STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

In the Matter of a Review of the Long-Term Gas System Plans of Consolidated Edison Company of New York, Inc. and Orange and Rockland Utilities, Inc.

Case 23-G-0147

Initial Comments of Natural Resources Defense Council, with assistance from Synapse Energy Economics

Date: August 21, 2023

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The Natural Resources Defense Council (NRDC) welcomes the opportunity to comment on the Long-Term Gas System Plan (Long-Term Plan) of Consolidated Edison Company of New York, Inc. (Con Edison) and Orange and Rockland Utilities, Inc. (O&R) (the Companies). We appreciate the effort that went into the development of the Companies' Long-Term Plan. NRDC developed these comments with assistance from Synapse Energy Economics.

1. Introduction and Overview

1.1 Regulatory Background

The 2019 *Climate Leadership and Community Protection Act* (CLCPA) calls on the state to take decisive action to meet its greenhouse gas (GHG) emissions reduction targets. Under the CLCPA, all sectors of the state's economy are collectively required to achieve 40 percent greenhouse gas (GHG) emissions reductions from 1990 levels by 2030 and to achieve 85 percent emissions reductions and net zero emissions by 2050.

Created as required by the CLCPA, the Climate Action Council (CAC) has responsibility for creating a Scoping Plan. The Draft Scoping Plan, commissioned by the New York State Energy Research and Development Authority (NYSERDA) and New York State Department of Environmental Conservation, modeled statewide and economy-wide benefits, costs, and GHG emissions reductions of scenarios to achieve the CLCPA emission limits (Integration Analysis). [1] While initial modeling runs for the Integration Analysis included a business-as-usual reference case and a scenario based on the CAC Advisory Panel's initial recommendations (Scenario 1), neither were found to reduce GHG emissions sufficiently to meet CLCPA requirements.[2] The modeling projected that three alternative scenarios will meet CLCPA emission-reduction requirements: Strategic Use of Low-Carbon Fuels (Scenario 2); Accelerated Transition Away from Combustion (Scenario 3); and Beyond 85% Reduction (Scenario 4). The Integration Analysis concluded that certain strategies, including widespread building electrification, decarbonized electricity, and aggressive energy efficiency, are key to achieving the CLCPA targets.[3] Likewise, the December 2022 Final Scoping Plan calls for greater levels of electrification and statewide fossil gas use reductions by at least 33 percent by 2030 and by 57 percent by 2035, and 90 to 95 percent by 2050.[4] Critically, the Final Scoping Plan recommends a well-planned, strategic downsizing of the gas system.[5]

In 2020, the Public Service Commission (PSC or Commission) opened the gas planning proceeding (Case 20-G-0131) to "establish planning and operational practices that best support customer needs and emissions objectives while minimizing infrastructure investments and ensuring the continuation of

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

[2] *Id*., p. 69.

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

[4] New York State Climate Action Council. 2022. New York State Climate Action Council Scoping Plan, Appendix G, Page 24, footnote 13 ("Mitigation scenarios that achieve Climate Act emissions requirements by 2050 (Scenario 2, Scenario 3, Scenario 4) achieve 90-95% reductions in end-use gas demand by 2050.")

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

reliable, safe, and adequate service to existing customers."[6] In this docket, the Commission's May 12, 2022 *Order Adopting Gas System Planning Process* (Gas Planning Order) requires the gas utilities to file long-term gas system plans every three years and file annual reports in interim years.[7] Analyses underlying each long-term plan must consider energy efficiency and non-pipeline alternatives (NPA), and the utility must include an NPA-only scenario unless it presents sufficient evidence that an NPA-only scenario is not feasible. [8] As required by the Gas Planning Order, utilities must compare alternatives based on benefit-cost analysis, bill impact analysis, and emissions impacts. In addition, utilities must present a likely and a preferred plan for its portfolio of investments. [9]

The Gas Planning Order also requires the gas utilities to file depreciation studies that include the following scenarios:

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

Separately, the Commission issued an order directing the gas utilities to propose a GHG study to analyze the scale, timing, costs, risks, uncertainties, and bill impacts associated with significant reduction in GHG emissions. This order, titled the *Order on Implementation of the Climate Leadership and Community Protection Act* (CLCPA Implementation Order) requires each gas utility to file plans to achieve its share of emissions reductions through 2050. It also requires the utilities to jointly conduct and file analyses of decarbonization pathways through 2030 and 2050.[11]

1.2 Overview of Filed Long-Term Plan

In their May 31, 2023 filing, the Companies created three scenarios to support the development of their Long-Term Plan: the Reference case, the Hybrid pathway, and the Deep Electrification pathway. Some highlights of these scenarios include:

- The Reference pathway reflects a continuation of existing laws and policies, continuation of existing investments in energy efficiency and electrification, and preservation of programs related to new gas service. It fails to meet CLCPA targets.[12]

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

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

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

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

[10] *Id*.

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

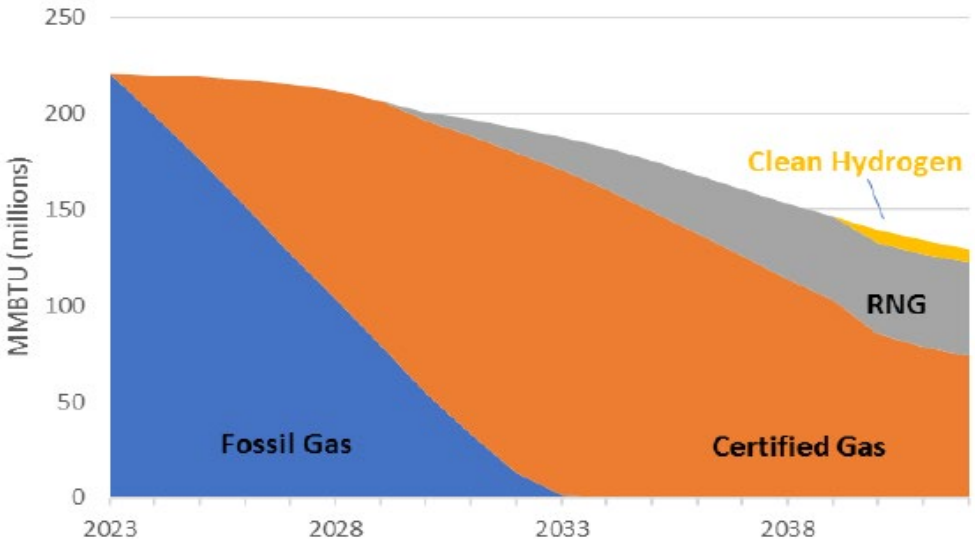
[12] Consolidated Edison Company of New York, Inc. and Orange & Rockland Utilities, Inc. 2023. *Gas System Long-Term Plan.* p. 3 and 83. Available at: https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7BE05F7388-0000-C833-8B9A-6E8F0F302CCD%7D.

- The Hybrid pathway incorporates heating electrification, certified fossil gas,[13] and low-carbon fuels (LCF), which the Companies identify as renewable natural gas (RNG),[14] hydrogen, and synthetic natural gas (SNG).[15]
- The Deep Electrification pathway assumes significant reductions in gas delivery service by 2050 to serve large customers and that energy needs will be met almost fully through electrification and steam through Con Edison's district heating system that the Company plans to decarbonize.

The Companies assessed these scenarios in terms of GHG emissions reductions and cost over a 20-year period, from 2023 to 2042. According to the Companies, they utilized GHG accounting methods consistent with the requirements of the CLCPA. The pathways vary in assumptions about the level of adoption of different energy technologies, as well as policy and investment support required to implement the objectives discussed.

For the Hybrid pathway, the Companies project a moderate reduction in gas volumes (39 percent) and emissions (61 percent) by 2042. As shown in Figure 1, this scenario includes large quantities of RNG (37 percent) and certified fossil gas (57 percent), with lesser quantities of hydrogen (6 percent) in 2042.[16]

Figure 1. Hybrid Pathway: System Volumes and Composition



Source: Gas System Long-Term Plan, p. 70.

[13] According to the Long-Term Plan, certified gas is fossil gas "that has been deemed to be produced according to criteria determined by an independent third party, with a focus on minimizing leaks of methane throughout the production process" (*Id*., p. 52).

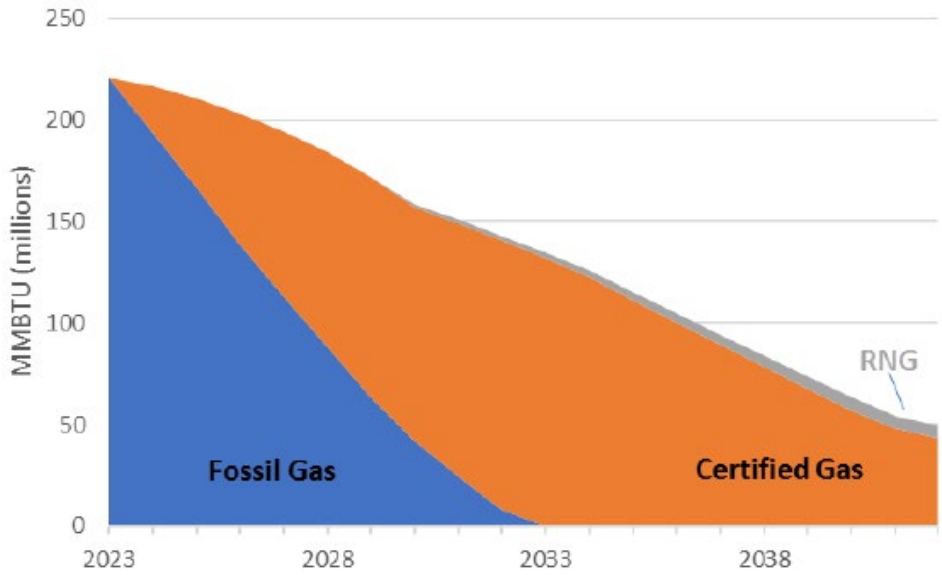
[14] The Long-Term Plan defines RNG as "a pipeline-compatible gaseous fuel derived primarily from anaerobic digestion and thermal gasification. Anaerobic digestion is the process in which bacteria break down organic matter from animal manure, food waste, landfill gas, and water resource recovery facilities to produce biogas. Thermal gasification is the breakdown of biomass material from agricultural residue, energy crops, forestry residue, and municipal solid waste into component gases and ash in an enclosed reactor." (*Id*., p. 49.)

[15] When the Long-Term Plan refers to SNG, it means a fuel produced by combining hydrogen with captured CO2 to create methane via a process known as methanation. The Companies assume that because SNG will be produced using captured CO2, there are net-zero emissions associated with SNG production, delivery, and combustion. (*Id*.)

[16] *Id*., p.4.

The Deep Electrification pathway projects a steeper reduction in gas volumes (76 percent) and in emissions (82 percent) by 2042. In that pathway, gas volume projections for 2042 (49 TBTU) include a smaller share of RNG (13 percent), but still large amounts of certified fossil gas (87 percent).[17] *See* Figure 2.

Figure 2. Deep Electrification Pathway: System Volumes and Composition



Source: Gas System Long-Term Plan, p. 81.

Both the Hybrid and Deep Electrification pathways consider NPAs where feasible for the replacement of aged or leak-prone assets. [18] The Companies both filed proposed NPA screening and suitability criteria in August 2022. Under the criteria, certain types of projects are excluded from NPA consideration. These include projects with an insufficient lead time for developing pricing estimates and implementing non-traditional customer-sited solutions, as well as projects involving immediate system needs relating to safety, reliability, service obligations, and non-distribution projects.[19]

As part of the Main Replacement Program, Con Edison identified an initial set of 46 mains that are candidates for NPA projects and developed portfolios of potential solutions.[20] Con Edison has not determined reasonable cost certainty for the projects yet, but it plans to make annual updates to its implementation plan.[21] Con Edison also continuously monitors arising needs for main replacement work to evaluate NPA eligibility. If a project requires main replacement before the successful implementation

[17] *Id*.

[18] *Id*., p.61, 72.

[19] *Id*., p. 48.

[20] Consolidated Edison Company of New York. 2022. Non-Pipeline Alternatives Implementation Plan. Case 20-G-0131. p. 10. Available at: https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7B6A490BBB-0E8B-41F9-9040-9342758D8AE2%7D.

[21] *Id*., p. 17.

of electric alternatives on customer properties, the NPA is no longer eligible and Con Edison will go forward with the traditional main replacement.[22]

O&R plans to start implementing NPA projects in the second half of 2023 and has filed its proposed NPA screening and sustainability criteria for approval. It has begun identifying an initial set of NPA projects, but it does not currently project any area load constraints. However, O&R has identified two potential near-term gas system expansion projects that could be good candidates for NPAs.[23]

The Companies did not choose a preferred scenario in the Long-Term Gas Plan. They explicitly stated they were not expressing a preference for either scenario, stating that they instead will pursue a "robust decarbonization plan that meets State decarbonization goals."[24]

2. Resource Options: Problematic Assumptions

2.1 Certified Fossil Gas

The Companies project that certified fossil gas will make up 57 percent of gas distribution in 2042 in their Hybrid scenario and 87 percent in their Deep Electrification scenario.[25] They assume that they will begin procuring certified gas in 2024 and meet all fossil gas needs through such gas procurement by 2033.[26] The Companies indicate that certified fossil gas reduces the upstream GHG emissions associated with fossil gas usage by 47 percent,[27] equivalent to 9 percent of lifecycle gas emissions.[28] However, certified fossil gas raises a number of concerns.

First, the Companies' assumptions about reductions in GHG emissions rely on some problematic conjectures. Certified fossil gas still releases GHGs during combustion and when it leaks out of the utility gas system. Second, beyond GHG emissions, certified fossil gas (chemically the same as fossil gas) raises the same downstream environmental and health concerns as fossil gas. Because it releases toxic air pollution when burned, there are serious questions about indoor and outdoor air quality impacts of relying on this fuel.[29]

Third, significant dependence on certified fossil gas by utilities would prolong dependence on the gas system. Promotion of certified gas may also encourage customers to invest in long-lived gas-consuming equipment, because they believe that equipment is compliant with state policy. Assuming a large role

[22] *Id*., p. 15.

[23] Consolidated Edison Company of New York, Inc. and Orange & Rockland Utilities, Inc. 2023. *Gas System Long-Term Plan*, p.40. https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7BE05F7388-0000-C833-8B9A-6E8F0F302CCD%7D.

[24] *Id*., p. 4.

[25] *Id*., p. 61, 73.

[26] *Id*., p. 80.

[27] *Id*., p. 67.

[28] In response to NRDC-17, the Companies provided assumed emissions factors but did not provide underlying assumptions regarding the assumed factors. Thus, we are not able to assess the assumed reduction in emissions from certified gas.

[29] Buonocore, J., Salimifard, P., Michanowicz, D. and Allen, J. 2021. A decade of the U.S. energy mix transitioning away from coal: historical reconstruction of the reductions in the public health burden of energy. Environ. Res. Lett. 16 054030, DOI 10.1088/1748-9326/abe74c.

for certified fossil gas (or for the other LCFs) in planning and promoting the fuel is inconsistent with and works against the decarbonization goals of the CLCPA.

2.2 Renewable Natural Gas

The Companies project that RNG will make up 38 percent of the 2042 gas distribution in the Hybrid scenario and 13 percent in the Deep Electrification scenario.[30] To meet carbon reduction goals, the Companies assume that they would use their representative share of RNG produced by anaerobic digestion from the Eastern United States.[31] In addition, they assume access to the full amount of RNG produced by anaerobic digestion in their service territories. In an "achievable deployment" scenario where only 33 percent of total RNG feedstock is captured, that would be 44 TBTU. The Companies assume they would only rely on thermal gasification in their service territories (amounting to 8 TBTU in the same scenario).[32] This lower estimate is due to current uncertainty around thermal gasification. The Companies plan to explore a thermal gasification pilot near New York City, because they foresee the need for advancements in thermal gasification technology to cost-effectively scale RNG from all feedstocks.[33] In total, the Companies assume access to 51 TBTU in 2042.[34]

To enable RNG injections into their systems, the Companies will need to interconnect anaerobic digestion facilities in their service territories in the near term and procure additional volumes of RNG. The Long-Term Plan indicates that the Companies assumed a total of $12 million in expenditures to interconnect LCFs, including RNG ($2 million for O&R and $10 million for Con Edison).[35] It is unclear whether additional interconnection investments beyond the $12 million would be needed to bring new RNG supplies onto the Companies' systems, but it seems highly likely. The Companies have sought recovery of costs to interconnect RNG facilities from rate payers previously. They have even sought such recovery when they could not claim the emission reduction benefits for customers because the Companies did not propose to retain the environmental attributes associated with RNG. Thus, there is concern the Companies will propose interconnection facilities to include in rate base in the future.[36]

RNG is not an inherently environmental solution. The carbon intensity of RNG varies substantially depending on certain factors such as feedstocks and production methods. It also varies based on production location and how the fuel is transported and distributed.[37] The Companies do not sufficiently consider differing life-cycle GHG emissions of RNG. While RNG is often presented as "zero carbon" with little justification, an assessment of its climate impacts must account for (1) the energy required to produce it, (2) whether the source creates new methane (as occurs with thermal gasification), and (3)

[30] Gas System Long-Term Plan, p.61-62, 73.

[31] In response to NRDC-19, the Companies clarified that they did not assume that all RNG will be used by natural gas utilities: "Rather, the Companies' customers were assumed to have access to their proportionate share of RNG from each of three regions: the Companies' service territories, the Mid-Atlantic region, and the Eastern U.S."

[32] *Id*., p.50.

[33] *Id*., p.70.

[34] *Id*., p. 50.

[35] *Id*., p. 61.

[36] In response to discovery, the Companies indicate that they are not actively exploring or seeking to purchase RNG produced using thermal gasification at this time (Response to NRDC-20). This raises the question of how customers would benefit from the RNG produced through the thermal gasification pilot.

[37] ICF. 2019. Renewable Sources of Natural Gas: Supply and Emissions Reduction Assessment. Prepared for the American Gas Foundation, p. 46.

how much methane leaks during production and distribution. The 20-year global warming potential of methane is more than 80 times that of carbon dioxide, so methane leakage is a particular concern.[38]

The Long-Term Plan does not distinguish the feedstock of RNG but mentions anaerobic digestion of animal manure, food waste, landfill gas, and water resource recovery facilities. For thermal gasification, it refers to agricultural residue, energy crops, forestry residue, and municipal solid waste as feedstocks. The net GHG emissions impacts of RNG from each of these feedstocks vary markedly. According to a 2022 study by the American Gas Association, the trade association for the gas industry, GHG emissions factors for RNG produced using anaerobic digestion range from -186.7 kgCO2e/MMBtu for dairy manure to 38.2 kgCO2e for landfill gas. For thermal gasification feedstocks, emissions factors are generally around 54 kgCO2e/MMBtu, as compared to 64 kgCO2e/MMBtu for fossil gas.[39] In light of the numerous assumptions that go into these estimates, there may be no or *de minimus* GHG reduction benefits from the several common RNG types, including landfill gas and RNG produced using thermal gasification.

In addition to potentially net-positive carbon emissions, producing RNG using thermal gasification could result in emissions of air pollutants are harmful to human health, including nitrogen oxides ("NO_X") and particulates.[40] NO_X pollution can lead to respiratory problems, from coughing and wheezing to decreased lung function. As proposed by the Companies, emissions associated with thermal gasification processing in their service territories could further degrade air quality in areas with existing air quality issues. Further, the strategy runs counter to CLCPA co-pollution goals, including maximizing reductions of GHGs and co-pollutants in disadvantaged communities.[41]

When burned, RNG (like methane from any source) produces NOx and other toxic air pollutants.[42,43] In light of these facts, there are serious questions about air quality impacts—both indoor and outdoor—from relying on this fuel.

2.3 Hydrogen

NRDC only supports the utilization of hydrogen as part of a broader, aggressive economywide decarbonization portfolio—and within any such portfolio, we strongly oppose wasting what will be a very finite and expensive resource in the gas distribution system. Particularly when there are much more cost-effective means to decarbonize buildings (i.e. strategic electrification, etc.). Instead, for the near- and medium term, hydrogen should be reserved only for the hardest to decarbonize sectors, namely industrial facilities (such as cement plants and steelmaking) for which there are currently no viable alternatives to significantly cut those GHG emissions.

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[38] International Energy Agency 2021. Methane and climate change. Available at: https://www.iea.org/reports/methane-tracker-2021/methane-and-climate-change.

[39] ICF. 2022. Net Zero Emissions Opportunities for Gas Utilities. Prepared for the American Gas Association.

[40] Panepinto, D., and Genon, G. Solid Waste and Biomass Gasification: Fundamental Processes and Numerical Simulation. Available at: https://folk.ntnu.no/skoge/prost/proceedings/pres2011-and-icheap10/ICheaP10/22Panepinto.pdf.

[41] *See* ECL § 75-0109(3)(c) - (d).

[42] Nitrogen can be removed from RNG, however doing so is expensive and adds to project costs. This is particularly true for RNG produced from landfill gas. (Haines, D. 2018. Getting the Facts on Renewable Natural Gas: Making California's future renewable. Available at: https://www.epa.gov/sites/default/files/2018-11/documents/7._deanna_haines-508.pdf.

[43] Lebel, E., Finnegan, C., Ouyang, Z. and Jackson, R. Methane and NOx Emissions from Natural Gas Stoves, Cooktops, and Ovens in Residential Homes. Environ. Sci. Technol. 2022, 56, 4, 2529–2539. https://doi.org/10.1021/acs.est.1c04707.

Importantly, siphoning off renewables subsequently back-filled by fossil power to operate electrolyzers—which would occur under loose guidance about what constitutes green hydrogen—generates at least twice the carbon emissions that status-quo gas-derived hydrogen emits.[44] Avoiding this negative outcome requires a strong emissions accounting system for grid-connected electrolysis that espouses three pillars: additionality, deliverability, and hourly matching.[45] A robust body of research consistently identifies all three principles as necessary to guard against substantial emissions increases and drive the deployment of truly zero emission hydrogen projects.[46]

The Companies plan to invest in hydrogen to reduce the carbon content of the gas they deliver. The Hybrid pathway assumes hydrogen blending into the gas distribution system beginning in 2040 at a level of approximately 7 percent by energy content.[47] They assume green hydrogen is a clean option because hydrogen fuel would replace methane and would need to be produced using renewable energy.[48] Only hydrogen produced with additional renewable electricity delivered to the hydrogen production facility, that has hourly matching of supply and demand, should be considered "green."[49]

Hydrogen produced using renewable energy could theoretically have zero GHG emissions, but in reality, that is not likely to be the case. Recent research finds that hydrogen gas has a larger global warming potential than previously understood.[50] Also, any leakage will cut into the fuel's GHG benefit. Further, the combustion of hydrogen also creates significant local air pollution in the form of nitrogen oxides, which pose a risk to human health.[51]

Producing hydrogen using renewable electricity is not currently cost-competitive.[52] The process generally involves large losses of energy and large amounts of renewable electricity, which could be used more efficiently for other purposes and could displace fossil generation.[53] The Companies assume achievement of the U.S. Department of Energy's aspirational, aggressive goal (called Hydrogen Shot) of

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[44] *See* Joint Comments to Department of the Treasury re Implementation of the IRA 45V clean hydrogen tax credits as it relates to guidelines for emissions accounting of grid-connected electrolyzers, https://www.nrdc.org/sites/default/files/2023-03/joint-letter-45v-implementation-20230223.pdf.

[45] *Id*.

[46] Ricks, Wilson, Xu, Qingyu, & Jenkins, Jesse D. (2023). Minimizing emissions from grid-based hydrogen production in the United States. Environmental Research Letters. https://iopscience.iop.org/article/10.1088/1748-9326/acacb5/meta; Zeyen, Elisabeth, Riepin, Iegor, & Brown, Tom. (2022). Hourly versus annually matched renewable supply for electrolytic hydrogen (0.1). Zenodo. https://doi.org/10.5281/zenodo.7457441.

[47] Long-Term Plan, p. 69.

[48] *Id*., p.50.

[49] Fahkry, R. New Analysis: The 3 Pillars Will Support Large Hydrogen Deployment. https://www.nrdc.org/bio/rachel-fakhry/new-analysis-3-pillars-will-support-large-hydrogen-deployment.

[50] Sand, M., Skeie, R.B., Sandstad, M. et al. A multi-model assessment of the Global Warming Potential of hydrogen. Commun Earth Environ 4, 203 (2023). https://doi.org/10.1038/s43247-023-00857-8.

[51] Cellek, M. and Pınarbaşı, A. Investigations on performance and emission characteristics of an industrial low swirl burner while burning natural gas, methane, hydrogen-enriched natural gas and hydrogen as fuels. International Journal of Hydrogen Energy 43, 2 (2018). https://doi.org/10.1016/j.ijhydene.2017.05.107.

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

[53] In response to NRDC-22, the Companies indicate that they would need roughly ~1.65 TWh per year of clean energy to produce the amount of hydrogen required for blending in the Hybrid Pathway. The Companies intend to purchase, not produce clean hydrogen.

an 80 percent decline in the production cost of hydrogen by 2031. Given the tenuousness of this assumption, a more reasonable approach would include modeling a sensitivity on the price of hydrogen.

There are physical and technical limitations to incorporating hydrogen into the existing gas system. The level of hydrogen blending proposed by the Companies, approximately 7 percent by energy content by 2040,[54] is consistent with traditional thinking on the maximum percent of hydrogen that can safely be distributed to customers with the existing system (20 percent by volume, which is equal to 7 percent by energy content). Recent research is calling that assumption into question, however. A report to the California Energy Commission found that only 5 percent hydrogen by volume, or 1.75 percent by energy content, is safe. Above that level, hydrogen poses safety, cost, and feasibility concerns. Existing customer-owned natural gas end-use equipment is not designed to burn hydrogen safely.[55] Despite this, the Companies do not assume that customer equipment will require retrofits.[56]

Furthermore, the Companies' approach during the term of the Long-Term Plan period could point to their strategy after the period of analysis. A plan for the post-2040 period that relies on increasing levels of hydrogen would also require additional investment in facilities for producing and transporting the hydrogen, the costs of which could fall on consumers. While the Companies' current plan included the added expenses of using hydrogen blending in the larger distribution system, they likely did not include costs associated with a higher concentration of hydrogen in the gas stream after the period of analysis.[57]

2.4 Synthetic Natural Gas

The Companies state that they are exploring SNG produced from clean hydrogen facilities "as a way to meet remaining economy-wide GHG emissions reduction targets." The Companies would use the process of methanation to combine hydrogen with captured CO2 to create methane.[58] In response to discovery (NRDC-21), the Companies indicated that they do not plan to use SNG in the 20-year period of the Long-Term Plan, due to SNG's higher costs and technological immaturity.

As noted in the previous section, there are numerous concerns regarding the Companies' incorporation of hydrogen. There are also cost, feasibility, and energy intensity issues with respect to the proposal. As such, SNG should not be incorporated into the LTP, as the Companies propose.

3. Concerns

3.1 Affordability

The main replacement programs (including the Main Replacement Program and the Gas Infrastructure Reduction or Replacement program) represent the largest capital spending category for both

[54] Long-Term Plan, p. 69.

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

[56] Response to NRDC-37.

[57] Long-Term Plan, p. 67.

[58] Long-Term Plan, p. 50, 69.

Companies. The main replacement programs are projected to end in approximately 2030 for O&R and 2040 for Con Edison. In the Reference case, Con Edison capital expenditures decrease by approximately 70 percent over the 20-year term of the plan, as the main replacement programs wind down. For the Hybrid and Deep Electrification pathways, core assumptions on the timing and emissions impact of the main replacement programs are consistent, but at a faster pace for the Deep Electrification pathway. These assumptions include:

- Using NPAs where feasible rather than the replacement of aged or leak-prone assets, and
- Maintaining threshold level of routine capital expenditures that declines as the projected customer demand shrinks over time.

While the Companies do not call out the main replacement programs as a strategy for reducing GHG emissions, they are projecting emissions reductions from these programs. From 2021 to 2042, Con Edison projects an 88 percent reduction in Scope 1 emissions, which include impacts of pipe replacement, in the Reference case and even larger reductions in the Hybrid and Deep Electrification pathways.[59] O&R projects a 56 percent decrease in Scope 1 GHG emissions over the same period for the Reference case and likewise anticipates steeper cuts in Scope 1 emissions in the Hybrid and Deep Electrification scenarios.[60] However, main replacement programs are a very expensive way to reduce GHG emissions. As NRDC's experts testified in the Con Edison rate case, Case 22-E-0064, emissions reductions from investment in pipeline replacement cost more than 4.5 times as much as emissions reductions from investment in a combination of efficient electrification and pipeline retirement.[61] Likewise, these witnesses testified that RNG and other lower-carbon fuels are expensive "solutions" for reducing GHG emissions, costing upwards of 2 to 8 times the cost of electrification per ton of avoided CO_2e. Problematically, the Companies did not perform an analysis of the cost of emissions reductions achieved through the use of LCFs compared to alternatives like electrification.[62] Nevertheless, the emphasis should be on implementing NPAs including electrification instead of pipe replacement, as much as possible.

Mitigating costs and bill increases will be critical to avoiding a rate crisis. Customers already have incentives to electrify their end uses from state and federal programs; increases in gas rates, say from higher fuel costs, or the state's cap and invest program that is currently being developed, will make those incentives even stronger than they are today. As customers fully electrify or otherwise substantially reduce their use of pipeline gas to avoid higher gas bills, gas rates will need to increase for other customers to cover the Companies' fixed costs, thus prompting even more customers to reduce or eliminate gas use. This could trigger a vicious process, potentially leaving an enormous burden on

[59] Response to NRDC-27, Attachment 1.
[60] *Id*.
[61] New York Public Service Commission, Case 22-E-0064 and Case 22-G-0065, Direct Testimony of Alice Napoleon and Asa Hopkins PhD on Behalf of Natural Resources Defense Council, May 20, 2022, p. 30, lines 14-17. https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7BBB321B5E-7297-49D4-A2DE-63E9725C181D%7D.
[62] Response to NRDC-26.

customers that have the least control over their building systems, such as renters and low-income households.

In the Long-Term Plan, the Companies provide the rate impacts associated with the two scenarios, but not the bill impacts. For the Hybrid pathway, the drivers of bill impacts include the introduction of more expensive fuels into the gas supply mix, declining sales, and maintaining adequate levels of gas capital investments to ensure safety and reliability.[63] The Deep Electrification pathway sees even steeper declines in sales, resulting in even greater bill impacts for those who remain on the gas system.[64]

While the Hybrid pathway appears to see more gradual rate increases, the decline in sales in the Hybrid scenario is substantial (about 30 percent). Importantly, the Hybrid scenario would not avoid the challenges associated with declines in sales and customer defection from the gas system that will occur in the Deep Electrification scenario. Over the long term, the Deep Electrification scenario will provide relief from the costs of maintaining the gas system. Also, the Deep Electrification pathway includes a much lower level of expensive fuels, which will drive up costs and may exacerbate a rate crisis in the Hybrid scenario.

On balance, the Hybrid pathway appears to be very costly. Potentially compounding the cost of this scenario, the Companies' actions to integrate and promote certified fossil gas, RNG, hydrogen and potentially SNG will send customers the message that these fuels provide an environmentally preferable alternative to conventional fossil gas. This may lead many customers to stay on the gas system and to replace gas-burning equipment appliances in-kind. Such actions would likely require the Companies to invest in pipe replacement as pipes age, adding to rate base.

3.2 Emissions Reductions

The Hybrid pathway would continue combustion of numerous fuel types (certified fossil gas, RNG, hydrogen, and SNG) at high levels, and it would rely on technologies that are unproven and undeveloped. This strategy risks failing to achieve CLCPA GHG reduction targets, incurring high costs for customers and the state as a whole, or both, and is not aligned with the modeling of CLCPA-compliant scenarios in the Scoping Plan, as discussed above in 1.1, with reductions in gas demand of 90 to 95 percent by 2050.[65]

The Hybrid scenario also puts the responsibility for the largest reductions in GHG emissions on sectors other than buildings. Relative to 2021 emissions, the Hybrid pathway sees overall emissions reductions of 35 percent, but certain sectors bear higher shares than others. The electric sector would see a 70 percent reduction, which may be appropriate given CLCPA and Clean Energy Standard electric sector requirements.[66] On the other hand, as shown in Table 1, the buildings sector would only be responsible for 21 percent of emissions reductions.

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[63] Long-Term Plan, p. 68.
[64] Long-Term Plan, p. 77.
[65] NYS Scoping Plan, Appendix G, p. 24, footnote 13.
[66] The 2015 New York State Energy Plan and the CLCPA require that 70 percent of New York's electricity comes from renewable energy by 2030. (New York State. Clean Energy Standard: Renewable Portfolio Standard. Available at: https://www.nyserda.ny.gov/All-Programs/Clean-Energy-Standard/Important-Orders-Reports-and-Filings/Renewable-Portfolio-Standard.

Table 1. Emissions by Sector for the Hybrid Pathway

Emissions by Sector (metric tons of CO2e)	2021	2030	Percent change (%)
Electricity	26,983,366	8,121,402	-70%
Buildings	45,495,270	35,833,759	-21%
Transportation	19,851,076	13,802,342	-30%
Industrial	4,854,842	3,277,590	-32%
Agriculture	696,301	564,004	-19%
Waste	7,337,491	6,063,778	-17%
Non-Energy	6,936,411	4,716,759	-32%
Total Emissions	112,154,756	72,379,634	-35%
% reduction from 2021	**0%**	**35%**	

Source: Response to NRDC-27, Attachment 1.

The Hybrid scenario risks not achieving GHG reductions required by statewide targets, because it does not tap into all of the GHG reductions that the buildings sector is capable of achieving with the wind-down of the gas system and with electrification, and because other sectors face challenges with implementing these greater emissions cuts. For example, electrification and decarbonization options for the industrial sector are currently lacking, as compared to the options currently and widely available for displacing gas use for heating buildings.

In the Deep Electrification pathway, buildings contribute a much larger share of emissions reductions (36 percent). As a result, emissions reductions overall are much greater. Even if other sectors fall short of the Companies' projections, more robust action in the buildings sector will put the state on the path to achieving the overall targets.

Table 2. Emissions by Sector for the Deep Electrification Pathway

Emissions by Sector (metric tons of CO2e)	2021	2030	Percent change (%)
Electricity	26,983,366	9,123,157	-66%
Buildings	45,495,270	29,160,770	-36%
Transportation	19,851,076	12,587,492	-37%
Industrial	4,854,842	3,289,240	-32%
Agriculture	696,301	564,004	-19%
Waste	7,337,491	6,063,778	-17%
Non-Energy	6,936,411	4,716,759	-32%
Total Emissions	112,154,756	65,505,200	-42%
% reduction from 2021	**0%**	**42%**	

Source: Response to NRDC-27, Attachment 1.

3.3 Gas Planning Order Compliance

The Gas Planning Order calls for each Long-Term Plan to include the likely and preferred portfolios of investments, summarizing the cost and bill impacts and the emissions impacts from the preferred

option.[67] The Companies' Long-Term Plan does not provide information on bill impacts, nor does it indicate a "preferred" pathway. The Companies explicitly state that they are not putting forth a preferred pathway, since the precise course the ultimate transition to electric will take will be affected by regulatory, legislative, and technological changes, meaning they cannot predict the final outcome at this time. Instead of establishing a preferred pathway, the Companies maintain that they need to plan for a range of possible outcomes.[68] This response by the Companies does not comply with the expectations of the Gas Planning Order.

In addition, the Gas Planning Order calls for alignment of the gas planning proceeding with the Scoping Plan: "Staff shall align its work under the Gas Planning Proceeding with any recommendations for the decarbonization of the gas delivery system that may be included in the Climate Action Council's Scoping Plan once finalized."[69] The Scoping Plan calls for the gas system to undergo a well-planned and strategic downsizing. It also anticipates targeting low-carbon fuels to the sectors that are challenging to electrify, including adoption of hydrogen for high-temperature industrial applications.[70] Neither Long-Term Plan scenario appears to adequately direct LCFs to the uses most difficult to electrify, although the Hybrid scenario's slower pace of electrification and continued use of the gas system puts it much farther afield from the Scoping Plan's direction and achievement of CLCPA targets. All three of the CLCPA-compliant Scoping Plan scenarios[71] see greater emissions reductions for the buildings sector (ranging from 35 to 37 percent) by 2030, as compared to the Hybrid pathway's much lower reductions for that sector (21 percent).[72] Industrial emissions in both Long-Term Plan pathways are cut 32 percent, far exceeding the reductions anticipated in the Scoping Plan scenarios, which range from 15 percent to 25 percent.

3.4 Conversions to Gas

In a section discussing Con Edison's peak demand forecast, there is a reference to the impact of net growth expected to be realized over a 20-year period from nine factors, including Steam-to-Gas and Oil-to-Gas Conversions.[73] The Companies' claims regarding the benefits of converting steam and oil equipment to gas, and the benefits of decarbonized steam, are difficult to assess. The emissions and emission-reduction potential associated with steam and oil and conversion to gas can be significant, and hence deserve careful scrutiny.

In the Hybrid pathway end state (by 2042), 7 percent of floorspace is on steam and 6 percent of the floorspace is on oil.[74] These figures are similar in the Deep Electrification Pathway, where 5 percent of floorspace is on steam and 7 percent of the floorspace is on oil.[75]

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

[68] Discovery Response NRDC-1-56, Case No 22-G-0131.

[69] Gas Planning Order, p. 28.

[70] Scoping Plan, p. 123.

[71] These include: Scenario 2, Strategic Use of Low Carbon Fuels; Scenario 3, Accelerated Transition Away from Combustion; and Scenario 4, Beyond 85% Reductions.

[72] New York State Climate Action Council Scoping Plan, Integration Analysis Technical Supplement, Section I, Annex 2: Key Drivers and Outputs. 2022.

[73] Long-Term Plan, p. 33 and Fig. 25 on p 35.

[74] Long-Term Plan, p. 61

[75] *Id.*, P. 72.

The Companies note that in the Deep Electrification pathway, oil-to-gas conversions are discontinued within five years.[76] In the Hybrid scenario, all oil usage is phased out by 2050.[77] However, Con Edison assumes some conversion of current oil customers to natural gas, thus driving a near-term increase in floorspace heated with gas. The plan makes no mention of phasing out oil-to-gas conversions for the Hybrid pathway.

By converting oil-fired equipment to natural gas, the Companies are effectively locking in natural gas use for a longer period. The Companies have not clearly articulated the reasons and the tradeoffs (in terms of cost and emissions) as to why oil-fired equipment is sometimes converted to gas equipment instead of electric heat pumps. A more effective decarbonization action consistent with the CLCPA would be to convert oil-fired equipment to electric equipment.

Asked if the Companies considered electrification instead of conversion to gas, they responded that in the Hybrid pathway, existing oil customers can switch to either electric or gas between now and 2030. According to the Companies, conversions are constrained by the potential of a heat pump incentive that targeted only 10 percent of floorspace. Once this level was achieved, oil-fired equipment will be converted to gas.[78] However, this response does not take into account the requirements of Local Law 97, which will compel buildings to electrify and move away from fossil fuels. In the Deep electrification pathway, the Companies assumed that any near-term oil-to-gas conversion would be offset by gas-to-electric conversions in 2030.[79]

Similar to the concerns with oil-to-gas conversions, the emissions implications of conversions to steam deserve careful review. The Companies note that they have approximately 1,530 steam customers. The evolution of the steam system and Con Edison's planned use of it is not extensively discussed in the Long-Term Plan. However, in 2022 Con Edison also released a document titled *Steam Long-Range Plan,* where it states that, "(g)iven the complex and interdependent nature of CECONY's steam, gas and electric systems assets, we must continue to assess these trade-offs as we evolve our systems over time." This report shows an expected steady decline in steam sales,[80] although there are still new steam connections by hard-to-electrify customers that are transitioning to steam from oil and gas.[81] Con Edison also notes that the steam system could potentially be decarbonized to help buildings' compliance with New York City's Climate Mobilization Act.[82] The Company anticipates most customers will adopt electric heating or connect to the steam system due to the need of building operators to comply with the law. [83] However, until Con Edison completes a long term steam decarbonization plan it is difficult to assess the anticipated evolution of the carbon intensity of the steam system, especially since the steam system and many of the buildings connected to it are unique in this country.

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[76] *Id.*, p.72.

[77] *Id.*, p. 62.

[78] Response to NRDC-8.

[79] *Id*.

[80] Consolidated Edison Company of New York, Inc. 2022. *Long-Range Plan: Our District Steam System.* p. 23. Available at: https://www.coned.com/en/our-energy-future/our-energy-vision/long-range-plans.

[81] *Id.*, p. 4-5.

[82] *Id.*, p. 4.

[83] Consolidated Edison Company of New York, Inc. 2022. *Long-Range Plan: Our Integrated Energy System*, p. 41. Available at: https://www.coned.com/en/our-energy-future/our-energy-vision/long-range-plans.

4. Recommendations

We recommend that Con Edison and O&R fix the modeling and the Long-Term Plan filing consistent with these comments. Specifically, the revised Long-Term Plan should:

- Include a preferred plan that is CLCPA-compliant;
- Include modeling that is aligned with the Scoping Plan;
- Prioritize NPAs over main replacement program investments, and as possible more precisely and effectively target replacement of the pipes necessary for safety;
- Consider and incorporate the results of an analysis of the cost of emissions reductions achieved through the use of LCFs compared to alternatives like electrification;
- Fix problematic cost and emissions assumptions regarding SNG, RNG, and hydrogen, and target these fuels to the end-uses for which alternatives are not readily available; and
- Not include certified fossil gas.

Further, we recommend that the Companies disclose and incorporate into the Long-Term Plan the following:

1. The GHG emissions impact of oil and steam, reflecting the outcome of a steam decarbonization plan;
2. Emission and cost tradeoffs of converting (a) steam to gas vs. steam to electric and (b) oil to gas vs. oil to electric; and
3. Clear articulation of assumptions behind decarbonized steam, including assumptions behind new customer growth due to conversions from gas and oil to steam.