VIA ELECTRONIC MAIL (board.secretary@bpu.nj.gov)

September 7, 2023

Honorable Sherri L. Golden, RMC
Secretary of the Board
New Jersey Board of Public Utilities
44 South Clinton Avenue, 1st Floor
P.O. Box 350
Trenton, NJ 08625-0350

Re: "IN THE MATTER OF THE IMPLEMENTATION OF EXECUTIVE ORDER 317 REQUIRING THE DEVELOPMENT OF NATURAL GAS UTILITY EMISSION REDUCTION PLANS" AND THE NEW JERSEY BOARD OF PUBLIC UTILITIES' NOTICE OF TECHNICAL CONFERENCE SOLICITATION OF PUBLIC COMMENT

BPU DOCKET NO. GO23020099

Dear Secretary Golden:

New Jersey Natural Gas Company ("NJNG" or "the Company") submits the below comments pursuant to Docket No. GO23020099 and the public comment solicitation related to the Board of Public Utilities' ("BPU" or "Board") Technical Conference concerning Executive Order 317, which took place August 2nd and August 3rd of 2023.

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Introduction

NJNG, the principal subsidiary of New Jersey Resources Corporation ("NJR"), is a local distribution company that provides safe, reliable and reasonably priced natural gas service to more than 570,000 customers in the counties of Monmouth, Ocean, Morris, Middlesex, Sussex and Burlington. NJNG and its predecessor companies have proudly operated in New Jersey, serving New Jerseyans and their communities, for over 100 years.

Today, NJNG is the largest standalone natural gas utility in New Jersey, owning and safely operating more than 7,700 miles of natural gas distribution infrastructure. NJNG, its parent company and affiliates, employ over 1,300 people, the majority of whom are New Jersey residents.

Across our organization, we are committed to continuing our leadership in New Jersey's transition to cleaner and lower carbon forms of energy. We agree that climate change poses an urgent, global challenge for society, and are working actively to advance practical and innovative solutions toward our shared goal of reducing greenhouse gas emissions.

At NJNG, our vision for the future of gas – and for our ongoing role as a local distribution company and lifeline energy provider – is this: to rapidly enable a renewable energy transformation for New Jersey that is affordable and reliable through the reduction of fossil gas consumption, and the storage, transport and delivery of renewable energy sources whenever and wherever they are needed to lower emissions. We can accomplish this by leveraging our upgraded energy delivery infrastructure, vast and trusted customer relationships, record of reducing natural gas usage through successful energy efficiency programs, and our long-standing commitment to, and record of achievement of, our own emissions reduction goals.

We look forward to working with the Board and other stakeholders on establishing and refining strategies, goals and regulatory actions in line with this vision – not simply acknowledging *a role* for New Jersey's

natural gas infrastructure in a clean energy future, but by recognizing and capitalizing on the *significant role* our company and assets will play in making our energy evolution more achievable, more affordable, more reliable and more resilient.

Policies and regulatory decisions that affect the future of gas utilities in New Jersey will without a doubt impact energy affordability, reliability, the speed of the transition, and the ways in which families and businesses access and consume energy all across our state. To illustrate:

- More than 1,500 critical infrastructure facilities throughout NJNG's service territory alone – and many times that number statewide – rely on natural gas service for safe, reliable primary and back-up energy, 24/7 and 365 days a year.

- The overwhelming majority of New Jerseyans count on natural gas utilities to be there with the energy they need, at the times they need it most, as a matter of their safety, health and wellbeing. 82% of the residents in our service territory rely on natural gas to heat their homes during the severe colds of New Jersey winters. Statewide this figure is 75% - the highest natural gas customer penetration of any state in the Northeast. This infrastructure can serve as a renewable energy accelerator with supportive policies in place.

- New Jersey ratepayers have already invested $17 billion to build out a vast, upgraded, 35,000+ mile underground natural gas pipeline network – more coverage per square mile than any other U.S. state. This ubiquitous network provides safe, reliable, and low-cost energy to homes and businesses, as well as the state's power generation sector.

- As detailed in these comments, this system cannot be easily or affordably replicated or replaced. Instead, it should be regarded and leveraged as an asset that can deliver and store low- and zero-carbon fuels for a variety of end uses including heating and transportation, continue to complement and balance costly demand on the state's electric system, and maintain energy reliability and resiliency for New Jerseyans. In so doing, New Jersey's existing gas network can be a powerful tool to help ensure New Jersey's 2050 goals become a reality as affordably and reliably as possible.

New Jersey's Future of Gas Proceeding

The stakes are high as this proceeding unfolds alongside the State's other related energy initiatives. Future energy policy decisions resulting from these discussions will have a direct impact on the quality of life and cost burdens borne by our customers and communities for decades and generations to come. The need for transparency, openness, and objectivity in this process is absolutely essential to ensure the development of policies that work toward our common goals of substantial, rapid, most-affordable emissions reduction, rather than a predetermined policy of widespread electrification that results in higher costs, less energy reliability and resiliency, and that puts 2050 goals at risk and further out of reach.

The technical conference hosted on August 2 and 3, 2023 included a variety of voices and perspectives, but also exposed serious flaws in the agenda resulting from a rushed process.

- The agenda notably excluded a key consideration called out in Executive Order 317 – the readiness of the electric grid to manage electrification of multiple end uses. Reliability must be of highest concern during the clean energy transition, and is a critical issue continuously raised by the state's energy providers.

- Most topics were premised on an assumption that millions of New Jersey families and businesses will adopt electric heat pumps and rapidly leave the natural gas system, ultimately resulting in rate pressures and underutilized infrastructure.

  This assumption is rooted only in aspirations, and not supported by any evidence of customer adoption, technology innovations, or appliance price-performance comparisons.

As part of the opening remarks of the technical conference, President Fiordaliso emphasized "we don't have enough clean energy to generate the energy that is necessary to supply the 9.3 million people here in the State of New Jersey with energy. And until that day comes, things like nuclear power and gas will help us to provide the reliability that the citizens of New Jersey demand, and should have every day of the week." The Executive Director of the Governor's Office of Climate Action and the Green Economy committed to a process that would seek "… competitive, technology agnostic heating solutions that meet the standards for cost-effectiveness and emissions reduction, protection of human health and reliability."

Contrary to these opening remarks, many of the agenda topics and the State's invited guests created a prominent platform to push full electrification of the building sector as a sole solution, while downplaying any meaningful role New Jersey's underground infrastructure assets may have in a clean energy future.

Of critical concern was the call from these parties for discontinuance of ongoing gas utility investments including energy efficiency, as well as improvements to safety and leak reduction – in direct conflict with our legislative mandate of universal access to gas and gas utilities' statutory obligation to serve.

Given these contradictions, we are respectfully seeking clarification from the Board regarding the stated focus on a technology agnostic approach, especially if the even-handed and data-driven approach focused on cost, reliability and emission reductions expressed at times by the Administration is to become a reality: a level, technology-neutral playing field upon which all stakeholders may fairly compete to support emissions reduction.

The State's natural gas utilities should, can and eagerly wish to continue playing a key role in New Jersey's emission reduction journey and the achievement of the State's 2050 climate goals. As detailed in these comments, we have solutions and investments that can be made to rapidly lower the amount of energy our customers need, while also reducing the greenhouse gas emissions from the energy they do use in line with 2050 goals.

But in order to ensure these solutions begin to be put into practice – and that their myriad benefits to the energy transition are realized – a clear acknowledgment from the Board of the following is needed:

1) that New Jersey's long-term view for the clean energy future is one that leverages both the gas and electric systems to ensure affordability and reliability;

2) that investments across multiple technologies, not just a preferred subset of them, will be needed to reach 2050 goals; and,

3) that consumer choice, costs, and disruptions in homes and businesses are a grave consideration that must be handled with thoroughness, honest dialogue, and a sophisticated and unbiased view of the facts.

Flexible Approaches Amidst Uncertainty

Considering the magnitude of the transformation before us, there is no federal or state government official, industry expert, think tank or special interest who can tell us with certainty in the early 2020s what the "best" way to achieve our goals by 2050 will be. This is a straightforward and realistic recognition that has come from other states that have gone down the path of a future of gas proceeding, including Massachusetts. Note comments from the Commonwealth Attorney General, whose petition initiated Massachusetts' future of gas proceeding:

> "At the core of the [Department of Public Utilities'] decision making must be the **acknowledgment of the technological uncertainty of decarbonizing the building heating sector** and the resulting risks and challenges that face gas distribution companies."
>
> "**The Department, however, is neither equipped nor tasked with determining, predicting, or selecting an 'optimal' decarbonization pathway for the Commonwealth's building thermal requirements**. Thus, the Department should avoid designating a single scenario or pathway for preferred regulatory treatment. Instead, the Department should create a regulatory framework that is flexible, protects consumers, and provides for fair consideration of the current and future technologies and commercial applications required to meet the Commonwealth's clean energy objectives."
>
> "This uncertainty requires that **any regulatory framework be designed to allow for flexibility, adaptability, and accommodation of competitive customer choice among the growing availability of commercial technologies** that offer alternative or complementary heating solutions. Flexibility, adaptability, and competition cannot be premised upon a particular technology, specific investment, or an administratively predetermined pathway approach. Rather, any framework must be sensitive to potential risks and allow for achievement of our climate mandates, while ensuring equity and the minimization of ratepayer costs."
>
> **- Massachusetts Office of the Attorney General**
> Investigation by the Department of Public Utilities on Its Own Motion into the Role of Gas Local Distribution Companies as the Commonwealth Achieves Its Target 2050 Climate Goals
> Final Comments
> October 14, 2022

The "best" view today is one that considers varied scenarios and pathways, and leaves multiple doors open to harness investment, innovation, competition, and consumer choice to lead us to better, faster, and more affordable solutions to achieve climate goals. And along the way, we should reserve judgment on the merits of

any one scenario until such time as substantive data and a clearer picture emerges of what works and what does not work.

This is what is commonly referred to as an "all-of-the-above approach." McKinsey & Company provides some sound advice in this matter:

> "Any system-wide decarbonization planning is inevitably uncertain due to evolving technologies, customer needs, and policy. To set strategy under uncertainty, ongoing assessment and reassessment of potential trajectories is key and requires analysis and pilots to test hypotheses and to understand costs and feasibility….
>
> "As we begin to move along decarbonization pathways, critical sensitivities—such as technology cost, performance trajectories, and customer adoption rates—will need to be identified so risk-mitigation plans can be put into place and signposts can be monitored."
>
> **- McKinsey and Company**
> "Decarbonizing US gas utilities: The potential role of a clean-fuels system in the energy transition"
> March 2022

NJNG supports this approach to marshal all our resources in a flexible, transparent, and innovative way toward the common objective of emission reduction, allowing competition and efficiency to guide a lower cost, energy-secure journey.

The State has not firmly adopted or indicated such a pragmatic approach through Executive Branch actions.

For example, New Jersey has acknowledged at a high level the potential value of clean hydrogen in achieving clean energy goals through its participation in the Northeast Hydrogen Hub. The hub is a 60+ member consortium of private and public sector entities competing to secure U.S. Department of Energy funding to build and scale a regional clean hydrogen hub.

Hydrogen hubs recognize the valuable role of clean fuels in reaching decarbonization goals and, in particular, driving more practical decarbonization solutions in economic segments and industries where low- and zero-carbon fuels are a lower-cost – and sometimes the only viable – decarbonization solution available, such as transportation sector segments (heavy and medium duty freight, rail, maritime, aviation), and heavy industry and manufacturing, as just a few examples.

The U.S. Department of Energy has stated that the "The national clean hydrogen strategy and roadmap shall focus on identifying opportunities to use, and barriers to using, existing infrastructure, including all components of the natural gas infrastructure system."

NJNG was the first utility on the east coast to place into service a clean hydrogen production facility and blend zero-carbon hydrogen into our gas distribution system. The Howell Green Hydrogen project uses renewable on-site solar energy to produce hydrogen by splitting water molecules using an electrolyzer. The process does not generate any greenhouse gas emissions or result in disruption or modification to customer

behavior. It is proof of clean hydrogen's potential to help seamlessly reduce emissions in NJNG's service territory and more broadly.

However, New Jersey has not indicated the development of a comprehensive clean hydrogen or clean fuels strategy to date.

Clean hydrogen is just one of many flexible renewable fuels and decarbonization opportunities that can be pursued using existing natural gas infrastructure; it is logical for the State to take a wider view of these opportunities and to recognize the unique characteristics and value of New Jersey's dual energy systems, especially as it relates to the challenge of building sector decarbonization. Consider the age and characteristics of our state's housing stock, the penetration and well-established connectivity of the natural gas network, the customer economics of electrification for many homes and businesses, the reliability challenges already faced by the electric grid today, and the momentum and progress in clean fuels development to decarbonize the gas network.

As stated by representatives of both New Jersey Resources and New Jersey Natural Gas during Technical Conference panels, we acknowledge a role for beneficial electrification across the energy economy and are not against heat pump deployment under the appropriate conditions, including while preserving consumer choice and achieving net-emissions reductions. We recognize the role that electrification can play in reducing end-use emissions in many sectors. Where we continue to differ is on questions of how electrification measures, including building electrification, should be evaluated <u>before</u> being selected as the preferred decarbonization solution in any part of the economy:

- In light of the power sector's reliance on fossil sources of power generation for the foreseeable future, do electrification efforts actually reduce emissions?
- Are the costs of electrification measures to families, businesses and state/program budgets justified by the amount of emissions reduced when compared to other viable decarbonization technologies?
- What are the impacts of full electrification when it comes to system reliability and resiliency?
- What viable, long-duration backup options exist for critical facilities in the state?
- What are the costs and associated rate impacts of a massive buildout of the electric system to migrate New Jersey's winter heating load from the gas system to the electric system? Is that buildout practical or cost-effective considering there are other viable alternatives using the existing underground pipeline network, when it comes to siting, permitting and construction of new infrastructure?
- What are the fact-based, practical considerations for customer adoption and scale?

<u>The electric system and the gas system are inextricably linked; as such, the future of the gas system should be framed around these questions. However, they have not been adequately asked, let alone answered in the policy dialogue.</u>

NJNG's Requests for Next Steps in the Proceeding

New Jersey Resources and New Jersey Natural Gas appreciate the opportunity to offer comments in response to the Future of Gas Technical Conference that took place August 2-3, 2023. Per the Board's request, we call for further study into the following, based on the comments and facts laid out in this submission:

- Perform an updated Ratepayer Impact Study in consideration of unaddressed stakeholder feedback concerning studies shortcomings (as described in these comments) and current economic circumstances (i.e. inflationary pressures since 2020).

- Undertake a comprehensive integrated planning analysis between electric and natural gas distribution systems, which is necessary to ensure that energy demands can be met while also maintaining safe and reliable service.

- Host, at a minimum, a second technical conference to consider Grid Readiness and Reliability as called for in Executive Order 317, and other topics not addressed in the initial technical conference of August 2-3, 2023. Proactively seek advance input from New Jersey electric and gas utilities and appropriate outside testimony from experts familiar with New Jersey's energy systems in the development of the next technical conference agenda(s).

Reviewing Progress in Building Sector Decarbonization Goals Since the 2019 Energy Master Plan

Like society's energy consumption and carbon footprint, New Jersey's climate goals are complex, interrelated, cut across agency jurisdiction, and have multiple intersections through lawful, statutory requirements and a patchwork of executive branch orders and actions. This framework has evolved across administrations of both parties over more than two decades. This is no less complex when looking more narrowly at the goals for the decarbonization of New Jersey's building sector.

- The 2019 Energy Master Plan ("EMP") set forth a goal of 100% carbon-neutral electricity generation and "maximum electrification of the transportation and building sectors".

- The EMP modeled a "least cost" pathway to meet the Global Warming Response Act ("GWRA") mandate of an 80% reduction of greenhouse gas emissions from 2006 levels by 2050, modeling a 28% reduction by 2030.

- Governor Murphy's Executive Order 274 then set a new, higher interim goal of a 50% reduction economywide by 2030.

The New Jersey 2019 EMP established a view that electrification of energy end use with a massive increase of renewable electric generation will drive greenhouse gas emissions reductions. The policy premise was established from the assumption that a clean grid feeding electrified end uses will lower emissions.

The first part of the equation is key to achieving any emissions reductions from electrification of end uses – having a clean grid, which requires a sharp increase in the deployment of renewable electric generation. Without it, migrating building heat customers from natural gas to electrification can result in no significant emissions reductions, or even increase emissions, while imposing significant cost impacts on customers.

Said differently, without sufficient new renewable electricity supply, New Jersey risks shifting emissions from end use to the electric generation sector, resulting in worse emissions outcomes. To illustrate: fossil generation currently is the marginal generator 91% of the time in PJM[1]. In practical terms this means that at any given time to meet new electricity demand – be it a charging electric vehicle, building heat pump, or any other demand source pulling electricity from the grid – 91% of the time requires burning of a fossil fuel to meet the incremental increase in electric demand.

This dependence on fossil electric generation is fully acknowledged by the Board in its 2023 Building Decarbonization Straw Proposal, which estimated only a 14% reduction in grid emissions rates by 2030 from a 2022 baseline, ***at odds*** with the 50% by 2030 interim goal. This rate of reduction assumed in the straw proposal is consistent with projected PJM CO2 reductions found in EIA's Annual Energy Outlook[2].

Additional future load from electrification of heating and electric vehicle charging will increase needs for electric capacity, much of which will likely come from fossil-based generation sources – increasing greenhouse gas emissions. Reductions in energy use from heat pump efficiencies in buildings will largely be offset by increases in fossil electricity generation and efficiency losses from the electricity's transmission and distribution (i.e. "line loss"). An over-reliance on electrification will be counterproductive to achieving New Jersey's

[1] Quarterly State of the Market Report for PJM: January through March 2023, Monitoring Analytics, LLC
[2] EIA Annual Energy Outlook 2023; Table 54. Electric Power Projections by Electricity Market Module Region

greenhouse gas reduction goals, while imposing higher cost burdens on customers and inviting energy reliability concerns.

No matter how we heat our buildings, power our passenger vehicles, fuel our buses, aircraft or marine vessels, or decarbonize industrial and chemical manufacturing, emissions impacts *must* matter. Reducing greenhouse gas emissions is the only way to address climate change and its impacts. It is the common enemy and only marker of our progress – which is why banner international climate accord targets, as well as those in New Jersey law, are centered on greenhouse gas emissions reductions.

When it comes to the building sector in New Jersey, it is critical for all parties to understand that electrification does not mean emissions-free, or even reduced emissions. Fossil fuels are currently being used to generate much of the electricity used to meet current demand, as well as over 90% of marginal increases in electric load on the grid - and will be relied upon for years to come. Electric heat pumps also make use of refrigerants that have a global warming potential nearly 75 times that of methane.

Punctuating the challenge of achieving greenhouse gas emissions reduction goals in a rush toward electrification is that New Jersey is not currently on track to meet the renewable energy deployment that was called for in the EMP least cost pathway – a key strategy in cleaning the grid.

Today in New Jersey, we have clear challenges to renewable energy deployment and an unclear timeline to achieve 100% clean and reliable electric generation that meets current demand, let alone aspirations to electrify the transportation and building sectors. To reemphasize: this means that until we lower emissions from the grid through more substantial renewable energy deployment, every home heating customer moved from natural gas to an electric heat pump will result in minimal emissions savings at best, with extraordinary costs to both customers and state budgets.

The EMP least cost path modeling specified instate renewable solar would increase from 3.5 GW of installed capacity in 2020 to 12.2 GW in 2030. This translates to an annual solar deployment goal of approximately 750 MW of new installations per year. Since 2020, New Jersey has only achieved about half of that pace of deploying new solar.[3]

The EMP modeling also indicated that offshore wind would have 3500 MW operational by 2030 with another 4000 MW coming online by 2035.

For a variety of reasons, New Jersey is not currently on track to meet those interim goals.

Greenhouse gas emissions reduction should guide New Jersey's energy and decarbonization policy, facilitating an objective, **criteria-based evaluation of investments and strategies** that:

- Actually result in near-term emissions reductions;
- Can be compared by cost- and emissions-reduction effectiveness; and,
- Consider other priorities, including navigating consumer adoption hurdles (including, allowing for choice among multiple consumer decarbonization journeys and technologies).

In addition, it is critical to ensure that the emissions impacts reflect the reality of what the grid will experience. In assessing electric system impacts, they must be based on marginal emissions that consider

[3] New Jersey Solar Installations Report as of 06/30/23 (Annual Capacity), Accessed 9/1/23.

steadily increasing incremental heating load, as well as the emissions factor and impacts of electric heat pump refrigerants that, as noted above, have a global warming potential nearly 75 times that of methane.

These realities have repeatedly been overlooked in favor of a simpler, inaccurate narrative that an electrified building means a more affordable, lower emissions building, when that is far from the case.

Any comparative analysis of fuel switching activity should also consider the improvements in emissions profile of gas systems from clean fuels like RNG and hydrogen, or biofuels for delivered fuels. If the State is interested in really understanding the impacts, they have to look at all facets of the equation, including a steady decrease in carbon intensity of pipeline-delivered fuels based on renewable fuels investment.

From this perspective, it's far easier to understand how leveraging the gas system that is already largely permitted, operational and paid for, can create more feasible and near-term opportunities to reduce emissions, while keeping all options on the table for achieving our shared emissions reduction goals out to 2050.

As we actively pursue a range of decarbonization strategies, NJNG will maintain its obligation to serve customers with reliable, safe and affordable energy, while supporting the transition to a net-zero emissions economy, as detailed below.

New Jersey Natural Gas Has Credible Decarbonization Solutions and Plans that are Anchored in Data and Provide for a Least-Cost, Most-Reliable Path to 2050 Goals

NJNG, our parent company NJR, and affiliates are committed to meeting the State's decarbonization goals, and to our corporate goal of net-zero operational emissions in New Jersey by 2050. Longer term, we also believe the emissions associated with the use of natural gas by our customers can conform with State goals through energy efficiency, replacement of natural gas with renewable fuels, and other emissions reduction solutions coming to market such as carbon capture.

NJNG is actively pursuing a range of new and innovative decarbonization solutions that can be deployed across the gas and electric systems. Although policy emphasis is typically directed toward decarbonizing electric grids, New Jersey can benefit from taking a broader approach. New Jersey can diversify its available solutions by leveraging the existing gas network, which would simultaneously help reduce emissions and minimize the need for new costly infrastructure, keeping energy affordable and reliable.

In fact, the specific EMP subgoals to maintain the gas system that call for non-pipeline alternatives to capacity additions, reducing gas leaks for safety and emissions, and prioritizing and ensuring our capacity additions and extensions are prudent investments are all business as usual for NJNG, and part of how we operate in close collaboration with our regulators.

Where we continue to differ from the EMP is the perspective that there is a single preferred way to meet the State's decarbonization goals with mandates or forced policies favoring electrification, and the related conclusion of some stakeholders that now is the appropriate time to start planning for decommissioning the gas system without any informed input from natural gas utilities or consumers who have, through rates, already made the investment in the infrastructure that safely, reliably and economically serves them.

NJNG has been working with leading, nonpartisan energy experts over many years to better refine our decarbonization goals, understand challenges and opportunities, and lead with facts. Through these efforts, we understand that not every answer is known, but we can state confidently that New Jersey's pathway to achieve its statutory 2050 goals in the Global Warming Response Act, or to go even further (such as net-zero by 2050), in a least cost and most reliable way will make use of emissions reduction solutions in both the gas and electric systems.

- **Meeting Goals:** New Jersey can achieve all stated climate goals today by making use of the $17 billion already invested in existing infrastructure.

- **More Affordable:** Doing so avoids additional estimated energy transition costs up to $90 billion[4]. These costs, which can be avoided, would overwhelmingly be needed to overbuild intermittent renewable generating sources to replace dispatchable fuels in the power generating sector and to build new electric system transmission and distribution infrastructure to meet a new winter peaking system.

[4] Independent Consultant Study Performed for NJNG, June 2023

Building this entirely new infrastructure to accommodate full electrification of both the transportation and building sectors would only serve to replace and replicate – at an enormous cost – what New Jersey's existing pipeline infrastructure already does today, which is deliver the energy equivalent of 60 gigawatts of electricity on the coldest days of the year.

- **More Reliable and Resilient:** New Jersey already experiences the 5th highest power outage rate in the United States, according to EIA data. NJNG has had no weather-related outages on our system for over 10 years. The ability of the gas system to meet seasonal and peak day demands and to reliably deliver gas, or other fuels similarly in the future, even during high-impact events, represents an important and valuable resource that is relied upon daily by families, businesses and critical infrastructure.

  This must be considered when designing future energy policies and pathways to a low-carbon future.

NJNG's "All-of-the-Above" Strategy Aligns with and is Supported by Federal Policy

The current federal policy environment makes this especially important for New Jersey today. Historic legislation from Congress in the form of the Inflation Reduction Act of 2022 ("IRA") and the Bipartisan Infrastructure Law ("BIL") has reaffirmed a supportive federal policy framework for an "all-of-the-above" approach to climate policy, including unprecedented funding to achieve emissions reduction and renewable energy goals across technologies in both the gas and electric systems.

These critical laws advance a technology-neutral energy policy that promotes a wide array of renewable energy types to drive down emissions, including technologies that make use of existing pipeline infrastructure to store and deliver the low-carbon fuels of the future.

Historic Funding Levels for Emissions Reductions Across Technologies: The IRA and BIL channel unprecedented amounts of federal funding toward the research, development, deployment and scaling of low-carbon and renewable energy technologies and infrastructure. Totaling $8.8 billion, there was more funding for clean hydrogen development in the BIL than any other single clean energy technology.

The IRA provides federal funding and support with a singular focus – to drive carbon emissions reductions across technologies, including clean hydrogen, renewable natural gas, biogas, carbon capture and storage, an extension and broadening of renewable investment tax credits for solar and wind alike, energy storage, geothermal energy, hydro, energy efficiency, electric vehicles and charging infrastructure, among others.

Complementing the clear path laid out by these pieces of legislation, it is clear executive branch **actions by the Biden Administration support an "all-of-the-above" path and send clear messages about the need to value and use existing infrastructure investments in our clean energy future:**

- The U.S. Department of Energy's National Clean Hydrogen Strategy and Roadmap calls for: "Future work, which will be done in collaboration across agencies and states, will enable the development of injection standards for blending hydrogen into natural gas pipelines--including the upper blend limits. Other work includes assessing opportunities to repurpose natural gas infrastructure for hydrogen and identifying conditions under which deployment of new infrastructure would be necessary to enable the use of high concentrations of blends."

Market Momentum: Supported by the IRA, investment in energy efficiency, renewable natural gas (RNG), hydrogen, and carbon capture and storage is rapidly accelerating. The market is seeing increased attention from start-ups, traditional energy companies, and leading utilities.

Table 1. Selection of Inflation Reduction Act (IRA) and Bipartisan Infrastructure Law (BIL) Programs to Advance Clean Energy

Program	Program Description
IRA	
Clean Hydrogen Production Tax Credit (Sec. 45V)	Provides a four-tier incentive depending on the carbon intensity of the hydrogen produced, up to a maximum of 4kg of CO_{2e}/kg H_2. Clean hydrogen produced can claim up to $3/kg of clean hydrogen. Projects must begin construction by 2033 to be eligible.
Carbon Capture and Sequestration Tax Credit (Sec. 45Q)	Provides an enhanced rate of CO_2 captured for storage and utilization for qualified facilities through 2032. Enhances the tax credit for carbon capture and direct air capture. Extends the deadline for construction to January 1, 2033, and increases the credit amount.
Investment Tax Credit for Energy Property (Sec. 48)	Applies to the production of energy from solar, wind, geothermal, microturbines, fuel cells, and other eligible projects placed in service after December 31, 2021, and have construction begin before January 1, 2025. Credit is capped at a total of 1.8GW for all taxpayers. Has a base credit of 6% for facilities producing one megawatt of electricity or greater and a credit of 30% available to facilities producing less than one megawatt of electricity. This includes qualified biogas property, which pertains to a system that produces gas that comprises at least 52% methane. This would include renewable natural gas (RNG).
BIL	
Regional Clean Hydrogen Hubs (Sec. 40314)	Provides $8 billion to support the development of at least 4 regional clean hydrogen hubs aimed at improving the production, processing, delivery, storage, and end-use of hydrogen.
Energy Storage Demonstration and Pilot Grant Program (Sec. 41001)	Provides $355 million to conduct energy storage system demonstration projects that improve reliability, particularly in rural areas, including high-energy cost areas -- optimize system operation and power quality to defer or avoid costs of replacing or upgrading infrastructure, including transformers and substations -- supply energy at peak periods or during periods of significant variation of supply.
Weatherization Assistance Program (Sec. 40551)	Provides $3.5 billion to increase the energy efficiency of low-income homes, reduce energy costs, and improve the health and safety for vulnerable populations.

The market is seeing increased attention from start-ups, traditional energy companies, and leading utilities – with the U.S. attracting the second largest volume of new capital of any nation. According to the Sustainable Energy in America 2023 Factbook, a joint publication by BloombergNEF and the Business Council for Sustainable Energy, new capital investment in clean energy technologies rose 11% to $141 billion in

2022. Private equity and venture capital financing in technologies to address climate change also spiked to $25.5 billion with well over 400 deals closing last year.[1]

New Jersey's energy policy is at a crossroads with these market and federal policy realities – accept and allow broad technology investment to incubate, innovate and accelerate, or risk remaining stagnant in a flawed, single-solution approach. We believe this policy support and market momentum, coupled with concerted effort and alignment across stakeholders, can help put New Jersey on a meaningful path toward achieving the State's ambitious climate targets.

Gas Utility Investments Made Today Can Lower Emissions Over the Long Term in an Affordable, Reliable Way

End-Use Appliance Efficiency and Gas Heat Pumps

The common thread across all decarbonization pathways is energy efficiency – the need to substantially reduce the amount of energy used to provide heat to a home or business, operate commercial and residential appliances, or even to simply boil a pot of water. Energy efficiency is the fastest and most cost-effective way to reduce emissions across sectors, regardless of the type of energy delivered.

Providing customer rebates, financing options, and grants for high-efficiency equipment replacement or upgrades and weatherization is an important, low-effort and cost-effective emissions-reduction strategy for NJNG today.

NJNG strongly supports the continued expansion of New Jersey's energy efficiency programs across fuel types. The goals established by New Jersey's Clean Energy Act are among the most aggressive in the country as can be evidenced by a review of the American Council for an Energy Efficient Economy's ("ACEEE") Annual State Energy Efficiency Scorecard[5]. Utility efforts to achieve these goals would put New Jersey near the top of the pack in the energy-savings category. In fact, the 2022 ACEEE Scorecard indicated only one state was achieving more than the 2% savings on annual electric retail sales and only four states are achieving more than 0.75% savings on annual natural gas sales called for in the CEA.

Energy efficiency is the lowest cost, low-barrier strategy for achieving emissions reductions rapidly, while lowering energy bills for customers. **In New Jersey today, where more than 75% of residents are natural gas customers, incentivizing the upgrade from a standard 80% efficiency natural gas furnace to high efficiency furnaces or gas heat pumps (95% to 140%) has a greater positive impact on emissions reduction at a dramatically lower cost than both mandated or incentivized electrification for the overwhelming majority of customers[6].** Gas utilities could bring these high efficiency appliance solutions to market at scale to produce material energy and emissions reductions, and jobs and economic development to New Jersey.

NJNG has taken significant steps to advance the State's goals through our energy efficiency program. Unfortunately, New Jersey's current approach to decarbonization, highlighted most recently in its Building Decarbonization Start-Up Straw Proposal, is myopically focused on electrification and alarmingly deviates from past precedent that requires programs to demonstrate cost savings for participants. It is critical that State policy

[5] 2023 Utility Energy Efficiency Scorecard, ACEEE, August 24, 2023.

[6] Incremental cost per ton of abated CO2 vs. low efficiency furnace of $(278) for high efficiency furnace vs $513 for electric heat pump. Model assumptions: Total capital cost of $22K for whole house electric heat pump sized for 6 ton peak load; State average electric ($.168/kwh) rates from Nov 2022-Mar 2023 from Energy Information Administration, escalated at 1.4% based on Independent Consultant Study Performed for NJNG, June 2023,estimate; Annual electric load in is 9375 kwh per year assuming 800 therm heating load per year and electric heat pump efficiency of 250%, based on actual whole house heat pump performance from Cadmus Group "Residential ccASHP Building Electrification Study", June 3, 2022 study funded by NYSERDA, US DOE, Mass Clean Energy Center; Emissions for electricity calculated from New Jersey Triennium 2 Building Decarbonization Straw Proposal, "Emissions Reductions By 2050" Table 6, page 16, June 14, 2023; EPA standard emissions rate for natural gas combustion is 117 pounds/million BTU.

does not limit broader opportunities for cost effective decarbonization by placing an overreliance on electrification when that is just one of the available strategies capable of reducing energy usage and emissions for New Jersey's residents and businesses.

In fact, innovation in the energy efficiency and end-use appliance space is happening at a rapid clip and will continue to drive progress in the impact, efficacy and affordability of energy-efficiency solutions as climate strategies. One such important breakthrough area is in the development and commercial introduction of natural gas heat pumps ("GHPs"). GHPs are appliances that provide building heat and water heating at extremely high efficiencies when compared with traditional gas furnaces.

Similar to electric-powered, air-source heat pumps, GHPs are extremely efficient, but are driven by natural gas rather than electricity. As such, they are more efficient and effective at delivering heat in cold climates, and less costly to operate.

According to the British Columbia Institute of Technology's Zero Energy Buildings Learning Centre, GHPs have the following critical benefits:

- Have efficiencies of 140% (compared to high efficiency furnaces, which are currently capped around 99% efficiency, and standard efficiency furnaces which generally fall in the 80% efficiency range).
- **Can use refrigerant with no global warming potential in contrast to electric heat pumps. According to the Natural Resources Defense Council, "most current electric heat pumps which use refrigerant R-410A with a global warming potential (GWP) of 4,260 over 20 years. This means that when a pound of refrigerant leaks into the atmosphere, it packs 4,260 times the climate wallop as a pound of CO2."[7]**
- Are compatible with a wide range of fuel sources such as natural gas and low- and zero-carbon fuels such as renewable natural gas and hydrogen.

GHPs are a potential game-changer; a typical home with an 800 therm per year heating load could reduce emissions and operating costs by over 40%. Leveraging existing, reliable and operational infrastructure, this technology can be non-disruptive for customers and seamlessly deployed in millions of buildings that use gas furnaces today without adverse impacts on the electric system. **State policy and programs should recognize this potential and fully support efforts by gas utilities to test, commercialize and scale this technology.**

NJNG is already helping to drive this change. We currently have six commercial-use GHPs in operation at an existing facility, which are serving the dual purpose of providing HVAC on-site needs while providing an opportunity for real-world demonstration and education. NJNG is also a founding member of, and has a representative currently serving as Vice-Chair in, the North American Gas Heat Pump Collaborative, a group of industry stakeholders helping to bring these products forward to the residential market as soon as late 2023.

Hybrid Heat and Contemplated Policy Treatment

[7] https://www.nrdc.org/bio/pierre-delforge/dont-let-refrigerants-slow-heating-decarbonization#:~:text=Most%20current%20heat%20pumps%20use,as%20a%20pound%20of%20CO2

NJNG urges State energy policy and programs to incentivize a hybrid heat approach, leveraging gas and electric systems to meet its decarbonization goals in the building sector. Hybrid heat is the building equivalent of a plug-in hybrid electric vehicle, whereby the primary fuel consumed for operation is electricity (via a battery), with an integrated secondary power source that uses conventional fuel (gas). In the case of hybrid heating in a building, the primary electric source is an electric heat pump, with the secondary source being a high-efficiency gas furnace.

In a typical hybrid approach, electric heat pumps meet heating needs during milder temperatures when they can maximize their performance and efficiency benefits, with high efficiency gas heat operating in colder temperatures when heat pump efficiency tends to degrade, from as much as a manufacturer-listed Coefficient of Performance ("COP") of between 3.5-4.0 down to 2.5 in real world conditions[8]. At the same time, by stepping in to fulfill energy demand as heating energy requirements increase, a hybrid heat system helps to intelligently manage demand by shifting energy load from the electric system to the gas system. At a systemwide level, this improves reliability while lowering costs by using existing infrastructure to meet demand, avoiding the costs of building out a winter-peaking electric system to do the same job.

The benefits of this approach include lower costs, increased comfort and a more seamless appliance transition for customers, as well as avoidance of significant and challenging upgrades of electric system capacity to meet winter peak heating needs and improved reliability of the electric system.

Hybrid heat installations using high efficiency gas furnaces can conservatively provide a similar emissions profile to a fully electrified building over the lifecycle of conversions initiated well into the 2030s – while avoiding significant costs of building out the electric system. This is true before even considering the use of renewable fuels ramping up through the natural gas network or the use of extremely efficient natural gas heat pumps in a hybrid heat configuration, which would lower emissions even further.

There can be multiple configurations of hybrid heat systems deployed, depending on age and performance of existing equipment, unique building circumstances, and customer choice. Accordingly, the State's policy, including those contemplated in its Building Decarbonization Startup program, must ensure that there are no artificial obstacles to customer adoption.

> "On an aggregate level, the widespread adoption of gas-electric hybrid systems would cap the level of electric power demand needed by calling on gas as a backup sourced of heat and thereby mitigating the need for additional electrical infrastructure."
>
> **- S&P Global Commodity Insights**
> "The Peak Challenge: The role of natural gas in decarbonizing US lower-48 residential and commercial heating demand"
> April 24, 2023

[8] Residential ccASHP Building Electrification Study Final Report, CADMUS, June 3, 2022; Hudson Valley Heat Pump Pilot Program: Demonstrating the Emerging Technology of Cold-Climate Air Source Heat Pumps, NYSERDA, Report Number 22-08, 2022.

"When combined electricity-natural gas policies emerge they will signal a maturation of State-level climate policies in North America – one which recognizes the role natural gas infrastructure can play in enabling CO2 reductions from heat."

- S&P Global Commodity Insights
"Quebec leads the way in North America for reducing greenhouse gas emissions from building heat with both natural gas and electricity"
June 9, 2022

NJNG recognizes how early in this journey we are today, and how much needs to be learned to adopt the lowest cost, most effective emissions reduction strategies to ensure we achieve 2050 goals. We support the effort to learn more about decarbonization strategies through regulatory processes, while still allowing innovation, investment, technology maturity, and cost efficiency to be achieved to guide decarbonization solutions at an economy-wide scale. In fact, NJNG proposed a Hybrid Heat program as part of our 2020 energy efficiency filing. Our filing noted how important real-world experience would be for making future policy decisions.

Unfortunately, the program was not included in the approved settlement of the 2020 program.

The State must avoid any exclusionary policy or artificial restrictions on hybrid heat deployment that will be considered as part of this the Building Decarbonization Startup program to be filed by the New Jersey utilities next month. There should not be any restrictions that limit the potential for hybrid heat systems by only allowing hybrid heat configurations that pair a new electric heat pump with an existing furnace – precluding new, complete system installations under this pathway. Allowing contractors to recommend the best hybrid heating solution, which may include a new gas furnace, is the best way to ensure a higher level of customer adoption and make meaningful progress toward decarbonization goals.

Heat pump and furnace equipment must be properly specified to one another to function properly as a hybrid system. The vast majority of existing furnaces in the market are over five years old, creating mismatch and compatibility issues with hybrid deployment and an inability to communicate or function in harmony with a new heat pump. The New Jersey Air Conditioning Contractors Association ("NJACCA") has publicly expressed these concerns[9].

This could also severely impact the business of some progressive contractors who have been marketing hybrid heating systems through the Home Performance with ENERGY STAR program for more than a decade. Maintaining this offering is a vital component of preserving customer choice and socializing heat pump technology to customers, and – as it aligns directly with decarbonization goals – should continue to be encouraged.

According to results from Esource's 2021 Residential Electrification Study[10], nearly 80% of customers who own a natural gas furnace prefer to keep natural gas as their fuel source. This independent analysis supports the view that many customers are unlikely to shift exclusively to electric heating. If New Jersey wants

[9] Public Comments on Docket No. QO23030150, New Jersey Air Conditioning Contractors Association, June 27, 2023
[10] Results from the 2021 Residential Electrification Survey, ESource, September 27, 2021.

to make meaningful progress in electric heat pump installations, it should allow all forms of hybrid heating to qualify.

Once again, NJNG acknowledges that certain customers, by choice and circumstance, may adopt electric heat pumps . We believe that all available solutions are needed to achieve the State's existing GWRA emissions reduction goals by 2050. Our strong interest in developing an inclusive hybrid heat framework to facilitate hybrid heat partial and whole system installations with robust Evaluation, Measurement and Verification ("EM&V") processes will bring important learnings and drive scale – ultimately resulting in our company playing a hands-on, constructive role in deploying heat pump technology among our customers in a way that benefits the State's emission reduction journey and energy system reliability.

It is important to bring all utilities together in this way if the State wishes to meet its heat pump deployment objectives, and to do so in a way that helps abate long-term electric grid reliability and cost impacts. The State's goals include:

- By way of the 2019 EMP least cost scenario, the need for approximately 3 million residential and 150,000 commercial customers to convert from gas to electric heat pumps today through 2050.
- As an interim goal set in Executive Order 317, for 400,000 residential and 20,000 commercial buildings to adopt a heat pump by 2030.

At the time of this submission, Rockland Electric Company had the only electrification pilot approved and, more than halfway through this triennial energy efficiency program, there was only one reported participant.

New Jersey's approach to hybrid heating should encourage and leverage the state's natural gas utilities as a partner and resource in the effort to deploy heat pumps in a way that benefits the affordability and flexibility of the journey to 2050 emissions reduction goals.

Clean Fuels and Innovative Technologies

The Value of a Clean-Fuels System

"A clean-fuels system has the potential to support and help facilitate a decarbonized US energy system. Green hydrogen (made with renewables), blue hydrogen (made using natural gas and CCUS), and biogas are low-carbon energy sources that can complement renewable sources on an electric grid—which is important, since electricity demand from transportation, building-heat electrification, and the industrial sector is expected to increase in the coming years. …

"Our modeling shows that a decarbonization pathway for the energy system based solely on electrification, renewables, and storage, without clean fuels or carbon sequestration, results in a net higher societal cost. An energy system with a clean-fuels network would lower overall cost to society and create potential opportunities for gas utilities to invest in the energy transition. Investments in a clean-fuels infrastructure could be suited for a regulated utility since first, they will require a long

horizon—potentially several decades—and second, they must be made early enough to accelerate the market transition."

- McKinsey and Company
"Decarbonizing US gas utilities: The potential role of a clean-fuels system in the energy transition"
March 2022

Multiple studies charting pathways to 2050 net-zero and 100% clean energy goals, including a review of decarbonization pathway studies performed by Columbia University's Center on Global Energy Policy in late 2022, identify clean hydrogen and low-carbon fuels as key strategies to meet 2050 carbon reduction goals in the least-cost manner, utilizing existing pipeline infrastructure.

NJNG embraces this role for our infrastructure as a ready-made storage and delivery system for renewable fuels, including clean hydrogen and renewable natural gas, serving a variety of end-uses with renewable energy needed to drive economy-wide decarbonization, potentially including: medium- and heavy-duty vehicle transport, passenger vehicles, maritime and rail, industrial applications, fuel cells, building heat and more.

Renewable Natural Gas ("RNG") is a readily available decarbonization solution that is being used today to reduce emissions from homes and businesses, manufacturing facilities and the transportation sector. RNG is produced from existing byproducts of everyday life, including landfills, food waste and wastewater treatments plants that inevitably emit biogas as they decompose. In 2020, 7.4% of New Jersey's total greenhouse gas emissions came from biogas resulting from landfill and wastewater operational emissions.[11]

By capturing that biogas, which contains methane, and processing it into pipeline quality gas, we eliminate harmful fugitive emissions that are typically burned on site (flared) or vented directly into the atmosphere, and we displace fossil fuels in our energy system.

RNG is a fossil-free renewable energy source and a "drop-in" fuel in our underground infrastructure – it is 100% interchangeable with conventional natural gas and can be used in existing residential, commercial, industrial and transportation applications. It can be produced from a number of waste resources, such as landfills and food waste, wastewater treatment facilities, agriculture and animal waste streams, and forestry and crop residue – sources of waste and emissions for which there is no other effective solution for carbon emissions control.

This diversity in feedstocks means that RNG can be produced in every state in the U.S., including here in New Jersey.

RNG projects and markets are already established in many states and advancing quickly to scale to benefit from this flexible, carbon-neutral fuel source and help meet emissions reduction goals. New Jersey should follow suit and support development of RNG as a no-regret solution to efficiently use an unavoidable and naturally occurring resource from within the state to reduce emissions and lessen our reliance on fossil natural gas. As previously referenced, federal dollars are available through the IRA to support development of RNG projects.

[11] New Jersey Greenhouse Gas Inventory 2022 Mid-Cycle Update Report, December 2022.

Clean Hydrogen is an emerging energy source that does not emit any carbon emissions when used as a fuel. It is being actively invested in and pursued as a decarbonization solution across the economy, including with significant federal funding made available through the Bipartisan Infrastructure Bill and the Inflation Reduction Act. More than $8 billion in federal funding and these lucrative tax credits for clean hydrogen production are propelling interest from nearly all sectors, particularly industries that rely on natural gas fuel today.

The use of clean hydrogen as a carbon-free fuel source is extremely flexible – it can be blended with natural gas to lower the carbon intensity of delivered fuel or can be substituted for natural gas in select applications to eliminate carbon emissions entirely. As such, it is being contemplated in end-uses as diverse as transportation, heavy industry, manufacturing, power generation and energy storage, the building sector, in vast fuel cell applications, and beyond.

As noted in our introductory comments, NJNG was the first utility on the East Coast to place into service a clean hydrogen production facility and blend zero-carbon hydrogen into our gas distribution system. The Howell Green Hydrogen project uses renewable on-site solar energy to produce hydrogen by splitting water molecules using an electrolyzer. The process does not generate any greenhouse gas emissions and is proof of clean hydrogen's potential to help reduce emissions in NJNG's service territory and more broadly.

Our upgraded and modernized pipeline infrastructure was designed and built to safely transport and store alternative fuels such as hydrogen, and we have been blending 1-2% hydrogen in our system with no detectable changes. As a point of reference, Hawaii Gas has had an approximate 12% blend of hydrogen in their natural gas distribution system since the 1970s, and blends of up to 20% on existing natural gas pipelines are being studied in other jurisdictions.

NJNG has identified several viable opportunities to make investments in our service territory over the coming years to expand hydrogen production for scaled emissions reduction potential across multiple sectors.

Carbon capture is an exciting area of research, development and investment with significant potential to reduce atmospheric volumes of carbon and slow down the associated negative impacts of climate change. Carbon capture opportunities can range from nature-based solutions that expand and/or accelerate Earth's natural process of capturing and storing carbon, to advanced technological solutions that can prevent carbon from being emitted or extract carbon directly from the air. Solutions can range in size as well, from large-scale projects that capture carbon released in power plants or industrial facilities, to smaller technologies that can be installed at the building level.

NJNG is working to deploy innovative carbon capture technology that is installed on gas boiler equipment to capture the emissions associated with the combustion of natural gas. This technology can help reduce emissions by 30% (with future models providing increased reduction potential) and offers a practical technology that works with existing equipment to effectively reduce emissions with minimal disruption to the customer. This technology is already being deployed in existing businesses today, including in nearby New York City[12].

Furthermore, NJNG is committed to nature-based carbon capture solutions. Our charitable stewardship work through our Coastal Climate Initiative program is helping efforts to naturally sequester carbon through restoration of saltwater tidal marshes off the Jersey Shore. These marshes function as a natural carbon sink, removing carbon from the atmosphere and safely sequestering it in wetland soils and vegetation.

[12] "NYC skyscrapers turning to carbon capture to lessen climate change", Associated Press, May 15, 2023.

When considering open pathways to decarbonization that focus on emissions reduction, innovating and investing in innovative technologies will drive the learning we need to bring the most effective and affordable solutions to scale – what market adoption takes hold will inform smarter and more refined decisions in the future. It should be a priority to make incremental emissions reduction gains on our journey to 2050 and for New Jersey to maximize our share of federal funding support to allow technology and performance-driven investments to blossom, rather than simply hope for pre-determined solutions to work in some future state, perhaps decades down the line.

Carbon capture technologies, including distributed carbon capture fall clearly into this category.

Critical Questions of an All-Electric Approach to 2050

Customer Adoption Hurdles

The 2019 EMP least cost scenario would require 3 million residential and 150,000 commercial accounts to convert from gas to electric heat pumps, and in the future would preclude new customers from deciding how they choose to heat their homes and buildings.

NJNG recognizes that with federal incentives and State policy, heat pumps will begin to penetrate the market. As this occurs, it is essential to be transparent with the facts around customer adoption to understand if the market reality matches the policy goal. Importantly, this should include disclosing the run rate on conversions and how that compares to the State's electrified buildings goal and clarity as to whether the goal and associated metric around heat pumps is "conversions" or simply "deployments," i.e. is the customer deploying a heat pump only a partial vs. whole home adoptee?

While NJNG addresses flaws with the longer-term pricing comparisons between natural gas and electricity below in these comments (see "Correcting the Record"), NJNG agrees with the Building Decarbonization Start-up Straw Proposal's recognition in its May 11 draft publication that switching from natural gas is likely to cost consumers more based on the energy prices and system performance in our market.

This is a critical point, as for the entire history of energy efficiency incentive programs in New Jersey, a core tenet has been that investments should not only reduce energy use/consumption, but also result in savings to customers following some well-defined payback period. **The Building Decarbonization Startup proposal[13] represents a stark departure from this principle, whereby incentivized electrification measures carry the potential for higher utility bill costs, potential bill shock, and negative impacts on customer perceptions toward these programs that may well hinder market adoption over the medium and long terms, contrary to the State's goals.**

NJNG supports the concept of consumer choice and agrees that there may be some early adopters who are interested in installing electric heat pumps without seeing a reduction in their energy bills. However, the average homeowner is interested in understanding the impacts equipment installations may have on their household budgets and reducing costs whenever possible. It is essential that any program include transparency regarding the expected emissions reduction *and* price impacts that can be reasonably estimated in the short term and should avoid any reliance on highly variable long-term forecasts or flawed studies, especially if a significant component of costs, like electric distribution system investments, aren't included.

As such, it is premature to restrict strategies for decarbonization and to limit customer choice without considering the results of existing programs, advancements in technology, and the impacts on reliability and affordability, as well as key questions to inform a more complete understanding of issues, customer impacts, properly characterized market adoption and behavior, and net emissions impacts (see sections above "Reviewing Progress in Building Sector Decarbonization Goals"):

- Are proper installation practices being followed?

[13] https://nj.gov/bpu/pdf/publicnotice/T2%20EE4%20Building%20Decarbonization%20Straw%20Proposal.pdf

- What is the impact of accidental release of refrigerants (greenhouse gases which have warming potentials thousands of times higher than carbon dioxide or 75 times greater than methane) from improper installation and leakage from normal "wear-and-tear"?

- What are the emissions impacts from the unintended incremental cooling load (from customers who may be upgrading from window/portable air conditioning units to larger, whole home heat pump solutions)?

- How many customers are pairing the installation with weatherization measures?

- Regarding the estimated bill impacts, any analysis should attempt to isolate changes for the system switch only. NJNG recognizes the importance of bundling weatherization to maximize energy savings, but it would not be accurate or fair to count weatherization savings as part of the electrification benefit when that same weatherization savings could have been achieved if the customer stayed with a furnace or boiler. If the State really wants to understand the impact of changing out equipment, it should collect data on that.

- As has been considered in other states, are customers using other sources of supplemental heat (e.g., wood burning stoves)? If so, is it possible to estimate that and what are those emissions implications?

- What is the actual efficiency performance (COP) measurement of heat pumps across the diversity of New Jersey building types and climate zones? How does this compare to manufacturer specifications?

- How many heat pumps are for partial vs whole house space heating? If partial, how are heat pumps used for heating vs other building heating sources?

Affordability and Equity

"Now we are tasked to look at the cost of transition, potentially from gas to electric or to some carbon free energy source. First and foremost, we need to be honest about the cost. We cannot simply compare the cost of natural gas to the cost of electricity. Very few ratepayers can tell you how much they pay per therm or per kilowatt and I can assure you significantly less are aware of any mechanism to compare a therm to a kilowatt. Nor is that really relevant. Will my bills go down? Will I be paying more? That's it. That should be the number we are all looking at.

"To do that we need to look at everything. The cost of the increased usage of electricity is only one cost. If we're going to increase and switch people to electric in their homes, ratepayers will need new equipment. One study finds conversion of an average household from gas to electric, will cost $25,000 to $30,000. But the cost doesn't end with the equipment. If we're not using natural gas in our homes, we'll be using electric so electric use will go up. How are we generating that electric and who's paying? Ratepayers are already paying significant subsidies for the current generation mix. They are paying subsidies to generators for electricity made by solar and nuclear generation, and soon ratepayers will be paying for generated electricity through offshore wind. How much more will

ratepayers pay if we transition to all electric homes and businesses. Once we generate that electricity, it will have to be transmitted. Our current grid isn't ready. There will be costs transforming the electric grid. All these costs are going to add up and they're all going to end up in a ratepayer's bill and they all must be considered as we think about this transition."

- Brian Lipman, Director
New Jersey Division of Rate Counsel
BPU Future of Gas Technical Conference
August 3, 2023

To be achievable, New Jersey's energy transition must be as affordable as possible for customers – families and businesses that pay rates and especially low- and moderate-income households who already carry a significant energy burden. As of 2021, New Jersey's cost of living for a family of four is nearly 400% higher than the federal poverty level[14], and 2.2 million households – 39% of residents – are struggling to pay their bills[15].

Research shows that leveraging gas infrastructure to achieve New Jersey's decarbonization targets is a more cost-effective and feasible strategy than an all-electric alternative. Decarbonization pathways that rely solely on the electric grid and phase out use of the gas system could cost up to $135 billion[16]. Residents would incur the costs of new electric-only appliances, an overbuild of renewable and carbon free power generation, as well as extensive grid expansions. The research estimates that as much as $90 billion[17] of those costs would be required to decommission and phase out use of the gas system (see "Grid Impacts and Costs" below).

Real, substantial costs to families and businesses: on a total cost of ownership ("TCO") basis that includes upfront capital costs and lifetime operating costs, heat pumps cost significantly more for customers to install and operate today than high efficiency gas furnaces. Before subsidies, NJNG calculates the TCO for an electric heat pump in 2023 to be more than $54,000 per family compared to approximately $37,000 for a high-efficiency furnace – 46% higher costs.[18]

As detailed earlier in these comments, these costs come with no meaningful emissions savings until the electric grid becomes significantly cleaner. On any objective basis, the headlong rush to achieve outright conversions from natural gas fuel to full electrification (as opposed to high-efficiency gas equipment or hybrid heat solutions) is premature when it comes to customer disruption, reliability costs or emissions reduction benefits.

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[14] ALICE State and County Household Budgets 2021, New Jersey State Data, Accessed 9/1/23
[15] Census Bureau Week 60 Household Pulse Survey: July 26 – August 7, Issued 8/16/23
[16] Independent Consultant Study Performed for NJNG, June 2023
[17] Independent Consultant Study Performed for NJNG, June 2023

[18] Capital costs for all heating appliances based on Independent Consultant Study Performed for NJNG, June 2023,for typical 2000 sq foot single family homes sized for 6 ton peak load. Annual operating costs based on State average electric ($.168/kwh) rates from Nov 2022-Mar 2023 from Energy Information Administration, escalated at 1.4% based on Independent Consultant Study estimate. Annual electric load is 9375 kwh per year assuming 800 therm heating load per based on electric heat pump efficiency of 250% (based on actual whole house heat pump performance from Cadmus Group "Residential ccASHP Building Electrification Study", June 3, 2022 study funded by NYSERDA, US DOE, Mass Clean Energy Center.)

Equity in Meeting the Needs of Low- and Moderate-Income Customers: NJNG shares the belief that low- and moderate-income customers cannot be left behind in the long-term energy transition. But it is misguided and antithetical to this effort to put forward policies that may increase the energy burden for customers who are struggling to meet basic needs. New Jersey should be focused on making energy bills for the most vulnerable as low as possible now, instead of trying to react to hypothetical changes in prices years from now that are highly dependent on study assumptions and often missing critical variables that affect costs.

Some have called for efforts to correct for this increased energy burden by adjusting bill credits or new rate design paradigms. These will only lead to higher bills for all other customers. Rate design issues are usually a zero-sum game. Efforts to create a new, lower electric rate to address an increased energy from electrification simply mean that recovery of electric distribution fixed costs will shift to other customer classes. Similarly, efforts to increase Universal Service Fund bill credits to compensate for potentially increased energy burdens for low-income customers will result in higher societal benefits costs for all customers.

We state again our concerns around the need for transparency and grounding in facts around the issue of costs to families and businesses. Credibility with customers is a paramount concern in driving any market transformation. If a customer is told to expect savings when replacing equipment and switching fuels for their home heating needs, they should realize those savings, especially when they come with significantly higher upfront equipment costs, as with electric heat pumps. At present, the State runs a severe risk of damaging its credibility if a flawed, incomplete and misleading study of costs becomes the prevailing pitch to customers.

This is especially glaring in two studies that continue to be referenced in the dialogue around building electrification, one commissioned by the State and one conducted by a third party, the Acadia Center. In brief:

- NJBPU's Ratepayer Impact Study only modeled consumer cost impacts out to 2030 and failed to consider upfront capital costs for either electric vehicles or electric heat pumps, while outright not considering in any way the systemwide cost implications of massive increases in electric load driven by transportation and building end-use electrification, which ultimately get reflected in rates and customer bills.

- The Acadia Center's "Future is Electric I & II," often cited by electrification proponents as proof of available customer savings from switching, is flawed in its assumptions, analysis, and conclusions. Acadia's studies lack transparency into its modeling and assumptions, but in all cases relies on cherry-picked high natural gas prices that do not reflect real-world customer costs, nor do the authors disclose performance assumptions of electric heat pumps used in their model.

A more detailed review of the inadequate rigor and factual issues with each of these studies are included further below in these comments (see "Correcting the Record").

Grid Impacts and Costs

It is critical for the State to understand the full impacts of the increased load on the electric distribution system. This includes the need for significant investment in the electric distribution system to meet the increased load from vehicles, building electrification, secular trends in electric demand increases from datacenters, and the reality of a new winter peak.

This is much harder to model; so, it is often overlooked, including its relegation in the Ratepayer Impact Study to a footnote that merely states the costs were not included. Other studies start with an incredibly aggressive assumption about customer interest in migrating away from the use of the natural gas system and the modeling becomes skewed and unrealistically results in a change in economics. There is no evidence to suggest that customers will proactively change out an existing, working heating system just to electrify. If those same studies used realistic assumptions about customer migration, there would not be an artificial inflation in the cost of natural gas.

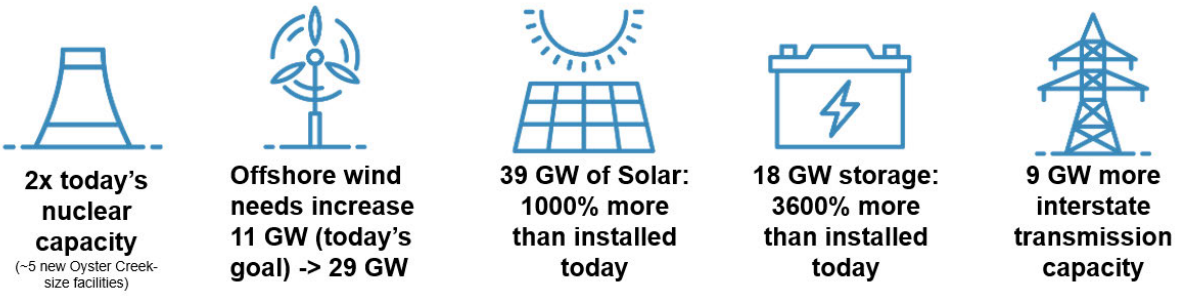
The referenced 2019 New Jersey Energy Master Plan: Ratepayer Impact Study cited as the cost comparison between electric and natural gas bills does not consider these electric distribution costs, despite being in scope for the study. For example, Con Edison recently cited a $72 billion estimate in transmission and distribution system capital expenditures needed to meet New York's electrification plan, or 8% growth per year, and more than doubling the total utility investment in the system.

Given the potential to reach a new winter peak for electric load under electrification scenarios that would approximately triple the current winter electric peak, it is irresponsible to not have performed a more focused study reflecting the necessity of additional electric distribution system infrastructure and its estimated costs. Without trying to identify and estimate those costs, any long-term cost comparisons versus natural gas system heating costs cannot reasonably inform policy decisions.

Beyond cost, New Jersey must also consider the need for where such infrastructure could and would be sited and the reasonable pace at which these investments could be made alongside the State's goals for increased electric load vis-à-vis electric vehicles and electric heat pumps. These elements are critical to ensuring reliability and affordability – and even pathway and strategy feasibility – as all work together to reach our climate goals.

Our own work performed with independent consultants in this area shows just how significant these infrastructure challenges truly are to achieve a net-zero economy by 2050, without use of the gas network:

To Meet 100% Electrification Path to Net-Zero by 2050:



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- **Requires 100% heat pump adoption across New Jersey's approximately 3.5 million residential and commercial buildings at enormous cost and unprecedented customer disruption.**
- **Introduced extreme system reliability and infrastructure resiliency challenges.**
- **Grid operator PJM has already raised reliability concerns around retiring thermal capacity and uptake of new renewable generation assets:**
    - "PJM's interconnection queue is composed primarily of intermittent and limited-duration resources. Given the operating characteristics of these resources, we need multiple megawatts of these resources to replace 1 MW of thermal generation."
    - "… **It is possible that the current pace of new [renewable development] entry would be insufficient to keep up with expected retirement and demand growth by 2030**."[20]

In this proceeding, we urge the State to update its Ratepayer Impact Study to address the shortcomings of its initial study, to fully account for all costs flowing through to ratepayers from broad electrification and to compare those costs against other pathways that utilize decarbonization solutions in both the gas and electric systems.

[19] Independent Consultant Study Performed for NJNG, June 2023
[20] Energy Transition in PJM: Resource Retirements, Replacements & Risks, PJM, 2/24/23

Reliability

> "Over the last century, two great industries have arisen – electricity networks and natural gas production and delivery – and together have become an absolutely critical foundation for our dependence upon an uninterrupted supply of reliable, safe, and affordable energy. We simply cannot keep the lights on or heat our buildings if both systems do not operate synchronously."
>
> **- North American Energy Standards Board**
> "Gas-Electric Harmonization Forum"
> July 28, 2023

Access to reliable energy is a basic need for customers and critical infrastructure across New Jersey. It is critically important to ensure energy delivery remains reliable while considering policy that transitions our energy resources. As climate change and extreme weather pose risks to our energy infrastructure, we have an obligation to invest in more durable, resilient and reliable energy networks to protect residents' livelihood and well-being. There is no starker example of the need for – and risks of not – considering energy system reliability and stability than 2021's Winter Storm Uri in which failure to deliver energy resulted in excess of 240 lives lost and economic damage estimated as high as $130 billion[21].

Underground gas infrastructure is inherently a more reliable form of energy transportation and delivery to customers. New Jersey's gas infrastructure is designed to reliably deliver 5 billion cubic feet per day of energy on the coldest days of the year, the energy equivalent of over 60 gigawatts of electricity. When buried underground, it is less susceptible to weather events and physical damage.

NJNG operates more than 7,700 miles of modernized underground transmission and distribution infrastructure. For longer than a decade – since Superstorm Sandy – there have been zero gas system outages due to weather conditions. Comparatively, electric system outages in the State average 104 minutes per year *per customer*. However, the duration and impact of significant outage events are unevenly spread, with over 35% of New Jersey households experiencing power outages lasting over 24 hours – 5th highest in the nation according to EIA data.

It's no surprise then that in NJNG's service territory alone, more than 24,000 households and businesses have installed back-up generators powered by natural gas or delivered fuels to minimize the burdens of electric outages.

As New Jersey looks to decarbonize its energy system and significantly build out renewable and low-carbon electric generation, consideration must be given to the feasibility of transitioning energy load from the gas system to the electric system. The natural gas system delivers the majority of energy during New Jersey winters, with 75% of households relying on natural gas for heat. Cautious planning is required, and the costs associated with building more resilient electric infrastructure transmission and distribution would become magnified without a dual-fuel energy system.

[21] Gas-Electric Harmonization Forum, North American Energy Standards Board, July 28, 2023.

New Jersey depends on our current natural gas infrastructure to operate year-round. Resiliency is a crucial component of a dependable energy system, which is obtained through diverse and redundant energy sources. Gas system resiliency and the ability to meet seasonal and peak demands represent essential elements that must be considered when designing energy systems and a low-carbon future.

Recent weather events have shown the value and necessity of a resilient gas system and the inextricable linkage between fuel delivery, the supply of electricity, and peak energy management across the gas and electric systems. From a critical infrastructure perspective, it is imperative in an energy transition as we see an uptick in larger outage events. In New Jersey Natural Gas' service territory, there are over 1,500 critical infrastructure facilities that rely on natural gas delivery, this includes: emergency services, healthcare facilities, sewer/water treatment plants, government operations, military bases, and telecommunications.

While extreme weather events often highlight calls for taking action to reduce emissions, they also display the need for our dual energy delivery system to ensure constituents are supplied the energy they need. Constituents also rely more heavily on the gas system as a backup during time of large-scale electric outages. Roughly 30-40% of residents across NJNG's service territory rely on portable backup generators during power outages[22], with many more opting for stand-by natural gas generators for home, business and critical infrastructure back-up power.

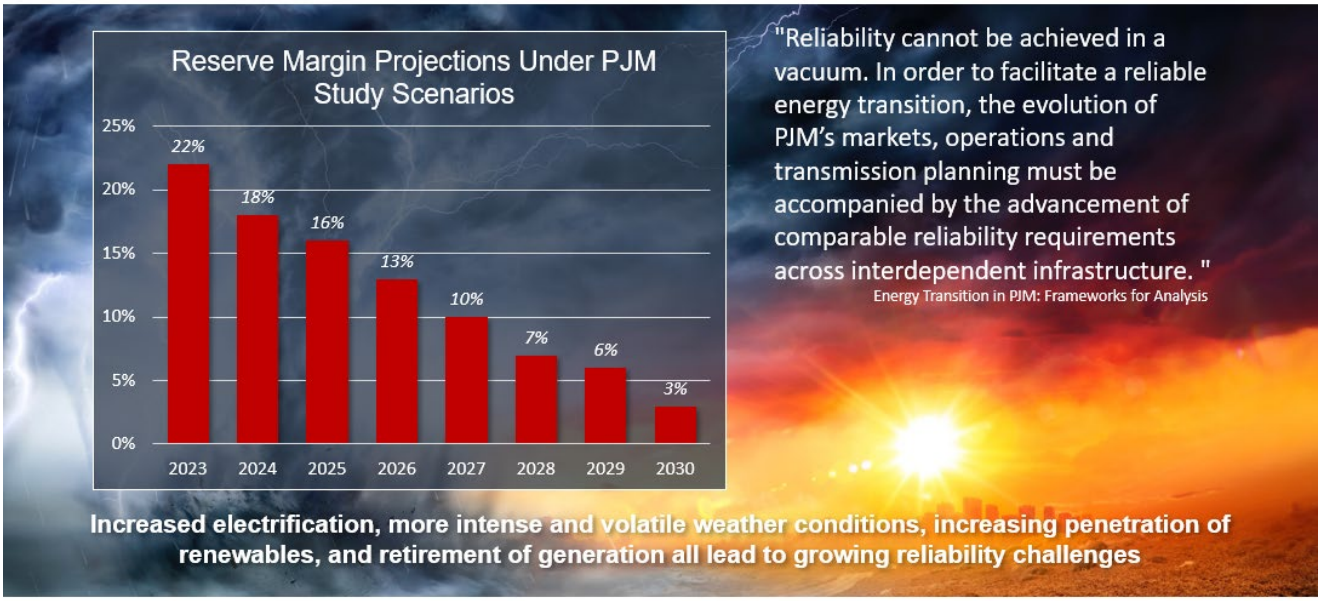
Real-world considerations such as these need to be acknowledged and built into scenario modeling. Dependence on the gas system is growing, particularly in times of natural disasters and reliability interruptions on the electric grid.

PJM Warnings and New Jersey Constituent Weather Impacts

As outages become more frequent and severe due to volatile weather conditions and climate impacts, increased electrification, and increasing penetration of renewables, reliability challenges will grow. We are witnessing these calls from PJM and other northern regional grid operators around the country that there are near-term threats to our grid reliability.

[22] Health Indicator Report of Portable Generators: Self-Reported Ownership for Use during Power Outages, New Jersey Department of Health, 2020.

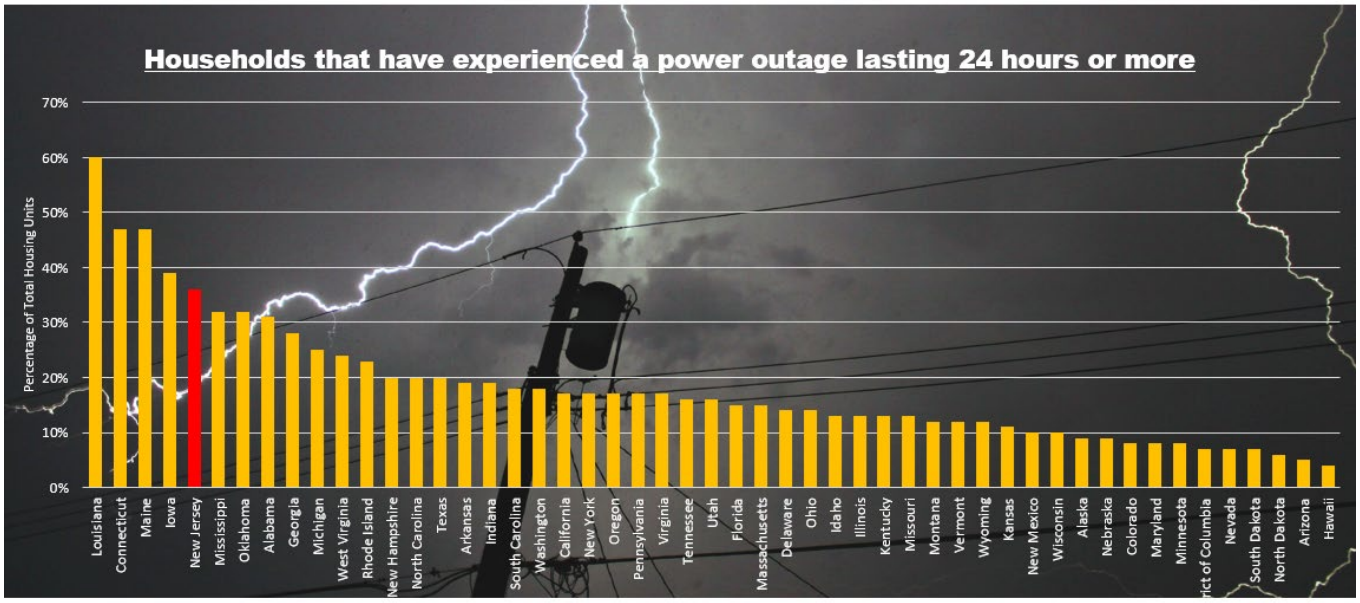
Warnings from PJM and NYISO: Threats to Grid Reliability on Near-Term Horizon



23

As intermittent renewables and electrification increase it will be all the more challenging to solve these existing issues on our grid.

New Jersey households and businesses already affected by weather impacts on grid



According to EIA, NJ had the 5th highest power outage rate in the US

[23] Reserve Margin Projections: Energy Transition in PJM: Resource Retirements, Replacement & Risks, PJM, February 24, 2023.
PJM Comment: Energy Transition in PJM: Frameworks for Analysis, PJM, December 15, 2021.

Our power system operators need all supply and demand side options at their disposal in the event of these weather events, wildfires, and cyber-attacks – which often knock out major power plants, damage wind and solar farms, or take down major electric supply lines. Ensuring adequate reserve margins are available for our grid allows for added necessary protection under these circumstances. Developing incentive mechanisms to appropriately compensate gas generators, pipelines, and storage facilities running fewer hours and with lower volumes to prevent these assets from exiting and shutting down is imperative.

They will also need to be able to rely on demand-side measures and, as it relates to winter heating loads – which may become electrified – operators will want to have the option to shed large chunks of that load when stressed winter conditions require them to do so. Many customers will continue to use their heat in wintry conditions, and this is where having a hybrid heating system deployed in homes can play a key role.

Regulators mandate and New Jersey families and businesses – our shared constituents – expect and deserve for energy system reliability at all times. Integrated systems planning is an effective tool to ensure limited ratepayer resources are expended in a cost-effective manner to meet energy demands and decarbonization mandates. **In this proceeding, we urge the State to perform a comprehensive integrated planning analysis between electric and natural gas distribution systems, which is necessary to ensure that energy demands can be met while also maintaining safe and reliable service.**

Correcting the Record and Raising Unresolved Issues in Transition Cost Studies

BPU-Commissioned Ratepayer Impact Study Conducted by The Brattle Group

We are now several years beyond the publication of the 2019 Energy Master Plan (EMP) and over a year since the BPU accepted and released the final Energy Master Plan Ratepayer Impact study conducted by the Brattle Group ("Brattle"). Unfortunately, key issues and gaps raised about the study and its findings during stakeholder comment and engagement processes remain unanswered, unaddressed, or overlooked.

Among other issues, the Brattle consultants:

- **Only modeled a single, four-year-old scenario/pathway identified in the 2019 EMP: "Full electrification, high renewable scenario".** This scenario was developed three years or more prior to Brattle's work, with no attempt to re-analyze or update its inputs or assumptions, including emerging innovations and the latest technology landscape, the impacts of significant changes to federal energy policy, or even the performance of existing clean energy programs.

- **Only modeled costs to 2030, significantly understating the full costs of building electrification, particularly where costs of building a winter peaking electric system will likely be incurred most dramatically in the 2035-2050 period.** This arbitrary approach fails to get to, let alone attempt to be, a comprehensive assessment of the costs of building decarbonization as contemplated by the "full electrification, high renewable scenario" of the EMP.

- **Lacked model transparency into key assumptions and calculations, including but not limited to:** customer conversions and gas demand volumes; customer economics of heat pumps including capital costs, heat pump performance, housing stock assumptions (such as duct work costs); and, how modeled customer economics flow through to the costs of State incentives needed to incent customer adoption (and, therefore, be absorbed as a clean energy program costs borne by ratepayers).

    - For example, in their November 2021 analysis "Assessing the cost-effectiveness of residential heat pumps for building space heat decarbonization in North America", IHS Markit concluded that in cold climates (like New Jersey) customers would need a $6,000 to $10,000 incentive to make electric heat pumps economic with natural gas heat. The study did not consider upfront capital/equipment costs in their analysis. What are these costs and subsidy levels today?

    - If the assumption is that 90% of New Jersey gas customers will convert to heat pumps by 2050, this would require nearly 3 million customer conversions. The State needs to be transparent about the subsidies that will be needed to support these conversions. A similar incentive needs analysis and cost impact must be conducted for approximately 250,000 commercial gas customers as well.

- **Declined to include a total view of electric system costs resulting from building electrification, nor apply them to utility revenue requirements to accurately assess ratepayer impact.** Transmission and distribution ("T&D") costs that are essential and unavoidable investments that have been independently

estimated to be as high as $80 billion[24] on their own in a high renewable, high electrification case, were somehow entirely excluded.

- **Made no attempt to understand or economically quantify the reliability and resiliency risks embedded in a fundamental shift to a winter-peaking electric system meant to serve the statewide heating load** for every New Jersey family and business in the harsh winters of the Northeast.

NJNG remains concerned that the notable exclusion of upfront capital costs borne by customers to convert to EVs and heat pumps, and the simplifying assumptions made about the impact of these conversions on the electric system limit the credibility and usefulness of this study for policy making purposes.

For additional information on shortcomings and unanswered issues raised with this study, please see Attachments A and B for comments submitted jointly by NJNG, Elizabethtown Gas Company, and South Jersey Gas Company, as well stand-alone NJNG supplemental comments.

Foundational Questions in the Acadia Center "Future is Electric" Studies

In addition, NJNG recognizes that some stakeholders have been referencing a pair of recent studies issued by the Acadia Center, known as "Future is Electric I & II," which suggest there are significant, immediate savings available for customers who switch from natural gas heating to electric heat pumps. This consultant study has a lack of transparency into its modeling, raising questions about the studies' findings that must be addressed before its conclusions can be considered credible, including but not limited to:

The Acadia Center studies' headline claim that (depending upon which gas/electric service territory a customer falls in) the average gas-heated home that electrified all appliances would realize 4-41% lower energy bills.

NJNG's modeling across gas-electric service territory pairings evaluated by Acadia finds that these same customers would achieve no energy bill savings and more often experience an immediate 3-45% increase in their utility bills.

On a total cost of ownership basis, which includes upfront capital costs of equipment, whole house heat pumps are $10,000-20,000 more expensive than high efficiency gas equipment. At the low end of this range, even while assuming reductions in heat pump costs and improvements in performance over time, the cost to convert approximately 3 million homes would be about $30 billion.[25]

If these studies are to be used as references in establishing policy, the Board should request that Acadia release its model and assumptions, specifically as it relates to what factors it considered beyond wholesale

[24] New Jersey's Pathway to a 100% Carbon-Free Electricity Supply: Policy and Technology Choices Through 2050: Summary for Decision Makers, ZERO Lab, Princeton University, March 14, 2022.

[25] Independent Consultant Study Performed for NJNG, June 2023

natural gas prices. Natural gas prices are an important input of customer utility basic gas supply costs, but not fully indicative of final rates. For example, did Acadia consider all changes in rates and bill credits in its analysis?

Further, Acadia should also disclose its assumptions around electric heat pump performance, which is a critical factor in modeling energy consumption in a given household. COP, a standard measure of equipment efficiency, is generally listed between 3.5 and 4.0 for electric heat pumps. However in a real- world study evaluating seasonable performance in a cold climates, specifically in Massachusetts, a Cadmus study found electric heat pumps performed at or below 2.5 COP. The COP used by Acadia could result in significant differences in modeled costs.

Given how out of sync the studies' conclusions are in comparison to the referenced EMP Ratepayer Impact Study (which itself has unresolved questions), recent work done within the NJCEP Comfort Partners program and our own modeling, it would be irresponsible to give credence to such findings unless underlying support is clearly demonstrated.

Conclusion

Much of the discussion in the BPU's Technical Conference, as well as the State's current Energy Master Plan and interim goals set by executive order, calls for electrifying all end uses of energy, disrupting millions of customers who chose gas as a way to heat their homes and businesses today. This change would generally be accomplished through the migration of customers to electric heat pumps, which would more than triple today's electric grid winter peak[26] to accommodate the additional heating load.

Saying we can abandon 35,000 miles of reliable pipeline infrastructure, a collective $17 billion ratepayer investment, for a grid that will depend heavily on intermittent renewable energy is simply not feasible and will create a number of unacceptable reliability concerns for our state. The reality is millions of New Jersey's residents and businesses rely on this system to operate at all times, and as a company that puts safety and reliability at the core of our business, we must challenge these notions that an all-electric energy system is not only affordable or feasible, but will be reliable to all New Jersey constituents. Lives and livelihoods depend on energy security and reliability; and as we move forward to reach our shared emissions reduction goals, system-wide reliability for New Jerseyans must be a bedrock priority.

In equal measure, achieving 2050 goals and shepherding an energy transition that is affordable, especially for New Jersey's most vulnerable and low- and moderate-income communities, is of paramount concern. The cost-benefit analysis of deploying extremely costly heat pump-driven building electrification for minimal emissions reductions is unaffordable for customers and invites staggering costs for electric system upgrades to deliver a single source of energy, imperiling reliability.

No matter one's view on broad-based electrification, with any comprehensive look at the facts, one must conclude that this policy does not work today and is at best premature. Lower cost solutions exist to reduce emissions in the near term, while leaving options, competition and innovation doors open to determine the most affordable, achievable strategies to economy-wide decarbonization. NJNG is aligned with the federal government in our belief that a commitment to decarbonization innovation in both the electric and gas systems will guide us to climate goals in a least cost and reliable way, while recognizing the enormity of the task at hand.

The bigger risk for New Jersey today is to rush headlong with simple strategies that do not reflect the complexity of economy-wide decarbonization.

NJNG, our parent company NJR, and its affiliates remain steadfast in our commitment to helping the State meet its decarbonization goals, and in pursuing opportunities to provide better, faster, and more affordable ways to that will make it more likely for the State to achieve its goals.

We remain confident that an integrated approach leveraging the advantages of both electric and gas infrastructure is essential to reduce both total energy system and consumer costs, while also reducing challenges associated with large-scale electric infrastructure additions and customer retrofits, while still achieving decarbonization across all sectors.

[26] 2021 winter peak of 12 gigawatts to a modeled 2050 winter peak of 38 gigawatts in a high electrification scenario. Independent Consultant Study Performed for NJNG, June 2023

And we are not alone in how we think about this:

- A McKinsey and Company study shows that converting a gas system to clean fuels could reduce overall cost of decarbonization by 70-85% in cold climate regions versus pure electrification[27].

- Recent decarbonization studies in MA, IL, and MD reach similar conclusions, savings estimated to range in the tens of billions from adapting a hybrid approach primarily in building sector, with a shared role for gas and electric in buildings, different fuels for different market segments, and different mixes of technologies as well.

- The federal government has concluded in the U.S. Department of Energy's recently issued Hydrogen Strategy that clean hydrogen is a core strategy in its all-of-the-above approach to reaching decarbonization goals, and makes it a near-term priority to "Assess compatibility of pipeline and component materials with hydrogen and hydrogen blends with natural gas."[28]

  It places high priority on Congress' directive in the Bipartisan Infrastructure Law for "identifying opportunities to use, and barriers to using, existing infrastructure, including all components of the natural gas infrastructure system, the carbon dioxide pipeline infrastructure system, end-use local distribution networks, end-use power generators, LNG terminals, industrial users of natural gas, and residential and commercial consumers of natural gas, for clean hydrogen deployment."[29]

  This is further affirmed by the clean energy policies enshrined in federal law through the Inflation Reduction Act, which provides unprecedented funding for emissions-reducing investments in renewable fuels and clean energy technologies like hydrogen, renewable natural gas/biofuels, carbon capture, energy efficiency, and renewable generation.

It is imperative that New Jersey leverage these vast resources as part of a thoughtful, fact-based energy strategy that allows for innovation, technology and customer choice to drive us to climate goals affordably, reliably and with equity in mind, enabling New Jerseyans to make energy choices best suited for their families and businesses that each put decarbonization opportunities in reach.

As a lifeline energy delivery company, we are ready to be a partner in this endeavor.

To address the issues we have raised in these comments in a transparent, fact-based way, we are asking that the Board, as part of this proceeding, update its Ratepayer Impact Study to be more complete based on stakeholder feedback, including comments submitted by NJNG; undertake an Integrated Systems Planning study to ensure a strong foundation for energy transition reliability across gas and electric utilities; and to host, at a minimum, a second Technical Conference to consider Grid Readiness and Reliability, as called for in Executive Order 317.

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[27] Decarbonizing US Gas Utilities: The Potential Role of a Clean-Fuels System in the Energy Transition, McKinsey and Company, March 2, 2022.
[28] U.S. National Clean Hydrogen Strategy and Roadmap, U.S. Department of Energy, Accessed 9/1/23
[29] U.S. National Clean Hydrogen Strategy and Roadmap, U.S. Department of Energy, Accessed 9/1/23

New Jersey can achieve our shared climate objectives, and we can be a leader - nationally and globally along the way- proving that an advanced economy, with thoughtful policymaking and broad public-private sector alignment can deliver on climate change, while preserving the quality of life for our residents.

We thank you for your consideration of these comments in this proceeding.

Respectfully submitted,

Mark G. Kahrer, Senior Vice President
Regulatory, External Affairs, Marketing and Energy
Efficiency New Jersey Natural Gas Company

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Attachments:

A. NJNG+SJI+Joint+Gas+Comments+Ratepayer+Impact+Study+4-8-22
B. EO22030130 NJNG Supplemental comments on Ratepayer Impact Study

April 8, 2022

Via email: board.secretary@bpu.nj.gov

Carmen Diaz, Acting Secretary of the Board
44 South Clinton Avenue, 1st Floor
Post Office Box 350
Trenton, NJ 08625-0350

Re: In the Matter of the Ratepayer Impact Study ('Study") of the New Jersey Energy Master Plan
BPU Docket Number EO22030130

Dear Secretary of the Board:

New Jersey Natural Gas Company ("NJNG"), , South Jersey Gas Company ("SJG") and Elizabethtown Gas Company (""ETG"") ("the Distribution Companies") submit these joint comments in BPU Docket Number EO22030130 for the New Jersey Board of Public Utilities' ("BPU" or "Board") consideration.

The Distribution companies serve nearly 875,000residential and commercial customers in the State of New Jersey, who depend on us to provide energy for building space heat, hot water and cooking needs.

Today, over 75% of New Jersey homeowners, or nearly 3 million customers, choose our infrastructure as the primary way to heat their homes, reflecting the affordability, reliability, flexibility, ease of access and environmental benefits of gas relative to other energy alternatives.

Our infrastructure is designed with sufficient capacity to reliably meet consumer needs in the building sector on the coldest days of the year, and also used to provide energy to support industrial manufacturing processes, central station and distributed backup power generation, and vehicle transportation.

Statewide, there has been an estimated $17 billion invested in assets to serve customers, maintaining an underground network with over 35,000 miles of service mains, comprising more miles per square foot than any other State in the US.

The Distribution Companies are fully committed to supporting the State in its efforts to reach its decarbonization goals and have adopted aggressive emissions reductions targets which are already driving results. In partnership with the BPU, we have invested in our systems infrastructure to improve safety and reduce leaks. We have managed successful energy efficiency programs to reduce gas consumption and energy costs for customers. Both of our parent companies have invested aggressively in New Jersey solar projects. We are innovating to develop and deliver new carbon neutral fuels like Renewable Natural Gas ("RNG") and zero emissions hydrogen produced from renewable energy.

As we look to the future, our infrastructure will be essential to achieving our State's emission reduction goals, and ensuring that we satisfy the unwavering needs of our society for energy reliability, affordability and security.

Over time, it is expected that traditional natural gas use will be reduced by energy efficiency, displaced by carbon-neutral clean fuels like green hydrogen and RNG, and offset with emerging technologies like carbon capture and storage.

In contrast to full electrification as reflected in the State's current "Least Cost" scenario, a clean fuels approach to decarbonization can avoid the need for major building and electrical system infrastructure costs, diversify the risks of reliance solely on the electric system, and support least-cost carbon abatement solutions in hard to electrify sectors like heavy duty transportation, long duration power storage, and industrial manufacturing.

Moreover, leveraging existing pipeline infrastructure for the storage, transportation and delivery of clean, gaseous fuels complements and does not compete with the State's plans to decarbonize electric generation through a dramatic increase in wind and solar. Leveraging green hydrogen production to capture excess renewable generation (that would otherwise be curtailed at times when supply doesn't match demand) and store it in existing pipelines will provide a flexible storage opportunity in the future.

With the trust of our customers, strong supply chain relationships, operational experience, and with ongoing partnership with regulators, our Companies can play an enabling role in delivering emissions reductions better, faster, cheaper than is possible with a full electrification approach.

We appreciate the opportunity to offer the following recommendations on the Ratepayer Impact Study:

1) The State should consider multiple planning scenarios to achieve decarbonization, not just the "Least Cost Scenario" (Full Electrification)

Multiple scenarios are consistent with an **ALL OF THE ABOVE APPROACH** to achieve the Energy Master Plan ("EMP") goals, with appropriate focus on decarbonization outcomes and not specific technologies.

The Ratepayer Impact Study focuses exclusively on the "Least Cost" Scenario (Full Electrification) from the 2019 EMP, and also an Ambitious Pathway Scenario which accelerates goal achievement from 2050.

The "Least Cost" scenario is a "full electrification, high renewable scenario." This scenario was developed in 2019 and should be re-analyzed with the latest inputs and assumptions. An Ambitious Pathway scenario should be informed by a comprehensive evaluation of actual performance against EMP goals to understand what is and what is not working and to adapt policy accordingly.

The timing to evaluate EMP and reconsider the planning scenarios is appropriate given that New Jersey is approaching the three-year anniversary of the Energy Master Plan, and there is a statutory requirement to update the EMP every three years. This update process should be rigorous, providing an opportunity to adapt policy based on real-world experience, key metrics on how clean energy programs are performing, and updates on emerging technology, policy changes, and market feedback.

The emergence of hydrogen provides a clear example of the need for flexible, open, technology-neutral policy approach to decarbonization. When the EMP was issued in January 2019, hydrogen was an emerging, but nascent topic in much of the clean energy conversation. The "Retain Gas" scenario originally evaluated in the 2019 EMP, did not include hydrogen.

Today, hydrogen is recognized for its potential transformational role as a clean molecule to provide least cost pathways to decarbonize the heavy transportation, power, industrial and building sectors. Since the 2019 EMP:

- 29 countries around the world have adopted hydrogen strategies, with a goal of deploying 70 gigawatts ("GW") of green hydrogen production by 2030 (up from 300 megawatts in 2021), and with more than $100 billion in global budget commitments

- The U.S has approved $9.5 billion to support hydrogen development—including the establishment of four regional hydrogen hubs—more funding than provided for any other green technology in the recently passed infrastructure bill. New Jersey announced on March 24, 2022, that it is joining with New York, Connecticut and Massachusetts to develop a proposal to become one of these four regional hydrogen hubs, with Governor Murphy recognizing the important role that clean hydrogen can play in New Jersey's clean energy future:

> "Clean hydrogen has the promise to expand New Jersey's diverse clean energy portfolio. Clean hydrogen technology has the potential to improve net greenhouse gas emissions and harmful air pollutant impacts. Joining together with our regional partners will allow us to build a strong coalition for the development of clean hydrogen technology and cultivate economic growth and opportunity for New Jersey. "

- Progress on policy and technology has unleashed a wave of investment, innovation, research and development around the world in an effort to find new ways to transport, store, deliver and use hydrogen.

    - Over 300 major hydrogen project announcements have been announced globally
    - 26 U.S.-based distribution companies are involved in hydrogen blending demonstration projects
    - An industry consortium is working with the National Renewable Energy Laboratory to assess the impact of hydrogen blends on the pipeline system and its materials to develop hydrogen blending standards
    - As part of their roadmap to convert their natural gas system to 100% hydrogen, the UK gas distribution utility Cadent has determined that there is no adverse impact to existing gas infrastructure and heating appliances at up to 28% hydrogen blending.

Similarly, RNG received negligible consideration in the 2019 EMP. However, as technology has evolved, RNG has emerged as a game-changer for utilities because it reduces the impacts of organic wastes, while also serving as a high-impact fuel. A blend of natural gas and RNG can result in a pipeline supply aligned with emissions targets, while maintaining the reliability and affordability of the overall system. It is possible to achieve a carbon-neutral pipeline supply in a cost-effective manner without removing natural gas from the system.

2)Reflecting advances in hydrogen, RNG, and carbon capture, the Study should develop and incorporate a new clean fuels scenario which leverages existing gas infrastructure through blending clean molecules of the future

Numerous independent studies and publications including those from Columbia University, McKinsey and Bloomberg – speak to the value of leveraging existing gas infrastructure in the energy transition.

The McKinsey and Co. report issued in March 2022 "Decarbonizing Gas Utilities: The Potential Roles of a Clean Fuels System in the Energy Transition," indicates that in cold climate regions (like NJ), the cost of a building decarbonization strategy which includes clean fuels, **can result in 75% lower cost than a strategy which relies on full electrification alone**.

The Companies agree this cost estimate is indicative of the magnitude of the cost saving potential in New Jersey. Over the past several years, we have conducted significant research and analysis to evaluate alternative decarbonization scenarios for natural gas use in buildings, including the supply potential and costs associated with carbon neutral pathway, and the costs relative to full electrification.

We would welcome the opportunity to collaborate with policymakers, the modeling team, and other stakeholders to define a clean fuels scenario.

3)The Study should provide additional detail and transparency into inputs and assumptions in the EMP 2019 "Least Cost" (Full Electrification) scenario in order to more precisely understand the incremental costs of building electrification on the total costs of the Energy Master Plan.

The costs of customer conversions from gas to electric heat could be significant and must be understood.

- Beyond the assumption that gas use in aggregate declines by 2.4% annually due to electrification it is not clear from the March 25, 2022, Brattle Group presentation what specific assumptions the modeling team is making about annual customer conversions.

- The customer economics of heat pumps and their performance in colder climates must be considered and reflect the significant difference between New Jersey's retail gas and electric rates, as well as the higher capital costs to install heat pumps for homes in New Jersey with its older building stock and where the majority of homes may not have existing heating systems easily compatible with electric heat pumps.

- The gap needed to make heat pumps economic for customers must be reflected as the incentive the State will need to pay to encourage customer adoption and, therefore, be included as a clean energy program cost and with an associated rate impact. (*The estimated costs cited below may be conservative given recent inflationary pressures.)*

- For example, in their November 2021 analysis "Assessing the cost-effectiveness of residential heat pumps for building space heat decarbonization in North America", IHS Markit concluded that in cold climates (like New Jersey) customers would need a $6,000 to $10,000 incentive to make electric heat pumps economic with natural gas heat.

- If the assumption is that 90% of New Jersey gas customers will convert to heat pumps by 2050, this would require nearly 3 million customer conversions. At a $6,000-$10,000 incentive range, the total program cost would be **$18 to $30 billion**. A similar incentive needs analysis and cost impact must be conducted for commercial customers as well.

The cost impacts of high building electrification on the electric system also requires further update, analysis and clarification reflecting current cost pressures .

- The EMP modeling assumes electric generation capacity will increase from 20 GW in 2020 to 70 GW in 2050 which includes 53 GW of renewables. We assume most of this capacity increase is attributable to building electrification, but this should be confirmed.

- The costs imposed by building electrification on these incremental capacity additions should be transparent. If, for example, the average cost between 2022 and 2050 is $2 per watt, the total investment to add 50 GW could be over **$100 billion** or $30,000 per household in the State.

- That **$100 billion** still only addresses power generation. We have seen limited information on the transmission and distribution impacts of this high electrification case, which independent studies have estimated to be as high as **$80 billion** in a high renewable, full electrification case.

    - On page 3 of the Stakeholder Meeting Notice of March 11, 2022, in this proceeding, "Costs in Scope" include transmission and distribution costs, however, we did not see any reference of these costs in the March 25, 2022 stakeholder presentation. These are necessary costs of a full electrification pathway and must be accounted for.

    - Further analysis is also needed to understand the reliability of this 70 GW of 2050 electric capacity will be sufficient to meet electric demands for peak winter periods.

- Winter design conditions must reflect periods of consecutive cold days, and extended periods with limited sun and wind as derived from actual weather data. Based on our internal analysis using weather data from the polar vortex of 2017-18 with 15 consecutive days of subfreezing temperatures, we calculate that the State would be 20% short of power demand with the 2050 EMP generation contemplated. It is therefore possible that the electric system costs contemplated in the EMP may be significantly understated.

The need for increased transparency on costs of building electrification is not aligned with two specific modeling approaches we heard at the March 25, 2022, stakeholder meeting:

1) **The Study will only model costs to 2030. To get a comprehensive assessment of the costs of building decarbonization, the Study should look at costs to 2050, consistent with the EMP cost analysis.** A 2030 perspective will significantly understate the costs of full building electrification, particularly where costs of building a winter peaking utility will likely be incurred in the 2035-50 period.

2) **The Study does not calculate utility revenue requirements based on costs, but rather applies an overall 1% growth rate to utility revenue requirements.**

   We do not believe this approach will provide an accurate linkage between total costs, rates, and bill impacts. Building electrification may impose hundreds of billions of dollars of costs on electric customers. Once total conversion and electric system costs are quantified, these must be directly translated to revenue requirements in order to get a complete and accurate ratepayer impact assessment.

Thank you again for giving us the opportunity to share our views. We look forward to working with policymakers and stakeholders on this effort.

Respectfully submitted,

NEW JERSEY NATURAL GAS COMPANY

Andrew K. Dembia
Regulatory Affairs Counsel

SOUTH JERSEY GAS / ELIZABETHTOWN GAS COMPANY

Deborah M. Franco VP –
Rates, Regulatory & Sustainability

New Jersey Natural Gas

June 3, 2022

Via email: board.secretary@bpu.nj.gov

Hon. Carmen Diaz, Acting Secretary of the Board
44 South Clinton Avenue, 1st Floor
Post Office Box 350
Trenton, NJ 08625-0350

Re: In the Matter of the Ratepayer Impact Study ('Study") of the
New Jersey Energy Master Plan
BPU Docket Number EO22030130

Dear Acting Secretary Diaz:

New Jersey Natural Gas Company ("NJNG") is submitting the following comments in BPU Docket Number EO22030130 in response to the comments and presentation made at the most recent Ratepayer Impact Study stakeholder meeting held on May 23. Our comments today supplement those we previously submitted on April 8.

NJNG is fully committed to supporting the State in its efforts to reach its decarbonization goals and have adopted aggressive emissions reductions targets which are already driving results. In partnership with the BPU, we have invested in our systems infrastructure to improve safety and reduce leaks. We have managed successful energy efficiency programs to reduce gas consumption and energy costs for customers and are the largest owner of New Jersey solar projects.

As we look to the future, our infrastructure will be essential to achieving our State's emission reduction goals, and ensuring that we satisfy the unwavering needs of our society for energy reliability, affordability and security. Over time, it is expected that traditional natural gas use will be reduced by energy efficiency, displaced by clean fuels like green hydrogen and RNG, and offset with emerging technologies like carbon capture and storage.

The State is now several years into its Energy Master Planning process, and based on the Study presentations so far, we still see some important gaps remaining on costs which are necessary to inform the State's energy policy and planning.

NJNG remains concerned that the exclusion of customer capital conversion costs for EV's and heat pumps, and the simplifying assumptions made about the impact of these conversions on the electric system will limit the credibility and usefulness of this study for policy making purposes.

The capital costs of electrification conversions are material for individual customers, and in the aggregate across millions of consumers in the State. In the case of electric heat pumps, we have seen estimates in range of $6-10K average per customer to cover building upgrade costs needed to accommodate heat pumps in cold climates, and as high as $30K for homes with no ductwork or central air conditioning[1]. As recognized in the presentation, these capital costs are likely to require incentives and multi-year budgets to encourage customer adoption, which have a direct impact on ratepayer costs and rates, creating major economic burdens on low-income customers.

Specifically, the scenarios presented for heat pump conversions lack transparent assumptions on how many annual customer conversions are expected, and what incentive budgets will be needed to achieve these results. It is stated that the EMP Achievement scenario will result in a 2.4% annual reduction in aggregate gas consumption— a 12-fold increase in the conversion pace in the Current Trajectory scenario--- but without target numbers of customer conversions and the associated costs, the achievability and feasibility of this scenario cannot be assessed.

NJNG also reiterates our April 8 comments with concern that the scope of the analysis is limited to 2030, with the impact on future electric rates modeled as a simple 2% percentage extrapolation off our current rates based on historical data. This Study should instead provide the robust quantification of the costs of the full electrification, Least Cost scenario with a bottoms-up assessment of costs and rates based on added electric system capacity costs to serve incremental electrified loads.

The costs of full electrification as prescribed in the Least Cost scenario will entail hundreds of billions in upfront capital costs for the build out of generation, transmission and distribution infrastructure, resulting in material impacts on electric rates. Until these impacts to electric system and electric rates are quantified and better understood, it is not possible to understand the fundamental economics which will drive customer choices on how they heat their homes and businesses.

Brattle indicated the effort to quantify costs to 2050 is "exceedingly difficult", reflecting the complexities and uncertainties ahead. **This is precisely the reason why the State must maintain a flexible, adaptive approach to achieving its emission goals including considering a clean fuels approach to decarbonization, rather than the forced electrification plan currently in the Least Cost scenario, which continues to be endorsed by this Study as the sole alternative to be considered.**

A McKinsey and Co. report issued in March 2022 "Decarbonizing Gas Utilities: The Potential Roles of a Clean Fuels System in the Energy Transition," indicates that in cold climate regions (like NJ), the cost of a building decarbonization strategy which includes clean fuels, can result in 75% lower cost than a strategy which relies on full electrification alone.

[1] **"Assessing the cost-effectiveness of heat pumps for building space heat decarbonization in North America",IH-S Markit, Nov 2021**

Additional transparency and disclosure is required on the customer heating operating cost economics provided in the presentation. Providing typical customer analysis on just South Jersey and ACE territories, with the headline on key charts that 'Electrification offers significant savings" is premature until the analysis is completed across all regions of the State. It is also difficult to understand some of the key underlying assumptions on this analysis. Specific questions we have include:

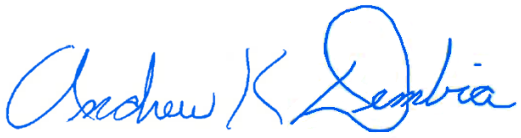
- What are the technology and efficiency assumptions on electric heat pumps? Based on what we see from the March 25 presentation, the assumption for the typical customer is to reduce gas heat consumption by 861 CCF, and replace with electric heat consumption of 5,053 kWh. This implies about a 4.0 coefficient of performance, which is too high for typical New Jersey winters in which heat pump efficiency declines at lower temperatures. It is not clear what size homes are considered, and if this assumes a whole house central heat pump or mini-split configurations for specific rooms.

- What are the specific electric and gas rate increase assumptions to 2030? Eyeballing the charts on pages 25 and 26, it appears as if gas bills are assumed to be reduced by about $1,750 per year. Based on the assumed reduction in gas consumption (861CCF), this implies an effective retail rate of about $20 per MMBtu, almost 30% above current SJI retail gas rates. From the same chart, the added electric cost from heating loads appears to add only $1,000 per year, only 4% over current ACE rates. Even with the limited focus to 2030, it is not clear how the electric rate increases can be relatively so low given the expected additions to electric load and the 2% annual escalator Brattle has applied to distributed costs.

- What assumptions are being made on the emissions savings from load shifted to the electric system? Since the analysis is limited to only 2030, it is important to understand the phase-in of renewables by year, and the emissions reductions calculation approach, in order to have an accurate representation of the benefits and costs.

Thank you again for giving us the opportunity to share our views on how to improve the insights and understanding derived from this Study.

Respectfully submitted,



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C: Service List