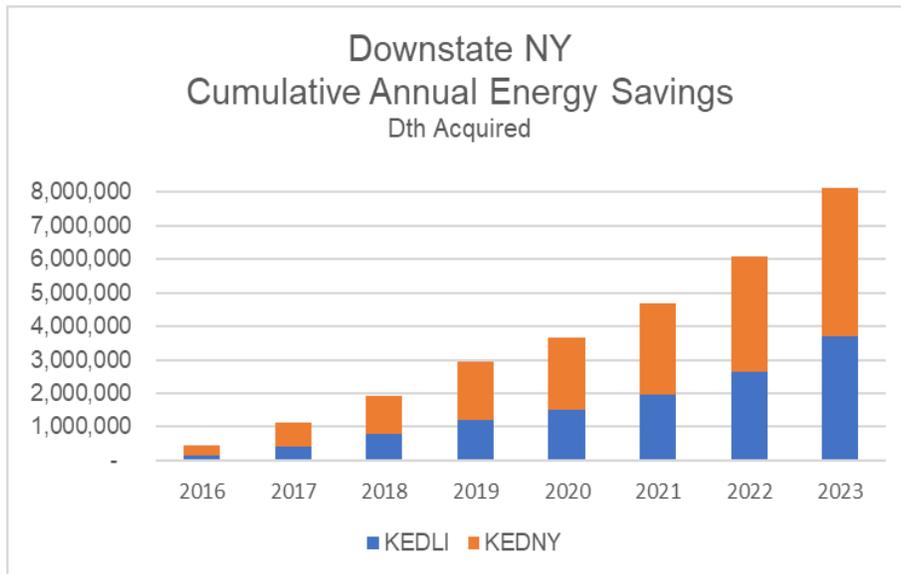


Figure 7-23: DSNY Annual Energy Savings (2016-23)¹⁵⁸



Significant energy savings can be seen in both the upstate and downstate regions of National Grid’s service territory. The Company also offers specific EE incentives for their low-to-moderate income customers, which are explored in greater detail in Section 7.5 of this report.

7.5.2 Electrification

New York State Clean Heat Plan (NYS CHP) is a prime example of a public-private partnership supporting the deployment of low carbon solutions.¹⁵⁹ NYS Clean Heat launched April 1, 2020, and it provides customers, contractors, and other heat pump solution providers with a consistent experience and business environment, and includes initiatives to advance the adoption of efficient electric heat pump systems for space and water heating applications throughout the State. Electric utilities provide incentives to encourage adoption of certain eligible heat pump technologies, including cold climate air source heat pump (ccASHP) systems, ground source heat pump (GSHP) systems, variable refrigerant flow (VRF) systems, commercial and multifamily heat pump systems, and heat pump water heaters (HPWHs). NYS CHP is implemented in coordination with a

¹⁵⁷ Source: ILT Plan, Figure 5-2.

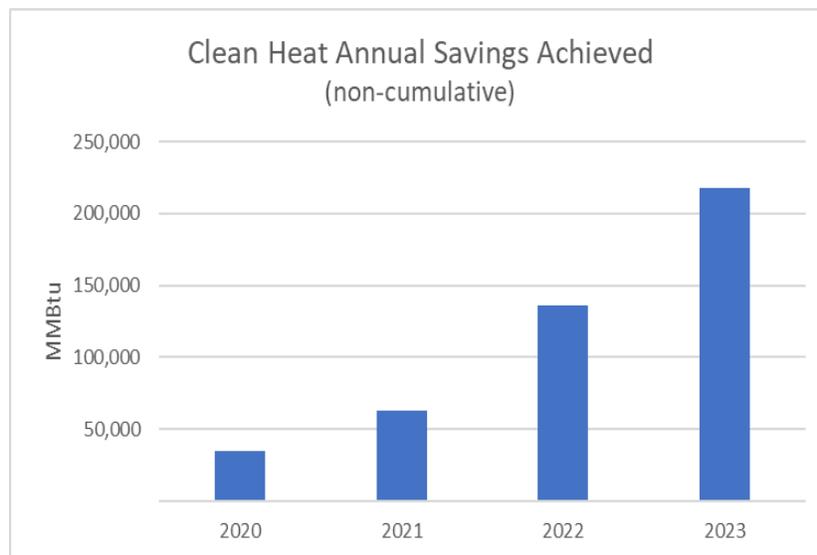
¹⁵⁸ Source: ILT Plan, Figure 5-1.

¹⁵⁹ <https://cleanheat.ny.gov/>.

portfolio of NYSERDA-led market development initiatives, which aim to build market capacity to deliver building electrification solutions. Federally, the IRA bill has specific provisions for adoption of more efficient appliances and electrification of various applications (e.g., heat pump, heat pump water heater, electric stoves, heat pump clothes dryer). NYS CHP rebates can be combined with federal IRA and other state tax credits and other incentives, making heat pumps more affordable than before. Furthermore, heat pump technology continues to advance making this technology both more efficient and affordable.

As an example, the Company focuses on the electrification of heat for NMPC through the installation of heat pumps by offering incentives to customers, regardless of their existing heating system type. The annual savings, since the launch of the program in 2020, can be seen in Figure 7-24.

Figure 7-24: NMPC New York Heat Pump Program Performance (2020-23)¹⁶⁰



The Company notes, that despite successes in the installation of heat pumps to date, heat pump installations can have varying effects on gas sales. For a customer choosing to retain legacy gas heating as a back-up, heat pump installation may or may not result in significant reductions in peak demand. PA will continue to assess these dynamics to better understand and assess the reasonableness of assumptions made around heat pump installations and the overall impact on gas sales and Design Day demand. For example, PA has not determined whether the Company is properly modeling the potential rate of heat pump adoption over the forecast period. PA learned through SME discussions and DR responses, that the Company has not yet developed a view on the economics of heat pumps from the perspective of 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 behaviors 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.

¹⁶⁰ Source: ILT Plan, Figure 5-3.

7.6 Recommendations to Improve ILT Plan

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

1. Discuss and illustrate the impact of specific exemptions to the state and local laws and policies, as it relates to the development of customer, UPC and sales forecasts.
2. Discuss the impact of weather trends as it relates to the development of customer, UPC and sales forecasts.

As noted in this section, PA's analysis is ongoing. Therefore, additional recommendations will be provided in our Preliminary Findings Report.

8 Economic Assessment

PA has begun a review of the economic aspects of the ILT Plan based on information presented in the ILTP Plan, responses from the Company to several data requests, technical conferences, and SME discussions. Our initial observations are summarized within the following sub-sections. We first highlight the bill impacts presented in the ILT Plan, examine the assumptions informing the Company's customer counts and gas sales, impacts to Disadvantaged Communities, benefit-cost analyses, and conclude with recommendations to strengthen the Company's next filed NGLTP.

8.1 Bill Impacts

The Order requires the Company to provide clear quantitative and qualitative explanations for their proposed long-term plan including capital projects and an estimated bill impact and net present value of estimated costs. In the ILT Plan, the Company stresses the importance of maintaining affordability for all customers, both the ones who participate in electrification programs and the ones who don't and emphasize efforts to ensure that their customers continue to have safe, reliable, and affordable access to energy throughout the clean energy transition.

Besides a Reference Case, the ILT Plan outlines two decarbonization scenarios and respective analyses to assess the customer bill impacts and benefit-cost analysis of the scenarios – the CEV, and the AE. The Company presents a Reference Case scenario for a benchmark of the two decarbonization scenarios. The Company notes, that while the results presented in the ILT Plan are illustrative, 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.”¹⁶¹ During SME discussions, the Company emphasized this ILT Plan is intended to be illustrative and directional and is not intended to result in selection of a scenario. PA agrees with the Company that uncertainties exist around energy policy in New York, technology improvements and cost implications, customer sentiment about decarbonization among others, and additional information and analyses could further improve the optimal selection of a scenario. However, one of the objectives of this long-term planning effort and stakeholder engagement should be to clearly inform the Company's long-term investments. While uncertainties always exist in long-term planning efforts, this process should be used to guide decisions by the Company, Stakeholders and Commission regarding investments in long-lived infrastructure assets.

The ILT Plan is based on several assumptions impacting the bill impact analysis that will be a focus of PA's review of the ILT. These assumptions are discussed in more detail below.

Customer Demand

The ILT Plan 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.”¹⁶² PA provided an overview and initial analysis of the Company's demand projections in Section 7. As noted in that section, several factors may not have been fully considered resulting in the potential that the continued growth for gas demand may be overstated across the three utilities. For example, New York's robust policy driven EE, decarbonization targets, and climate action targets that encourage electrification (in some cases by restricting the use of gas appliances in new buildings) do not appear to have been fully considered. Increased favorability of heat pump economics will add to the incentive for customers to switch to electric heat further reducing gas sales. The Company stresses that without additional decarbonization policies and programs, demand for natural gas will continue to increase.

“Preserving reliable access to critical energy service will require ongoing maintenance of the gas network and near-term investments in strategic assets to maintain the gas network.”¹⁶³

System Costs

The Company discusses the costs of ongoing system maintenance and investment in the gas network, specifically for the removal of LPP across their service territory. Further detail on company investment is

¹⁶¹ Source: ILT Plan, p. 120.

¹⁶² Source: ILT Plan, p. 14.

¹⁶³ Source: ILT Plan, p. 19.

highlighted in Section 6.5 of this report. However, costs associated with system maintenance and upgrades will significantly impact customer bills and affordability. As discussed below, the dynamics of decreasing customer counts and gas sales combined with increasing revenue requirement for delivery costs will significantly impact customer bills. An under-estimation of costs associated with the construction, operation, and maintenance of the gas system along with upgrades to the system to support LCFs fuel blending, will result in even higher deviations and upward rate pressure in the delivery costs of customer bills among the three scenarios.

IRA Incentives

It is unclear how the IRA incentives have been reflected in the ILT Plan especially how these incentives can impact the favorability of heat pumps and other electric appliances.

PA believes IRA incentives will increase the pace and magnitude of heat pump adoption across the U.S. and the Company's territories over the forecast period, ultimately lowering gas sales throughout the forecast period more substantially than originally forecasted by the Company. Additionally, discussed in further detail below, PA encourages the Company to assess the economics of heat pumps before and after the inclusion of federal and state subsidies and rebates.

Commodity Prices

The higher costs of LCFs combined with reduced gas throughput will increase unit commodity prices throughout the forecast period. LCFs are discussed in more detail in Section 9.2.

Heating Degree Days

We understand the Company did not consider changes to HDDs in developing its UPC and sales forecasts. A warming trend across the US has been documented over the past few decades and this trend is projected to continue in the future. The observed changes to the weather patterns appear in at least two different forms:

1. Colder than usual days (e.g., cold snaps) which will impact the design day planning and system peak demand, and
2. warmer than usual seasons with lower than usual UPC and delivered volumes of gas to each customer class.

In the bill impact analysis PA is not discussing the first and is more focused on the second which will have a direct implication on gas rates and customer affordability. The omission of this trend would overstate forecasted volumes of gas delivered to customers as the general overall warming trend (all else equal) will put downward pressure on UPC and gas sales, and therefore upward pressure on bills. To accurately forecast sales and UPC, it is important for National Grid to consider how a warming trend will impact these forecasts and, by extension, customer bills.

8.1.1 Bill Impact Methodology

The Company outlines their bill impact methodology for select customer classes across the NMPC, KEDNY and KEDLI service territories. The Company utilizes forecasted revenue requirements and meter counts for each scenario, which include forecasted annual values for rate bases, taxes, post-tax return on rate base, depreciation, O&M, DSM program costs, and purchased fuel (accounting for fuel costs and fixed costs).¹⁶⁴ The Company does not include increases in electric bills, Utility Thermal Energy Networks (UTENs), or 100% hydrogen distribution infrastructure of bills paid by customers using those technologies, but note that these considerations were captured in the BCA, discussed further in Section 8.3 of this report. PA encourages the Company to consider adding these costs into a bill impact analysis. Without these initiatives included, the presented bill impacts will likely provide an incomplete picture resulting in understated bill impact forecasts.

As noted above, PA's review of the ILT Plan reveals several key assumptions that could contribute to an under-estimation of bill impacts throughout the forecast period.

¹⁶⁴ *Ibid.*

Taken together, adjusting these assumptions will increase bill impacts as depicted below.

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.

$$\text{Gas Rate} = (1. \text{ Total cost of operating the Gas Network}) / (2. \text{ Total Gas Volumes Delivered})$$

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

Increased system operating costs combined with lower volumes will lead to higher natural gas rates (both delivery and commodity) and customer bills than forecast by the Company for most segments.

Based on PA's preliminary read of the ILT Plan, the Company is likely under-valuing the adoption of heat pumps and electrification in their service territory, in part due to their omission of incentives from the federal government (e.g., IRA incentives). Additionally, the ILT Plan suggests that the Company is likely not accounting for a decrease in HDDs over the forecast period, resulting in inflated gas volumes compared to what will likely be needed due to warmer winters over the forecast period. The Company applies optimistic assumptions for customer and volumes growth, despite limitations on gas hook-ups and decarbonization policies in NY. The Company cites the exceptions in CLCPA to be the main driver of this optimistic view on number of customers retaining gas or new customers joining the gas network. PA understands these growth assumptions are likely over-inflated and there will likely not be as many exceptions to these policies as the Company predicts, resulting in lower retail growth over the forecast period.

Similarly, the Company assumes higher penetration of fuel conversion, as customers using other fuels (e.g., FO, propane, etc.) will choose to convert to natural gas, as opposed to electrifying. PA is concerned that this assumption may not be valid given the policies, and incentives favoring electrification over use of natural gas in New York (e.g. Cap and Invest program). PA will continue working with the Company and stakeholders to review the reasonableness of such assumptions.

8.1.2 Bill Impact Analysis

The Company states that although the CEV and AE scenarios are highly effective at reducing GHG emissions, as discussed in further detail in Section 9.1 of this report, the two scenarios result in significantly higher bills for customers who remain on the gas network, as opposed to those who choose to electrify. The ILT 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."¹⁶⁵

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

*Table 8-1: Average Monthly Residential Bill – Average of NMPC, KEDNY, KEDLI*¹⁶⁶

Avg. Monthly Residential Bill - Avg. of NMPC, KEDNY, & KEDLI						
	Reference	% increase	CEV	% increase	AE	% increase
2024	\$138		\$138		\$138	
2030	\$199	44%	\$257	87%	\$275	100%
2040	\$253	83%	\$368	168%	\$676	391%
2050	\$285	106%	\$530	285%	\$4,022	2822%

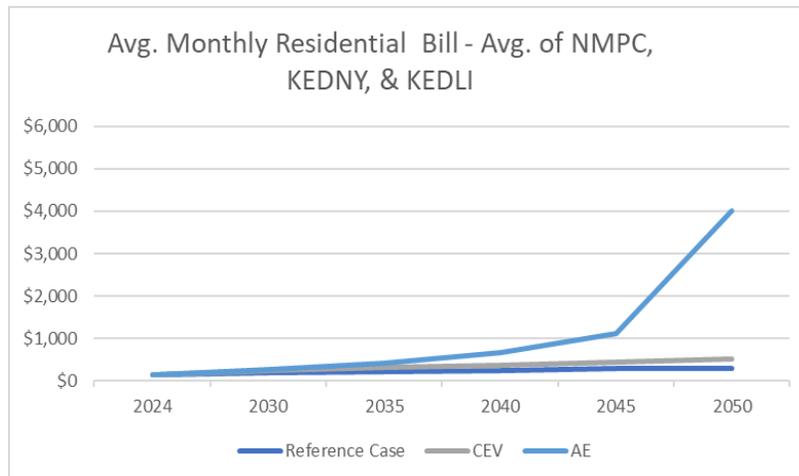
¹⁶⁵ Source: ILT Plan, p. 121.

¹⁶⁶ Source: ILT Plan, Table 7-1.

Based on Company filing, an average residential customer currently paying \$138/month for gas should expect to pay 285% more (\$530/month) for gas in 2050 under the CEV scenario and 2,822% more (\$4,022/month) for gas in 2050 under the AE scenario, as compared to the Reference Case scenario where bills increase 106% from 2024 to 2050.

Figure 8-1 provides the changes in average monthly residential bills over time throughout the forecast period.

Figure 8-1: Average Monthly Residential Bill (2024-50)¹⁶⁷



In addition to overall bill impacts, the Company included a breakdown of delivery only and commodity only bill impacts, as seen in the following figures. Throughout the forecast period, both gas delivery and gas commodity costs are forecasted to increase significantly. Gas delivery costs are forecasted to increase due to a smaller number of customers remaining on the gas system to share the costs of operating the gas system and costly upgrades (e.g., leak prone pipe replacements) forecasted by the Company to be made to the gas distribution system. Gas commodity costs are forecasted to increase due to the costly LCFs blended into the gas supply. Table 8-2 shows the progression of the delivery component of customer bills over time.

Table 8-2: Average Monthly Residential Bill - Average of NMPC, KEDNY, KEDLI (Delivery Only)¹⁶⁸

Avg. Monthly Residential Bill (Delivery Only - Avg. of NMPC, KEDNY, & KEDLI)						
	Reference	% Increase	CEV	% Increase	AE	% Increase
2024	\$104		\$103		\$103	
2030	\$160	54%	\$204	98%	\$232	125%
2040	\$214	106%	\$308	198%	\$588	469%
2050	\$244	135%	\$429	316%	\$3,778	3561%

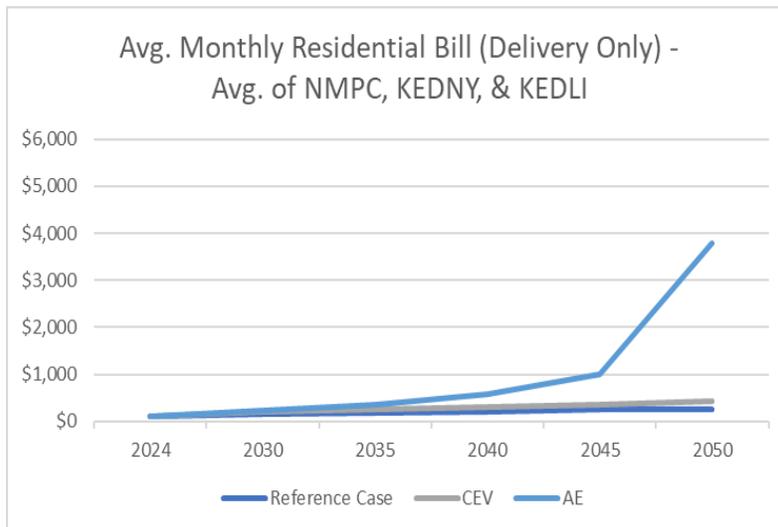
As displayed above, the average monthly residential delivery costs, under the Reference Case are forecasted to increase by 135% (from \$104/month to \$244/month) by 2050. In the CEV scenario, gas delivery costs will increase 316% (from \$103/month to \$429/month) and increase 3,561% (from \$103/month to \$3,778/month) by 2050 under the AE scenario. Increases in delivery costs can be attributed to increase in cost of service for the delivery portion of the bill (e.g., Rate Base, Taxes, Depreciation, O&M, etc.) and fewer customers remaining on the gas network to share operating costs.

Figure 8-2 provides the changes in the delivery cost component of the average monthly residential bills over time throughout the forecast period.

¹⁶⁷ Source: ILT Plan, Figure 7-1.

¹⁶⁸ Source: ILT Plan, Table 7-2.

Figure 8-2: Average Monthly Residential Bill - Delivery Only (2024-50)¹⁶⁹



Gas commodity costs are forecasted to increase, driven by blending traditional natural gas with LCFs. Table 8-3 displays the progression for the commodity portion of the average monthly residential bill over time.

Table 8-3: Average Monthly Residential Bill - Average of NMPC, KEDNY, KEDLI (Commodity Only)¹⁷⁰

Avg. Monthly Residential Bill (Commodity Only) – Avg. of NMPC, KEDNY, & KEDLI						
	Reference	% Increase	CEV	% Increase	AE	% Increase
2024	\$35		\$34		\$34	
2030	\$39	14%	\$53	53%	\$43	25%
2040	\$39	14%	\$61	76%	\$88	155%
2050	\$41	18%	\$101	194%	\$244	610%

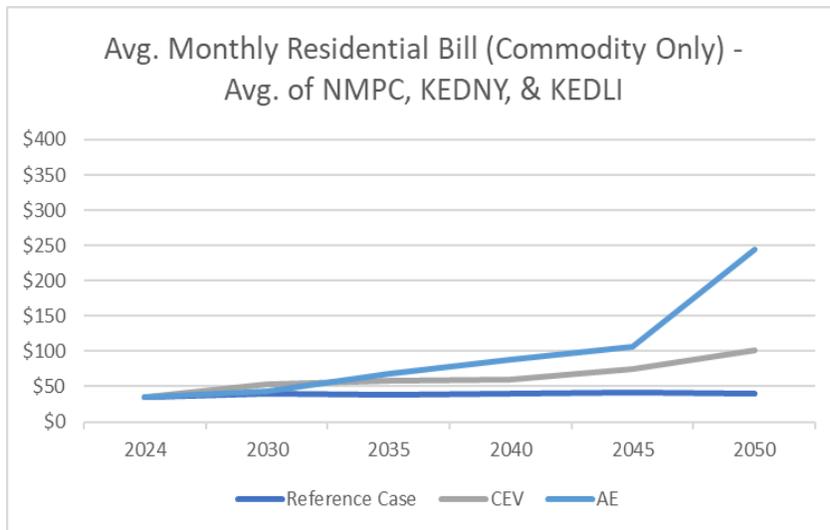
As displayed above, the average monthly residential commodity costs, under the Reference Case are forecasted to increase by 18% (from \$35/month to \$41/month) by 2050. In the CEV scenario, with significant LCFs blending, gas commodity costs will increase 194% (from \$34/month to \$101/month) and increase 610% (from \$34/month to \$244/month) by 2050 under the AE scenario, given higher rates of electrification in this scenario. Increases in commodity costs can be attributed to LCFs and fewer customers remaining on the gas network to share supply costs.

Figure 8-3 provides the changes in the commodity component of the average monthly residential bills over time throughout the forecast period.

¹⁶⁹ Source: ILT Plan, Figure 7-2.

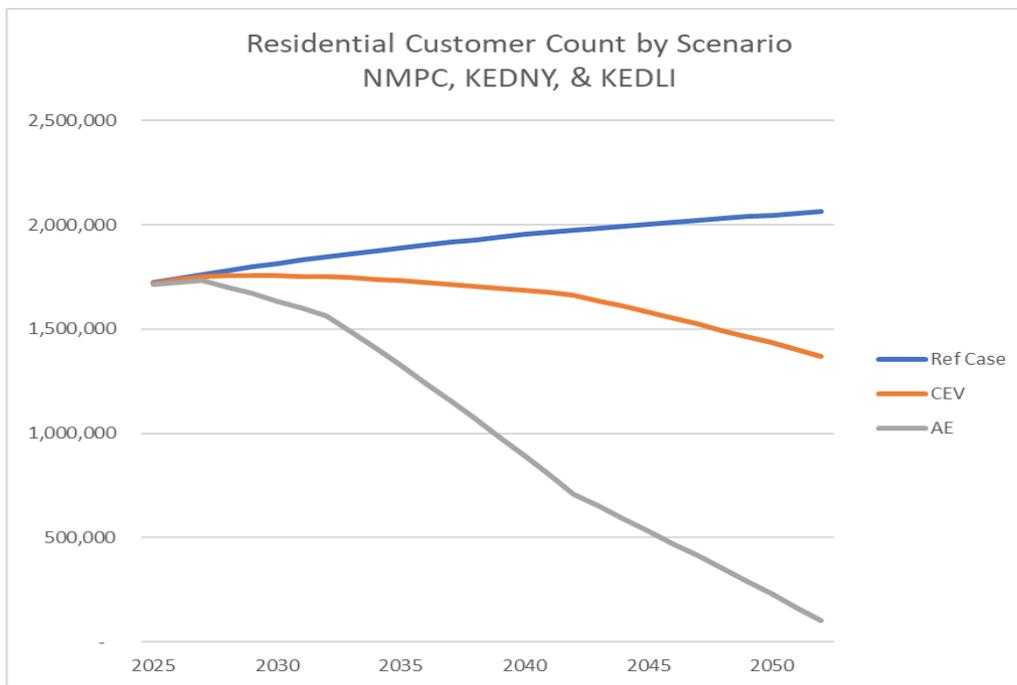
¹⁷⁰ Source: ILT Plan, Table 7-3.

Figure 8-3: Average Monthly Residential Bill - Commodity Only (2024-50)¹⁷¹



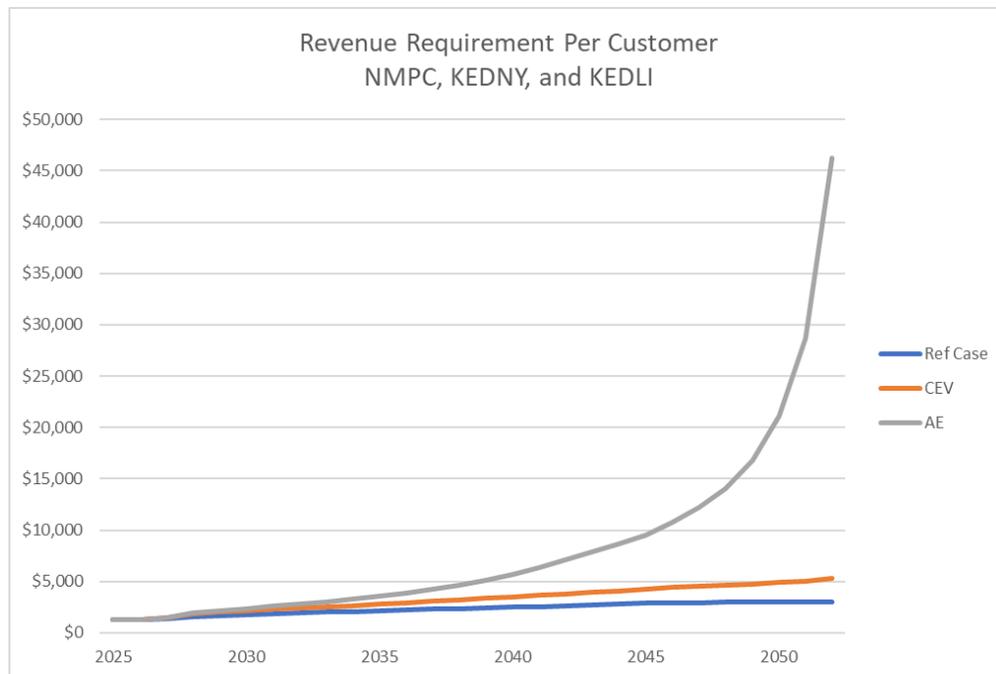
Throughout the forecast period, bills will be going up considerably for customers who remain on the gas system. The Company believes the CEV scenario to be the most affordable for remaining customers on the gas network in 2050, given that approximately 10 times more customers will retain gas service and share operating expenses than compared to the AE scenario. The rapid bill increase in the AE scenario is primarily driven by the dramatic decline in customer count, due to rapid electrification, paired with a relatively flat overall revenue requirement. 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. As customer counts decline, as shown in Figure 8-4, the revenue requirement per customer increases, as shown in Figure 8-5.

Figure 8-4: Residential Customer Count by Scenario (2024-50)¹⁷²



¹⁷¹ Source: ILT Plan, Figure 7-3.

¹⁷² Source: ILT Plan, Figure 7-6.

Figure 8-5: Revenue Requirement Per Customer (2024-50)¹⁷³

Although in the ILT 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. The ILT Plan briefly notes that some changes to the revenue requirement and cost allocation among various rate classes may be needed.¹⁷⁴ Further, 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 aggressive decarbonization scenarios, few 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 range of potential bill impacts and severity of this cross-subsidization risk for each scenario.

8.2 Disadvantaged Communities

In the ILT 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. The Company has developed a draft Equity and Environmental Justice Stakeholder Engagement Framework, which provides a summary of National Grid's principles and intentions in meeting this commitment.¹⁷⁵ Specific to Disadvantaged Communities, this framework outlines the Company's efforts to reduce barriers to participation in customer programs that can benefit low-income customers. The Company defines this framework as a living document and encourage stakeholder feedback and evolving the framework to include important lessons learned.

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 states they are focused on working with and for customers in Disadvantaged Communities to improve infrastructure, and "expand outreach to provide accessible, authentic engagement and representation" through the clean energy transition, in addition to expanding participation in EE and

¹⁷³ Source: ILT Plan, Figure 7-4.

¹⁷⁴ Source: ILT Plan, p. 125.

¹⁷⁵ Source: ILT Plan, p. 13 & Appendix 11.9.

affordability programs.¹⁷⁶ The Company is expressing an awareness of the burden net zero initiatives can have on low-income and Disadvantaged Communities and are committed to mitigating those burdens.

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.¹⁷⁷ PA encourages the Company to developing targeted analyses to inform the bill impact of the decarbonization scenarios 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. In addition, PA recommends retrieving and sharing aggregated customer information specific to Disadvantaged Communities to inform the bill impact of the decarbonization scenarios on customers in Disadvantaged Communities. Information such as annual gas consumption, annual customer bills, and use cases for gas could help inform how Disadvantaged Communities would be impacted under the different decarbonization scenarios.

Energy Efficiency in Disadvantaged Communities

In the Company's portfolio of EE and Electrification programs, there are low-to-moderate income (LMI) incentives offered to qualifying customers. These LMI specific incentives are 20% of incremental EE funding, of which 40% of that funding is allocated to spending in affordable multi-family housing.¹⁷⁸ Additionally, in partnership with the NY Utilities and NYSERDA, the Company worked to launch the Statewide Low- to Moderate-Income Portfolio, a statewide portfolio intended to create a holistic and coordinated approach to low-to-moderate income customers across New York.¹⁷⁹

8.3 Benefit – Cost Analysis

The ILT Plan includes BCAs for the three scenarios using methodology established in the BCA Framework Order.¹⁸⁰ The purpose of the BCA is to compare quantifiable benefits and costs accrued to customers from 2025 throughout the forecast period to 2050. A BCA ratio of greater than 1.0 indicates that the present value of benefits exceeds the present value of costs over the lifetime of the investment. A BCA ratio of less than 1.0 indicates the present value of costs outweighs the present value of benefits over the lifetime of the investment. The ILT Plan uses the Societal Cost Test (SCT) as the primary BCA. Table 8-4 outlines the Company's definitions used for the SCT.

Table 8-4: Benefit-Cost Test Definitions in the SCT¹⁸¹

Benefit-Cost Category	SCT
Avoided Gas Supply	Benefit
Avoided Gas Infrastructure Revenue Requirement	Benefit
Avoided GHG Emissions from Gas Combustion	Benefit
Avoided Emissions from Methane Leakage	Benefit
Avoided Electricity Consumption	Benefit
Avoided Electric Capacity	Benefit
Added Hydrogen and RNG Fuel Supply	Cost

¹⁷⁶ Source: ILT Plan, p. 14.

¹⁷⁷ Source: Company's response to PA 4-80

¹⁷⁸ Source: ILT Plan, p. 74.

¹⁷⁹ *Ibid.*

¹⁸⁰ New York State Public Service Commission, Order Establishing the Benefit-Cost Analysis Framework, January 21, 2016. ("BCA Framework Order").

¹⁸¹ Source: ILT Plan, Table 7-4.

Added Future of Heat Infrastructure Revenue Requirement	Cost
LPP Retirement Revenue Requirement	Cost
Increased Electricity Consumption	Cost
Increased Electric Capacity	Cost
Increased GHG Emissions from Electricity	Cost
Gas Utility Energy Efficiency Administrative Costs	Cost
Incremental Participant Cost	Cost
Non-Gas Utility Electrification Administrative Costs	Cost

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.¹⁸² The results of the SCT BCA by LDC and scenario are presented in Table 8-5.

Table 8-5: Benefit-Cost Test Ratios by Operating Company and Scenario¹⁸³

Operating Company	Benefit-Cost Test	Reference	CEV	AE
NMPC	Societal Cost Test (SCT)	0.67	0.72	0.73
KEDNY	Societal Cost Test (SCT)	0.43	0.60	0.51
KEDLI	Societal Cost Test (SCT)	0.52	0.78	0.65
National Grid Territory Total	Societal Cost Test (SCT)	0.47	0.68	0.60

Overall, the CEV and AE scenarios result in higher benefit-cost ratios than the Reference Case for all the operating companies analyzed. The CEV scenario results in the benefit-cost ratio closest to 1.0, representing the most favorable cost test 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 benefits for the three scenarios, as presented. In development of our Preliminary Findings Report, PA will assess the assumptions and calculations for the SCT in more detail.

¹⁸² Source: ILT Plan, p. 130.

¹⁸³ Source: ILT Plan, Table 7-5.

8.4 Recommendations to Improve the ILT Plan

Based upon our work to date and observations in this section, our preliminary recommendations for the Company to improve the economic impact components of the ILT Plan are summarized below. In some cases, these recommendations consider observations in other sections of this report. For example, the implications of potential changes to customer growth projections, gas sales forecasting, heat pump adoption, and the impact of electrification on UPC, sales and peak demand discussed in Section 7 have important implications for the bill impact and BCA analyses.

1. Clearly identify and include the costs associated with UTENs, 100% hydrogen distribution infrastructure, and any other costs that may not currently be accounted for into the bill impact analysis to ensure all costs are taken into account and stakeholders have a holistic view of the total costs associated with Company's proposed pathways in their assessment of the long-term plan.
2. Include the implications of reduction in delivered gas volumes as a result of warming trends and energy efficiency upgrades driven by federal and state incentives, in development of the forecasts for UPC and sales to improve the accuracy of their gas sales forecast and bill impact analyses.
3. Develop a view on the economics of heat pumps for space heating and water heating in the Company's service territory from the perspective of customers for various customer classes (at minimum for residential and small commercial customers) and how it will change over time as gas rates increase overtime.
4. Retrieve customer information specific to Disadvantaged Communities to inform the bill impact of the decarbonization scenarios on customers in Disadvantaged Communities. Further investigate and consolidate the list of barriers that exist for deploying electrification solutions (e.g., heat pumps) across the Disadvantaged Communities and potential solutions that can help the Company overcome these barriers.
5. Conduct a study to show how fuel blending with RNG and hydrogen would impact a representative low-income customer's bill over time and the potential impact on energy assistance programs.
6. Conduct a comprehensive (gas and electric) share of wallet analysis to understand the bill impact of each Scenario on customers' affordability and how potential shifting costs from gas to electric bill would look for each customer class.
7. Develop a more robust view on the role of targeted electrification that could lead to abandonment/retirement of the gas network in certain geographies. Quantifying the number of rebates or subsidies required to close the financial gap to incentivize electrification in certain regions and among certain customer types will emerge from this analysis and would be a valuable exercise.

As noted in this section, PA's analysis is ongoing. Therefore, additional recommendations will be provided in our Preliminary Findings Report.

9 Environmental Assessment

PA has evaluated the environmental-related aspects of the ILT Plan, including the potential GHG emissions associated with the three scenarios and plans to blend LCFs into the gas network. The following discussion is based upon information presented in the ILT Plan, responses from the Company to several data requests, technical conferences, and SME discussions. Our initial observations are summarized within the sub-sections below, followed by recommendations to strengthen the ILT Plan. We first discuss the Company's forecasted GHG emissions and associated state targets, then discuss the Company's inclusion of LCFs: specifically, RNG and hydrogen.

9.1 GHG Emissions

The Company expresses strong support for New York's climate action goals and acknowledge 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 2050.¹⁸⁴ The Company's wide-reaching approach to emission reduction include:

- 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, and
- Blending LCFs such as RNG and hydrogen.

To date, the Company reports a reduction in GHG emissions of nearly 8.7 million metric tons, since 2016, when the Company's EE and heat pump programs were implemented. The Company's DSM programs are discussed in greater detail in Section 7.5.1. Electrification through the installation of heat pumps is discussed in Section 7.5.2 of this report. Lastly, the Company's report that since 2008, annual GHG emissions have been reduced 35% through leak repair, avoiding 5.5 million metric tons of carbon dioxide.¹⁸⁵ A detailed discussion of infrastructure CapEx associated with LPP can be found in Section 6.5.

In the ILT Plan, the GHG emission impacts of the Reference Case, CEV and AE scenarios. The results depicted in Table 9-1 were developed using the 20-year Global Warming Potential approach. The emission reductions presented below 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.

Table 9-1: GHG Emissions Reductions by Scenario (2024-50)¹⁸⁶

Operating Company	Impact Type	Reference	CEV	AE
NMPC	CO ₂ e (metric tons)	27,516,084	322,275,624	348,396,994
KEDNY	CO ₂ e (metric tons)	144,352,925	515,414,713	583,119,721
KEDLI	CO ₂ e (metric tons)	81,962,562	369,729,522	401,695,554
Total	CO₂e (metric tons)	253,831,572	1,207,419,859	1,333,212,270

The ILT Plan anticipates a reduction of carbon dioxide-equivalent through 2050 of over 1 billion metric tons in both the CEV and AE scenarios by 2050. This reduction is significantly more than the reductions projected

¹⁸⁴ [National Grid Responsible Business Charter 2023.](#)

¹⁸⁵ Source: ILT Plan, p. 12.

¹⁸⁶ Source: ILT Plan, Table 7-7.

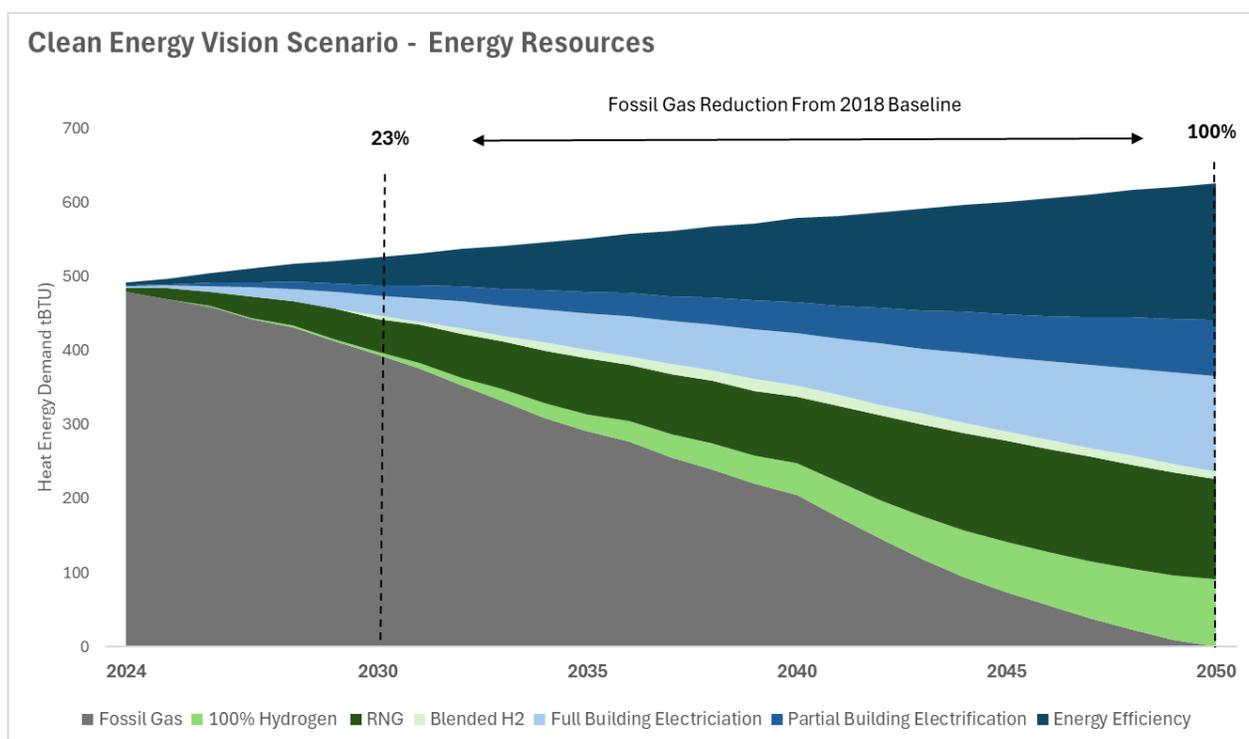
under the Reference Case. The Company confirms that both the CEV and AE scenarios use substantial amounts of LCFs to drive their emission reductions and rely on blending RNG immediately and hydrogen by 2030 to achieve GHG emissions reductions. PA will continue to assess these assumptions; however, as discussed in Section 8 and below the bill impacts of LCFs appear to be significant.

9.2 Low-Carbon Fuels

The ILT Plan includes the use and development of LCFs as a key decarbonizing measure throughout the ILT Plan to progress toward New York’s clean energy goals. The Company has evaluated the inclusion of RNG and green hydrogen for blending into their supply mix and describe the blending of RNG and hydrogen as key pillars of both the CEV and AE decarbonization scenarios.

The CEV scenario, which represents the Company’s preferred pathway, aims to eliminate fossil fuels before 2050 by expanding electrification and energy efficiency, while the gas network plays a “complementary role delivering low-carbon alternative fuels.”¹⁸⁷ The Company aims to eliminate the delivery of traditional natural gas to remaining gas customers, replacing it with RNG or green hydrogen no later than 2050. The energy resources planned throughout the forecast period for the CEV scenario are displayed in Figure 9-1.

Figure 9-1: Clean Energy Vision Scenario – Energy Resources (2024-50)¹⁸⁸



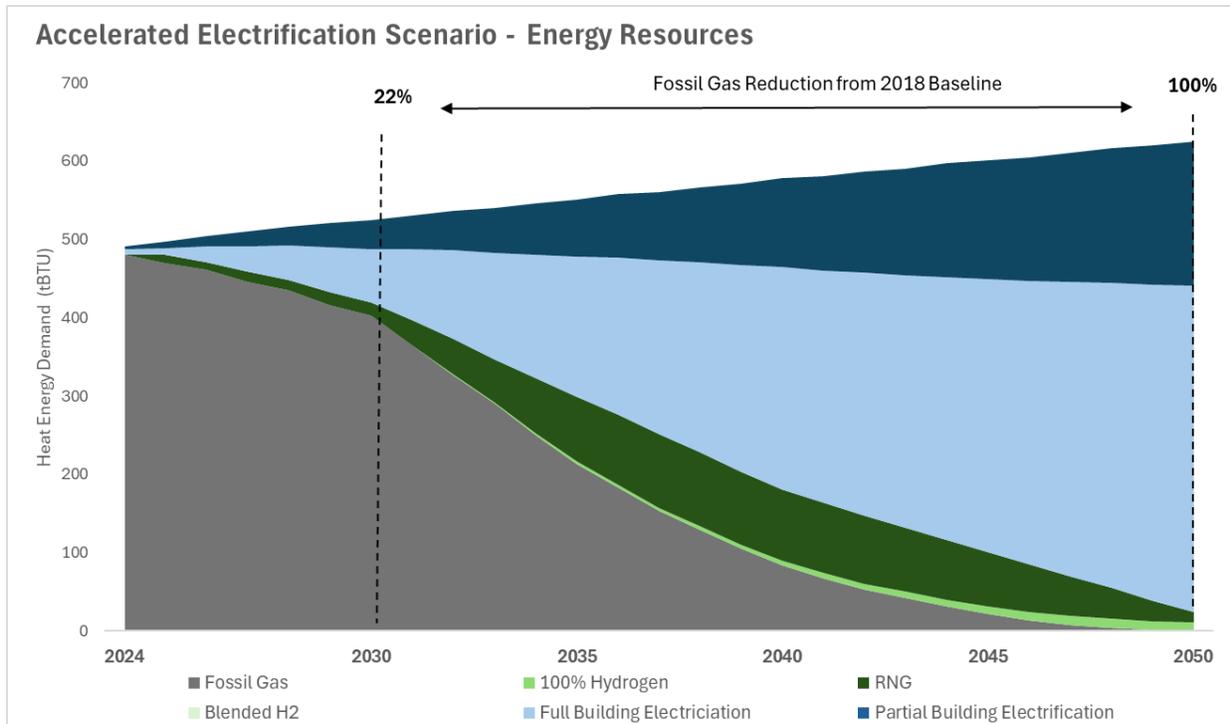
The CEV scenario assumes RNG blending begins in 2024, increasing to an approximate blend of 20% by volume by 2050. The Company assumes blending hydrogen would commence in 2028 and achieve an approximate 5% blend by 2050.

For the AE scenario, the scenario relies on higher levels of electrification, as compared to the CEV but still utilizes significant volumes of LCFs, albeit more limited. The energy resources planned for the AE scenario throughout the forecast period are displayed in Figure 9-2.

¹⁸⁷ Source: ILT Plan, p.16.

¹⁸⁸ Source: ILT Plan, Figure 2-7.

Figure 9-2: Accelerated Electrification Scenario – Energy Resources (2024-50)¹⁸⁹



The AE scenario assumes RNG blending begins immediately, increasing from 2030-40, and as full building electrification continues to accelerate, RNG blending is reduced to approximately 5% by 2050. The Company assumes blended hydrogen would commence around 2030 and achieve an approximate 5% blend by 2050. The bill impact implications of LCFs are discussed in Section 8.1.2.

9.2.1 Renewable Natural Gas

RNG represents a significant portion of the Company’s plans to reduce GHG emissions associated with gas consumption. 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. Results from this study are displayed in Table 9-2.

Table 9-2: Estimate of Annual RNG Production from Eastern U.S. States, and Potential RNG Supplies Available to New York¹⁹⁰

RNG Supply Cases Defined by AGF	Annual RNG Supply Potential Eastern U.S. in 2050 (Tbtu/year)	Estimated Share of Eastern U.S. 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
Regional share of non-power, non-industrial		13.0%	7.2%

¹⁸⁹ Source: ILT Plan, Figure 2-8.

¹⁹⁰ Source: ILT Plan, p. 52.

natural gas sales in 2020

The high and low potentials found in this study suggest the Company will need to procure approximately 135 TBtu/year by 2050 to achieve the CEV decarbonization scenario, representing approximately 7.2% of the average RNG potential in the eastern United States.¹⁹¹ Given that multiple hard-to-decarbonize markets are seeking a RNG solution, including the transportation sector, power generation, and demand from other gas utilities, and the limited supply of RNG, the reasonableness of this 7.2% RNG market share for the Company will be further evaluated in preparation of our Preliminary Findings Report.

It is important to note that the Company has already been procuring RNG. From March to year end 2023, the Company has injected approximately 75,000 Dth of RNG into their gas system from the Newtown Creek biogas facility. This facility was commissioned in partnership with the New York City Department of Environmental Protection and is expected to supply KEDNY with between 137,000 and 237,000 Dth of RNG supply per year. In addition, the Company is supporting the development of four additional RNG projects expected to inject approximately 5,350 Dth/day into the gas system.¹⁹² The Company describes potential feedstocks for RNG production to include only sustainable biomass including, wastewater treatment facilities, food waste, livestock manure, agriculture, and forest residues.

Based on current RNG development and the results of the third-party study, the Company has assumed they will need to transport RNG from other states into their service territory. The Company has stated plans to transport RNG to their service territory from the point of production using select CNG receiving facilities and has clarified they will not be trucking RNG to their service territory.¹⁹³ PA plans to further develop our understanding the potential emissions impact of transporting RNG, and likelihood of the Company's success in securing the projected amount of RNG at a reasonable price.

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 procure environmental attributes associated with RNG, which at this point in time are sold onto the open market.¹⁹⁴ The Company has also expressed the need for potential regulatory changes required to support the LCFs blending strategies. PA will continue evaluating the feasibility and cost of RNG to provide a view on the level of support for such regulatory changes.

9.2.2 Hydrogen

In the ILT 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 highlight the flexibility of hydrogen as an ideal energy carrier for delivering gas decarbonization in a manner responsive to customer demand and market prices.

The Company explains that green hydrogen can be blended with natural gas or RNG up to 20% by volume and be delivered through upgraded gas networks, upgraded through the Company's LPP removal program, and used in existing customer appliances and systems without requiring significant upgrades. To estimate the cost of hydrogen in the ILT Plan, the Company used a third-party report prepared by E3¹⁹⁵ for the California Energy Commission that explains the cost of hydrogen is primarily driven by the cost of the renewable power used to produce it, the efficiency of the production process, and the cost to deliver the hydrogen to an injection point.

To test some of the key hydrogen assumptions, the Company discuss their plans to propose to the Commission a series of hydrogen deployment projects to demonstrate the practicality and evaluate costs of hydrogen blending.¹⁹⁶ 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 suitable distribution infrastructure. The

¹⁹¹ Source: ILT Plan, p. 53.

¹⁹² Source: ILT Plan, p. 45.

¹⁹³ Source: Company's response to PA 1-24.

¹⁹⁴ Source: Company's response to PA 1-19.

¹⁹⁵ Energy Environmental Economics

¹⁹⁶ Source: ILT Plan, p. 56.

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 JP in KEDNY and KEDLI's recent rate filings, the Company must receive Commission approval prior to blending hydrogen.¹⁹⁷

The Company has also described the role of 100% hydrogen networks in the ILT Plan, outlining that 100% hydrogen would be made available to geographic clusters of industrial or commercial applications determined hard-to-electrify.¹⁹⁸ 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 that the Company is first targeting hydrogen blending on areas of the gas system that were or will be replaced as part of the LPP program.¹⁹⁹ 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. PA will further assess the suitability of blending hydrogen for use in residential and small commercial appliances, or reserving hydrogen blending for hard-to-electrify customers with high heat industrial end-uses, as much as possible.

9.3 Recommendations to Improve the ILT Plan

Recommendations for the Company to improve the environmental components of the ILT Plan are summarized below.

1. Further describe the practicality of securing an RNG market share of 7.2% of average potential RNG in the eastern U.S. given the limited RNG supply and high demand at projected price points and proximity to the Company's territories. Develop a view on the potential feasibility of a targeted use of RNG and hydrogen in a limited geography for hard to electrify commercial and industrial customers rather than blending these LCFs with the natural gas supply across the entire system.
2. Conduct an analysis to determine the price point where blending RNG or hydrogen be more expensive than using heat pumps for space heating in residential and small commercial buildings.

As noted in this section, PA's analysis is ongoing. Therefore, additional recommendations will be provided in our Preliminary Findings Report.

¹⁹⁷ Source: Company's response to PA 1-43.

¹⁹⁸ Source: Company's response to PA 4-66.

¹⁹⁹ Source: Company's response to PA 4-64.