Electric Sector

I. Introduction

Commenters are generally supportive of the Draft Scoping Plan's ("DSP") electric sector strategies (E1-E10) and encourage the State to move expeditiously to phase out fossil fuel generation and accelerate the transition to a zero-emissions grid, with a focus on ramping up renewable and battery storage installations and upgrading transmission and distribution network infrastructure. The State must also invest in new technological solutions such as long duration storage that will facilitate the transition to a true zero-emissions grid. However, other purported technology solutions such as renewable natural gas ("RNG") and hydrogen combustion are not zero-emissions and therefore inconsistent with the CLCPA's 2040 electric sector mandate and should be excluded. Moreover, even if some hydrogen or RNG were deemed zero emissions, there are a host of significant issues that limit the role they can plan in a decarbonized electric sector.

II. Phasing Out Fossil Fuel

Commenters strongly support electric sector strategy E1 ("Retirement of Fossil Fuel Fired Facilities"), which recognizes that "[a]chieving a 100% emissions-free power grid will require phasing out the use of fossil fuel for power generation over time."[1] Fossil fuel-fired generation must be reduced and eliminated in a deliberate and comprehensive manner in order to achieve the CLCPA's mandates for 70% renewable generation by 2030 and zero-emissions electricity by 2040.

A. New gas generation will frustrate efforts to reduce state GHG emissions and transition to a zero-emissions electric sector.

As the DSP implicitly recognizes, new gas generation is inconsistent with the CLCPA and will frustrate efforts to reduce state greenhouse gas ("GHG") emissions by transitioning to a zero-emissions electric sector. The CLCPA requires 70% renewable energy by 2030 and zero-emissions electricity by 2040. Neither electric sector mandate can be met if New York continues to build its electric system around additions of gas generation.

In 2021, a mere 27.9% of statewide electric generation came from renewables while 47.6% of generation came from fossil fuel plants.[2] On a capacity basis, the situation is even worse, with the State relying on gas plants for more than two-thirds of its electric generating capacity.[3] The State therefore must substantially decrease—not increase—reliance on fossil fuels in order to decrease greenhouse gas emissions and achieve 70% renewable generation by 2030 and exclusively zero-emissions electricity by 2040. NYISO projects that statewide electric demand will decrease slightly between 2020 and 2030.[4] As such, existing fossil resources must retire and/or significantly curb generation in order to meet the CLCPA's 2030 requirements. No headroom exists for new gas generation.

Without a focus *now* on meeting the 2030 mandate, the State risks retaining and installing more gas capacity than *could possibly* run—and less renewable capacity than the State *must* run—to achieve a minimum of 70% renewable generation and ensure that overall statewide emission reductions reach 40% by 2040. New gas capacity therefore decreases the likelihood—and increases the cost—of achieving the 70 by 30 mandate.

And new gas is flatly incompatible with a zero-emissions electric sector because gas plants emit both greenhouse gases and co-pollutants, including nitrogen oxides ("NO_x") and particulate matter. Reducing co-pollutant emissions, particularly in disadvantaged communities ("DACs"), is a core purpose of the CLCPA.[5]

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[1] N.Y. Climate Action Council, *Draft Scoping Plan* ("DSP") 154 (2021), https://climate.ny.gov/-/media/Project/Climate/Files/Draft-Scoping-Plan.pdf.

[2] New York Independent System Operator ("NYISO"), *Gold Book: 2022 Load & Capacity Data* 73 (2022), https://www.nyiso.com/documents/20142/2226333/2022-Gold-Book-Final-Public.pdf/cd2fb218-fd1e-8428-7f19-df3e0cf4df3e?t=1651089370185.

[3] *See New York State Profile and Energy Estimates*, U.S. Energy Info. Admin. (Oct. 21, 2021), https://www.eia.gov/state/analysis.php?sid=NY.

[4] NYISO, *Power Trends 2021: New York's Clean Energy Grid of the Future* 12 (2021), https://www.nyiso.com/documents/20142/2223020/2021-Power-Trends-Report.pdf/471a65f8-4f3a-59f9-4f8c-3d9f2754d7de; Max Schuler & Chuck Alonge, NYISO, *Long Term Forecast Update*, at slide 34 (Nov. 19, 2020), https://www.nyiso.com/documents/20142/17044621/LT-Forecast-Update.pdf.

[5] *See, e.g.*, ECL § 75-0109(3)(d) (stating DEC must, in promulgating regulations, prioritize reduction of GHG and co-pollutant emissions in disadvantaged communities).

Nor would a requirement that new gas plants retire in 2040 suffice to render new gas generation consistent with the CLCPA. Building a gas plant that must retire just as the State's renewable energy needs become most acute would neither ensure reliability nor facilitate renewable integration. Here too, such a plant would make it more, rather than less, difficult to achieve the 2040 zero-emissions electricity mandate.

New fossil fuel generation is particularly problematic because it perpetuates a grid where local reliability is dependent on fossil fuel capacity resources and jeopardizes the economics of zero-emissions alternatives. Building a fossil fuel plant entrenches the grid's local reliance on that resource and dampens market signals for storage or other non-emitting capacity resources to site in that load pocket. Thus, adding new gas resources will make it even more challenging for New York to extricate itself from its present over-reliance on fossil fuel generation.

B. New gas generation should be prohibited with only the narrowest exception for unavoidable reliability needs.

Given its clear inconsistency with the CLCPA and deleterious effect on efforts to achieve the 2030 and 2040 electric sector mandates, the State must prohibit new gas generation with only the narrowest exception for clear and unavoidable near-term reliability needs. Commenters therefore support the DSP's direction that new or repowered fossil fuel generation should be considered only as a last resort where reliability needs arise and cannot be resolved through zero-emissions solutions.[6]

The DSP provides a clear four-part framework for considering new or repowered fossil fuel generation. First, whenever "a reliability need or risk is identified, emissions-free solutions should be fully explored . . . ."[7] Second, only after those emissions-free solutions are examined and found insufficient to resolve the reliability need should new or repowered fossil generation even be considered.[8] Third, NYISO and local transmission operators must affirmatively concur both that new or repowered fossil is needed to maintain system reliability and further, that zero-emissions alternatives are insufficient to meet that reliability need.[9] Finally, the DSP explains that "[e]ven in those cases, the fossil-fueled generation facility should assist in meeting the goals of the Climate Act. That is, its deployment should result in a greater integration of zero-emissions resources; a reduction in fossil fuel generation; a significant reduction of GHG and co-pollutant emissions; a benefit to an environmental justice community; and a benefit to the electric system that addresses the identified reliability need or risk."[10]

Together, the requirements help shield against unnecessary fossil fuel generation, restricting fossil generation projects to situations in which there is a pre-identified reliability need, and making sure the analysis of zero-emissions alternatives is thorough and comes first, not as an afterthought. The requirement that both NYISO and local transmission operators

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[6] *See* DSP at 155.
[7] *Id.*
[8] *Id.*
[9] *Id.*
[10] *Id.*

confirm (1) that the fossil project is necessary to maintain system reliability and (2) that the reliability need cannot be met with zero-emissions alternatives provides an important guardrail against industry over-reach in striving to justify new generation projects. The FSP should go further, however, and clarify that only a *concrete, near-term* reliability need at the location of a proposed project suffices as a basis for considering new or repowered fossil generation. NYISO undertakes a broad review of system reliability, looking out many years and considering a wide range of theoretical scenarios. However, NYISO identification of a reliability need many years out would not support new or repowered fossil generation given the likelihood that zero-emissions resources—including newly developed technology—could resolve the reliability issue in the intervening years.

Finally, Commenters support the Power Generation Advisory Panel and Climate Justice Working Group recommendation for a near-term moratorium on permitting new fossil fuel generation.[11] A moratorium is consistent with the use of fossil as a last resort and would afford time for full CLCPA implementation, including regulatory and policy changes to incentivize the clean resources necessary for a zero-emissions grid and which can obviate the need for additional fossil generation.

C. Existing gas generation should be phased out as quickly as feasible and especially in Disadvantaged Communities.

The DSP calls for the PSC, DEC, NYSERDA, and the New York State Energy Planning Board to coordinate to determine the potential for GHG and co-pollutant reductions from fossil generation by 2030 and set a timeline for emissions reduction targets, taking into account the location and emissions profile of sources statewide, including in disadvantaged communities.[12] The DSP further states that the emission reduction targets should be evaluated every two years, adjusted as necessary to meet the 2030 and 2040 electric sector mandates, and provide a timeline "represent[ing] a continual decline in emissions from present to 2040 while ensuring reliability."[13] Commenters support this coordinated and considered approach. Commenters further recommend aggressive action to reduce fossil fuel generation as quickly as feasible, consistent with a deliberative process to ensure all such generation is replaced with true zero-emissions solutions yielding both climate and health benefits alike.

Beyond simply "consider[ing]" disadvantaged community designations when determining emission reduction targets, reductions and plant closures should be affirmatively prioritized in disadvantaged communities to the extent possible, as these same communities currently suffer the greatest environmental and health burdens. In addition to generating GHG emissions, the combustion of fossil fuel emits harmful pollutants such as nitrogen oxides (NO_x), sulfur dioxide (SO_2), particulate matter (PM), and carbon monoxide. NO_x and SO_2 further contribute to the secondary formation of ozone and fine particulate matter ($PM_{2.5}$). These pollutants are each directly harmful to human health and contribute to respiratory disease,

[11] *See* DSP at 155-56.
[12] DSP at 156.
[13] *Id.*

asthma, cardiovascular disease, and death.[14] In New York City alone, $PM_{2.5}$ pollution "causes more than 3,000 deaths, 2,000 hospital admissions for lung and heart conditions, and approximately 6,000 emergency department visits for asthma in children and adults" each year.[15] Elevated ozone levels likewise cause an estimated "400 premature deaths, 850 hospitalizations for asthma and 4,500 emergency department visits for asthma."[16] Disadvantaged communities located near existing fossil-fired plants are especially at risk of these harms.

To facilitate the expeditious retirement of the existing gas fleet, State actors should assess each existing gas plant to establish what, if any, reliability risks exist that would hinder plant retirement. NYISO currently undertakes a similar evaluation upon receipt of deactivation requests,[17] but the proactive identification and resolution of reliability concerns will enable the earlier retirement of generators and decrease the unnecessary use of fossil fuel (for example, and as described below, easing transmission constraints could obviate the need for a peaker plant to serve local load). Once reliability needs have been identified, the State must implement a process for addressing those reliability needs through a CLCPA-compliant resource mix (i.e., some combination of zero-emission generation, energy storage, energy efficiency, demand response, transmission upgrades, and/or transmission interconnection). In addition, to ensure that the state remains on a trajectory to reach zero emissions by 2040, DEC should lock in all feasible emission reductions through enforceable emission limits. DEC, NYSERDA and the PSC must regularly iterate this process to ensure that reliability solutions are being systematically identified and implemented and emissions continue to decline toward zero by 2040.

III. Clean Solutions

Rather than continuing to rely on existing and new fossil fuel generation, the State must instead move aggressively to implement existing clean solutions necessary for achieving a zero-emissions grid, including the accelerated installation of renewables, battery storage, and transmission and distribution system upgrades. The State should also invest heavily in research and development of zero-emission long duration storage technologies.

A. The State must continue and accelerate the installation of renewables.

The State must continue and accelerate the installation of renewable generation, including through NYSERDA's existing procurement program—which the State should expand—and by ensuring a smoothly functioning siting process through the Office of Renewable Energy Siting ("ORES"). Commenters support electric sector strategy E2 ("Accelerate Growth of Large-Scale

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[14] *See, e.g.*, *Nitrogen Dioxide*, American Lung Association, https://www.lung.org/clean-air/outdoors/what-makes-air-unhealthy/nitrogen-dioxide (last updated Feb. 12, 2020); New York City Department of Health, *Air Pollution and the Health of New Yorkers: The Impact of Fine Particles and Ozone* 3, https://www1.nyc.gov/assets/doh/downloads/pdf/eode/eode-air-quality-impact.pdf; *Sulfur Dioxide (SO_2) Pollution*, EPA, https://www.epa.gov/so2-pollution/sulfur-dioxide-basics#effects (last updated Mar. 9, 2022).

[15] New York City Department of Health, *Air Pollution and the Health of New Yorkers: The Impact of Fine Particles and Ozone* 3, https://www1.nyc.gov/assets/doh/downloads/pdf/eode/eode-air-quality-impact.pdf.

[16] *Id.* at 25.

[17] *See* NYISO, *Open Access Transmission Tariff (OATT)* 2348 (2022), https://nyisoviewer.etariff.biz/ViewerDocLibrary/MasterTariffs/9FullTariffNYISOOATT.pdf (describing NYISO's Generator Deactivation Process, including the Generator Deactivation Assessment NYISO undertakes in coordination with responsible transmission owners).

Renewable Energy Generation") and offer the following comments geared toward ensuring the installation of sufficient quantities of renewables to achieve the CLCPA's 2030 and 2040 electric sector mandates.

First and foremost, the State must install substantially more renewable generation than specified by the CLCPA targets for 6 GW of photovoltaic solar by 2025 and 9 GW of offshore wind by 2035. NY PSL § 66-p(5); *see also* ECL § 75-0103(13)(e). The CAC Integration Analysis Technical Supplement projects that by 2050, "across all modeled pathways," the State must install "over 60 GW of solar capacity (both utility-scale and distributed resources), between 16-17 GW of new land-based wind capacity (including imported wind from neighboring ISOs), and between 16-19 GW of offshore wind resources. . . ."[18] The current CLCPA targets therefore represent only a small portion of the renewables ultimately required to achieve a zero-emissions grid. To ensure the installation of sufficient renewable capacity, the State should adopt higher procurement targets to match the Integration Analysis, expand funding for NYSERDA's existing procurement programs, and consider whether additional targeted procurement programs are necessary.

Second, the DSP recommends that ORES establish a non-binding goal of permitting enough MWs of renewable energy annually to "compliment[] the Tier 1 request for proposals procurements."[19] The FSP should clarify that "compliments" means at least matches. The FSP should also recommend that ORES review its first years' worth of permitting decisions to identify any process improvements that would accelerate the pace of its review, particularly to the extent decisions thus far have exceeded the six-month and one-year deadlines for permit decisions set forth in the Accelerated Renewables Act. NY Exec. Law § 94-c(5)(f).

In addition to addressing issues with the siting process, there are a host of additional obstacles to renewable generation development that must be addressed. Given the large capacity of renewable projects that will need to be developed each year in order to support a zero-emission power grid by 2040, it is important that projects receiving REC awards from NYSERDA through its Tier 1 solicitations are timely brought to market. To this end, the FSP should recommend modifications to the NYSERDA request for proposal ("RFP") process.

There is a potential tension between NYSERDA's current heavy weighting of bid price (70%) and several of the non-price factors for evaluation, including reducing the embodied carbon of the project[20] and incremental economic benefits to the State and to DACs.[21] If price is weighted too heavily in bid scoring, developers will be disincentivized from pursuing these important potential project benefits. Likewise, to the extent that New York seeks to encourage renewable development on non-agricultural lands, over-weighting price in the bid evaluation process may inhibit that goal, as agricultural lands may be the least expensive development

[18] DSP, *Appendix G: Integration Analysis Technical Supplement*, Section 1 at 45.
[19] DSP at 159.
[20] NYSERDA, Request for Proposals No. RESRFP21-1, *NYSERDA Seeks to Acquire Approximately 4.5 Million New York Tier 1 Eligible Renewable Energy Certificates Annually* 32 (2021), https://portal.nyserda.ny.gov/servlet/servlet.FileDownload?file=00Pt000000UOhG5EAL.
[21] *Id*. at 34-35.

option. Finally, there may also be a tension between price and project viability, currently weighted together with operational flexibility and peak coincidence at 20%.[22]

Ultimately, successfully bringing renewable projects to completion is of critical importance, as NYSERDA contracts for projects that do not ultimately reach completion take money away from potentially viable alternative projects and thwart efforts to achieve the State's renewable development goals. NYSERDA's evaluation of bids should give significant weight to factors indicative of the likelihood that projects will be timely and successfully developed.

In addition, as pertains to timing, the FSP should make recommendations on how the State can help ensure that the NYISO is timely processing interconnection requests for renewable developers. Uncertainty in the time frame for processing interconnection requests is not only a concern for delaying project completion, but also can increase the cost of CLCPA compliance, as developers must price this uncertainty into their bids. While New York does not govern the NYISO, the FSP should recommend that the State adopt legislation that would create an oversight board for NYISO to ensure that it is assiduously fulfilling its role in processing applications for interconnections of renewable energy projects.

B. The State must address transmission system needs.

To further support a clean energy transformation, the State must invest heavily in transmission and distribution system upgrades.[23] Such upgrades will both promote the installation of increasing renewable capacity and facilitate the shutdown of polluting fossil gas plants. Commenters are supportive of electric sector strategy E7 ("Invest in Transmission and Distribution Infrastructure Upgrades") and make the following additional recommendations.

Crucially, the State must apply an equity lens to transmission system upgrades with a focus on ameliorating the existing disproportionate impacts on DACs. Many fossil peaker plants are sited within—or very near—DACs. Transmission projects should therefore be expedited wherever they can obviate the need for an existing or new peaker plant and/or facilitate the retirement of an existing plant. Particularly within New York City, many peaker plants operate to address reliability needs within transmission-constrained load pockets.[24] These transmission constraints hinder plant retirements and thus prolong the operation of high-pollution, high-cost[25]

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[22] *Id.* at 21.

[23] *Cf.* Chapter 58 (Part JJJ) of the Laws of 2020 ("Accelerated Renewable Act") § 7(2) (directing the preparation of a power grid study to identify "distribution upgrades, local transmission upgrades and bulk transmission investments that are necessary or appropriate to facilitate the timely achievement of the CLCPA targets . . . .").

[24] *See, e.g.*, NYISO, *2021-2030 Comprehensive Reliability Plan* 12-13 (2021), https://www.nyiso.com/documents/20142/2248481/2021-2030-Comprehensive-Reliability-Plan.pdf/99a4a589-7a80-13f6-1864-d5a4b698b916.

[25] Recent publications have highlighted the exorbitant capacity payments made to the owners of fossil-fuel power plants in New York. *See, e.g.*, The PEAK Coalition, *Dirty Energy, Big Money: How Private Companies Make Billions from Polluting Fossil Fuel Peaker Plants in New York City's Environmental Justice Communities – and How to Create a Cleaner, More Just Alternative* (2020) (hereinafter "Dirty Energy, Big Money"), https://8f997cf9-39a0-4cd7-b8b865190bb2551b.filesusr.com/ugd/f10969_9fa51ccc611145bf88f95a92dba57ebd.pdf. Peak electricity in New York City can cost up to 1,300% more than the average cost of electricity in New York. *Id.* at 15. These high costs disproportionately burden low-income communities with over 600,000 families paying greater than six percent

power plants. At the same time, targeted investments in the transmission system can facilitate the retirement of existing fossil generation without the need for fossil fuel replacement.[26] While clean electricity may be available in the region, it cannot be dispatched to serve the transmission-constrained load in full. Prioritizing transmission system upgrades that eliminate load pockets and enable the retirement of fossil plants in DACs will therefore serve several important purposes: reducing pollution and health impacts in disproportionately burdened communities, decreasing electricity costs for those same utility-burdened, low-income communities, and facilitating achievement of the CLCPA's 2030 and 2040 electric sector mandates.

With regard to local transmission and distribution planning, the PSC should require utilities to incorporate storage and other grid-enhancing technologies (GETs). GETs, including storage as transmission, power flow controls, dynamic line ratings, and topology optimization software, are advanced technologies that can be incorporated alongside traditional wires-based assets. GETs have many advantages. They have a small physical footprint compared to traditional wires-based assets and may offer faster build times as a result. They also may be more cost-effective for specific applications and storage as transmission especially can offer important grid flexibility benefits.[27]

C. The State must expand investment in storage technologies.

The State must also expand deployment of existing battery storage technologies and fund research into and development of zero-emission long duration storage technologies.

Governor Hochul's announcement doubling the State's energy storage deployment target from 3 GW to 6 GW by 2030[28] is a step in the right direction. However, far more storage capacity will be necessary to achieve the CLCPA electric sector mandates. As the DSP notes, the recent Power Grid Study "identified a need for more than 15 GW of energy storage"—two and a half times the new State target.[29]

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of their annual household income in energy payments. NYC Mayor's Office, *Understanding and Alleviating Energy Cost Burden in New York City* 4 (2019), https://www1.nyc.gov/assets/sustainability/downloads/pdf/publications/EnergyCost.pdf.

[26] The PSC's approval of Con Edison's TRACE projects facilitated the retirement of existing fossil fuel units at the Gowanus and Astoria power plants and obviated the need for additional proposed fossil fuel generation at these sites. The State observed in its press release regarding the PSC's approval that "[t]he retirement of downstate fossil fuel-fired peaking generation without the addition of any new fossil-fueled power plants is itself a significant, first step towards achieving New York's clean energy future." Press Release, Pub. Serv. Comm'n, 19-E-0065, *PSC Approves $800 Million Investment to Maintain and Improve Reliability, Achieve Climate-Change Goals, Enhance Resiliency of NYC Transmission Grid* (Apr. 15, 2021).

[27] *See generally* FERC Notice of Workshop; Grid-Enhancing Technologies, 84 Fed. Reg. 48,609 (Sept. 19, 2019); Rob Gramlich & Jay Caspary, Ams. for a Clean Energy Grid, *Planning for the Future: FERC's Opportunity to Spur More Cost-Effective Transmission Infrastructure* 41 (2021), https://cleanenergygrid.org/wp-content/uploads/2021/01/ACEG_Planning-for-the-Future1.pdf; Jeff St. John, *4 Technologies That Could Unlock Transmission Capacity on the Grid*, GreenTech Media (Oct. 5, 2020), https://www.greentechmedia.com/squared/dispatches-from-the-grid-edge/four-key-technologies-to-unlock-u.s-transmission-grid-capacity.

[28] Kathy Hochul, *State of the State 2022: A New Era for New York* 146-47 (2022), https://www.governor.ny.gov/sites/default/files/2022-01/2022StateoftheStateBook.pdf.

[29] DSP at 166.

Commenters agree with the DSP's recommendations to update the State's Energy Storage Roadmap to target the 15 GW need identified by the Power Grid Study, increase funding for energy storage deployment, incorporate energy storage into delivery and transmission planning, and work with NYISO on market enhancements, including the elimination of Buyer Side Mitigation for CLCPA resources.[30]

The FSP should also require an annual evaluation of progress toward the 15 GW target. That way, if progress is insufficient, additional funding mechanisms can quickly be developed—or existing mechanisms expanded—to increase funding and spur the deployment of more energy storage. With only eight years until 2030, a more periodic review would hinder efforts to recalibrate in time to meet the 2030 requirement for 70% renewable generation.

Finally, the FSP should direct significant investment into the research and development of zero-emission long duration storage technologies. Commenters support the DSP recommendations that the State advocate for and leverage federal resources focused on zero carbon dispatchable long duration storage solutions and further that NYSERDA fund "research and demonstration projects for the development of large scale and longer duration storage" and work with NYISO and others to "bring technologies to large-scale deployment faster and more cost-effectively."[31]

IV. False Solutions

The DSP, through electric sector strategy E10 ("Explore Technology Solutions"), recommends that NYSERDA explore dispatchable technology solutions to serve remaining generation needs after full integration of renewables in the lead up to 2040. As noted above, Commenters strongly support research into and funding toward long duration energy storage. However, hydrogen and RNG combustion are false solutions, which NYSERDA should not expend resources on exploring further. Combusting (even green) hydrogen or RNG is not zero-emissions and is therefore inconsistent with the CLCPA's 2040 electric sector mandate, and in any event, faces significant barriers to implementation at scale.

While there is no appreciable role for hydrogen as a fuel for electric power generation, there may be a role for hydrogen in long-duration energy storage. Hydrogen fuel cells do not utilize combustion and consequently avoid the harmful emissions caused by burning hydrogen.[32] But even then, the utility of hydrogen is uncertain, as other emerging technologies could provide these services at a lower cost.[33] And, given the finite amount of genuinely green hydrogen likely to be available, it is critical that it be directed to genuinely hard-to-electrify applications.[34]

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[30] DSP at 166-67.

[31] DSP at 178.

[32] Sasan Saadat & Sara Gersen, Earthjustice, *Reclaiming Hydrogen for a Renewable Future: Distinguishing Oil & Gas Industry Spin from Zero-Emission Solutions* 18, 22-24 (2021) ("Hydrogen Report"), https://earthjustice.org/sites/default/files/files/hydrogen_earthjustice.pdf.

[33] Sara Baldwin et al., Energy Innovation, *Assessing the Viability of Hydrogen Proposals: Considerations for State Utility Regulators and Policymakers* 3 (2022), https://energyinnovation.org/wp-content/uploads/2022/03/Assessing-the-Viability-of-Hydrogen-Proposals.pdf.

[34] *See infra* Sections IV(B)(2), (3).

A. RNG combustion is not zero-emissions and sufficient RNG sources do not exist.

RNG is chemically indistinguishable from fossil gas. Both are methane. RNG emits as much CO_2 when burned and leaks as much methane when transported as gas produced from non-biological sources like hydraulic fracturing ("fracking").[35] RNG combustion therefore also emits the same co-pollutants as fossil gas. It is not and cannot be zero-emissions. In fact, methane's global warming potential is approximately 86 times that of carbon dioxide over 20 years,[36] the statutorily mandated time frame for GHG accounting under the CLCPA.[37]

Nor may the emissions from RNG combustion be excused through use of any offset scheme. Although the CLCPA provides that DEC "may establish an alternative compliance mechanism to be used by sources subject to greenhouse gas emissions limits to achieve net zero emissions," ECL § 75-0109(4)(a)—it explicitly bars both electric generation sources generally, and biofuels specifically, from participation in such a mechanism. *Id.* § 75-0109(4)(f) ("Sources in the electric generation sector shall not be eligible to participate in such mechanism."); *id.* § 75-0109(4)(g) ("The following types of projects shall be prohibited: . . . ii. biofuels used for energy or transportation purposes."). Though an offset/netting approach may be used to achieve the final 15% of emissions reductions under the CLCPA's sector-wide 2050 greenhouse gas limit, the CLCPA electric sector limits afford no such flexibility. *Compare* CLCPA §§ 1(4) *and* ECL §§ 75-0107(1)(a)–(b), 75-0109(4)(a)–(b), (f) (sector-wide greenhouse gas emission limit requires reducing emissions by 85% of 1990 levels and eliminating net emissions by 2050), *with* N.Y. P.S.L. § 66-p(2) (electric sector must be zero-emissions by 2040).

Moreover, carbon emissions from RNG production and use vary widely depending on the feedstock.[38] An all-feedstock approach to sourcing RNG would entail both the generation of new methane sources (e.g. thermal gasification of energy crops and forest and agriculture residues) as well as the promotion and use of methane from sources that would be better eliminated through alternative resource and waste management processes (e.g. animal manure and food waste).[39] Incentivizing the generation of, and then ultimately burning, RNG from such sources is not

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[35] NRG, the developer behind a recent NY gas plant proposal acknowledged as much in their Draft Supplemental Environmental Impact Statement: "RNG does not result in zero onsite GHG emissions. As RNG is methane and fully interchangeable with conventional natural gas, onsite GHG emissions would remain the same whether the Project is operating on RNG or conventional natural gas." AECOM, *Draft Supplemental Environmental Impact Statement: Astoria Replacement Project* 3-51 (2021), https://www.nrg.com/assets/documents/legal/astoria/00_2021/astoria-draft-dseis-06-30-2021.pdf.

[36] Gayathri Vaidyanathan, *How Bad of a Greenhouse Gas is Methane?*, Sci. Am. (Dec. 22, 2015), https://www.scientificamerican.com/article/how-bad-of-a-greenhouse-gas-is-methane/.

[37] ECL § 75-0101(2) ("'Carbon dioxide equivalent' means the amount of carbon dioxide by mass that would produce the same global warming impact as a given mass of another greenhouse gas over an integrated twenty-year time frame after emission.").

[38] *See* Emily Grubert, At Scale, *Renewable Natural Gas Systems Could Be Climate Intensive: The Influence of Methane Feedstock and Leakage Rates*, 15 Env't Rsch. Letters 084041 (2020), https://iopscience.iop.org/article/10.1088/1748-9326/ab9335/pdf.

[39] Sasan Saadat et al., Earthjustice and Sierra Club, *Rhetoric vs. Reality: The Myth of "Renewable Natural Gas" for Building Decarbonization* 8-10 (2020), https://earthjustice.org/sites/default/files/feature/2020/report-decarb/Report_Building-Decarbonization-2020.pdf.

carbon neutral. "RNG from intentionally produced methane is always GHG positive unless total system leakage is 0."[40] Thus, even if an offset scheme were legal, it would still not suffice to render RNG zero-emissions.

In reality, the available and climate or environmentally beneficial supply of RNG is very small. The supply of true, capturable waste methane (e.g., from uncontrolled landfills and wastewater treatment plants) amounts to less than 1% of current gas demand.[41] NRG—the developer behind a recent New York gas plant proposal—acknowledges that supply limitations render RNG infeasible. Specifically, NRG notes that the Fresh Kills Landfill on Staten Island was the largest landfill in the world prior to its closure in 2001 and produces only 62,500 cubic feet of methane per hour—enough to supply only 1.6% of NRG's proposed Astoria plant's needs operating at full load (3.9 million cubic feet per hour).[42]

B. Hydrogen Combustion: Neither Zero-Emissions Nor Feasible

1. Hydrogen combustion is not zero-emissions.

Combusting even pure hydrogen has GHG emissions, particularly when the gas leaks, as it is prone to do given its small molecule size.[43] Hydrogen itself is an indirect GHG with a global warming potential of 5.8 over 100 years.[44] On a shorter timescale, hydrogen's global warming potential is far higher: 19 to 38 on a 20-year timescale and 34 to 66 on a 10-year timescale.[45] Hydrogen combustion also generates NO_x emissions, a harmful air pollutant and indirect GHG in its own right[46] that in turn, contributes to the formation of ozone, particulate matter, and acid rain.[47] In fact, combusting hydrogen may produce NO_x emissions at six times the rate of combusting methane.[48]

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[40] Grubert, *supra* note 38, at 4.
[41] Saadat, *supra* note 39, at 9.
[42] AECOM, *Draft Supplemental Environmental Impact Statement: Astoria Replacement Project* 4-21 (2021), https://www.nrg.com/assets/documents/legal/astoria/00_2021/astoria-draft-dseis-06-30-2021.pdf.
[43] *Best Practices Overview: Hydrogen Leaks*, H2 Tools, https://h2tools.org/bestpractices/hydrogen-leaks (last visited May 4, 2022).
[44] *See, e.g.*, Richard Derwent et al., *Global Environmental Impacts of the Hydrogen Economy*, 1 Int'l J. Nuclear Hydrogen Prod. & Application 57, 64 (2006), https://www.researchgate.net/profile/David-Stevenson-13/publication/228402009_Global_environmental_impacts_of_the_hydrogen_economy/links/0912f510a9dedbc643000000/Global-environmental-impacts-of-the-hydrogen-economy.pdf.
[45] Ilissa B. Ocko & Steven P. Hamburg, *Climate Consequences of Hydrogen Leakage*, Atmospheric Chemistry & Physics 5 (preprint, discussion started Feb. 18, 2022), https://acp.copernicus.org/preprints/acp-2022-91/acp-2022-91.pdf.
[46] Gerhard Lammel & Hartmut Graßl, *Greenhouse effect of NO_X*, 2 Env't Sci. Pollution Rsch. Inst. 40 (1995), https://pubmed.ncbi.nlm.nih.gov/24234471/.
[47] *Basic Information about NO_2*, EPA, https://www.epa.gov/no2-pollution/basic-information-about-no2#Effects (last updated June 7, 2021).
[48] Lew Milford et al., *Hydrogen Hype in the Air*, Clean Energy Grp. (Dec. 14, 2020), https://www.cleanegroup.org/hydrogen-hype-in-the-air/ ("The bad news is that H2 combustion can produce dangerously high levels of nitrogen oxide (NOx). Two European studies have found that burning hydrogen-enriched natural gas in an industrial setting can lead to NOx emissions up to ***six times that of methane*** (the most common element in natural gas mixes). There are numerous other studies in the scientific literature about the difficulties of controlling NOx emissions from H2 combustion in various industrial applications. Even the Trump Administration's

As noted above, NO_x emissions leading to ozone formation is a major health concern for New Yorkers. The state's Department of Health has identified the reduction of air pollution, including ozone, as a key indicator to drive improvements in asthma rates and public health outcomes throughout the state. The New York State Prevention Agenda 2019-24 notes the "extensive evidence" linking ozone and fine particulate matter with respiratory and cardiovascular illness and death and establishes a goal to "reduce exposure to outdoor air pollutants," with an emphasis on vulnerable groups.[49]

Further, given that no commercially available power plant turbines can burn pure hydrogen, even power plants with access to green hydrogen will continue to burn a mixture of hydrogen and fossil gas. Burning just a 50/50 gas blend of green hydrogen and methane would still require industry to overcome significant obstacles. Hydrogen's energy density (one-third of fossil gas), molecular size (the smallest of all molecules), flammability, and flame speed (an order of magnitude faster than fossil gas), all pose challenges to retrofitting gas plants to run on hydrogen, which scale with increasing concentrations of hydrogen in the power plant's fuel blend.[50] Running a gas turbine on pure hydrogen also "requires different fuel delivery piping and components; different gas turbine controls, ventilation systems, and enclosures; and different selective catalytic reduction systems for NOx removal."[51] Many of these modifications are also needed for operation on high blends of hydrogen mixed with traditional gas.[52]

2. The limited supply of true green hydrogen precludes its use as a replacement for fossil gas power generation.

Globally, less than one percent of hydrogen is produced via electrolysis and only about 0.02% qualifies as green hydrogen (meaning that it is produced from electrolysis powered purely by renewable electricity).[53] Green hydrogen production is currently limited to demonstration projects, with projects "mostly in the single-digit MW scale."[54]

Instead, nearly all hydrogen within the United States is gray hydrogen, produced via steam methane reformation ("SMR") of fossil gas, an energy-intensive process emitting both GHGs and harmful co-pollutants including NO_x, fine particulate matter, carbon monoxide, and

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Department of Energy 'Hydrogen Program Plan' identifies H2 combustion as a significant problem." (emphasis in original)).

[49] N.Y. Dep't of Health, *New York's State Health Improvement Plan: Prevention Agenda 2019–2024*, at 72-73 (2021), https://www.health.ny.gov/prevention/prevention_agenda/2019-2024/docs/ship/nys_pa.pdf.

[50] Hydrogen Report at 24 (citing GE, *Hydrogen as a Fuel for Gas Turbines* 3-4 (2021), https://www.ge.com/content/dam/gepower-new/global/en_US/downloads/gas-new-site/future-of-energy/hydrogen-fuel-for-gas-turbines-gea34979.pdf).

[51] *Id.* at 24-25 (citing GE, *Hydrogen as a Fuel for Gas Turbines* 4 (2021)).

[52] *Id.* at 25.

[53] *Id.* at 7; Emanuele Taibi et al., Int'l Renewable Energy Agency, *Green Hydrogen Cost Reduction: Scaling up Electrolysers to Meet the 1.5°C Climate Goal* 18 (2020), https://irena.org/-/media/Files/IRENA/Agency/Publication/2020/Dec/IRENA_Green_hydrogen_cost_2020.pdf; *see also* Int'l Energy Agency, *Decarbonising Industry with Green Hydrogen* (Nov. 17, 2020), https://www.iea.org/articles/decarbonising-industry-with-green-hydrogen (defining "'green' hydrogen" as hydrogen produced "using electricity generated from renewable energy sources").

[54] Taibi et al., *supra* note 53, at 18.

volatile organic compounds.[55] And because electrolysis is so energy-intensive, hydrogen produced using grid-average electricity is even more carbon-intensive than hydrogen produced via SMR.[56]

Blue hydrogen, produced from fossil fuels but using carbon capture, is scarcely better than gray hydrogen in terms of GHG emissions. Professors Bob Howarth and Mark Jacobson recently determined that the carbon dioxide equivalent emissions from blue hydrogen were no more than 9-12% lower than gray hydrogen.[57] While blue hydrogen with carbon capture reduces (but does not eliminate) direct carbon dioxide emissions, it increases fugitive emissions of methane, a more potent greenhouse gas.[58] Professors Howarth and Jacobson also conducted several sensitivity analyses—for example, assuming low methane leakage rates or high carbon capture rates—and found these did not change their overall conclusion: "the greenhouse gas footprint of blue hydrogen, even with capture of carbon dioxide from exhaust flue gases, is as large as or larger than that of natural gas."[59] And in fact, even assuming the blue hydrogen was produced using 100% zero-emissions renewable energy, the study found that total GHG emissions were still nearly half those from combusting natural gas as a fuel.[60]

3. Generating sufficient quantities of green hydrogen would necessitate a massive and infeasible buildout of renewable generation.

The diversion of New York's currently limited supply of wind and solar energy towards the energy-intensive production of green hydrogen for combustion at gas plants would make it significantly harder to meet the CLCPA's mandate for 70% renewable generation by 2030 and necessitate a massive and infeasible buildout of renewable generation capacity:

> Meeting the global demand for green hydrogen that one industry group predicts in 2050 could require the build out of solar resources that cover more than 81,250 square miles. This is a land area larger than the state of Minnesota. Using green hydrogen in segments that can use direct electricity would exacerbate the challenge of deploying sufficient renewable resources by wasting renewable capacity on energy-intensive electrolysis.[61]

This is especially true as demand for New York's limited renewable energy supply will grow as electrification becomes more widespread throughout the state and as the agencies work to meet the requirement for zero-emissions electricity by 2040.[62]

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[55] Hydrogen Report at 10.
[56] *Id.* at 13.
[57] Robert W. Howarth & Mark Z. Jacobson, *How Green is Blue Hydrogen?*, *Energy Sci. & Eng'g* 1676, 1682-83 (2021), https://onlinelibrary.wiley.com/doi/epdf/10.1002/ese3.956.
[58] *Id.* at 1682.
[59] *Id.* at 1683-84.
[60] *Id.* at 1684-85.
[61] Hydrogen Report at 17 (citation omitted).
[62] *See* Julie McNamara, *What's the Role of Hydrogen in the Clean Energy Transition?*, Union of Concerned Scientists (Dec. 9, 2020), https://blog.ucsusa.org/julie-mcnamara/whats-the-role-of-hydrogen-in-the-clean-energy-transition; *see also* E3 ("Pathways to Deep Decarbonization in New York State") at 29 (June 24, 2020), https://climate.ny.gov/-/media/Project/Climate/Files/2020-06-24-NYS-Decarbonization-Pathways-Report.pdf (describing increased electricity demand as building and transportation electrification expands).

Repowering even a single gas peaker plant with green hydrogen would require thousands of megawatts of new renewable generation. According to gas turbine manufacturer GE, which has created a calculator to estimate renewable capacity required to power its turbines with "green" hydrogen, using today's technology, it would take over 1,800 MW of renewables operating at a 100% capacity factor to generate the "green" hydrogen necessary to power a single 437 MW GE H-Class 7HA.03 turbine operating at a 30% capacity factor, as has been proposed by NRG to build in Astoria, Queens.[63] Because renewable generation resources typically operate at a lower capacity factor, even greater renewable capacity would be required to fully power such a facility with green hydrogen. For a 437 MW peaking turbine, GE's calculator discloses that "[y]ou will need the equivalent of 2408—1.5 MW wind turbines to create the required energy for your hydrogen infrastructure."[64] *In other words, it would require more than 8 times the capacity of wind generation to produce the green hydrogen required to power a turbine operating only at a 30% capacity factor!*

4. Other practical considerations render hydrogen combustion infeasible.

Finally, even if green hydrogen were actually zero-emissions and available in sufficient quantities, its high cost, risk of leakage, and tendency to corrode pipeline infrastructure still render hydrogen combustion infeasible as a power generation source.

Hydrogen—and especially green hydrogen—is prohibitively expensive. The consultant for Danskammer Energy, which has proposed to construct a new gas plant in the Hudson Valley, concedes that "[a]t current estimates, the cost of hydrogen in 2040 is $45/MMBtu ["Metric Million British thermal unit"] (in nominal terms) for up to 30tBtu of fuel."[65] In contrast, the Energy Information Administration ("EIA") 2022 Annual Energy Outlook projects 2040 natural gas costs below $4/MMBtu (in 2021 dollars).[66] And because using renewable electricity to power electrolysis is energy inefficient—approximately 20 to 40% of the energy is lost—green hydrogen will always be much more expensive than renewable electricity.[67]

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[63] *Hydrogen and CO2 Emissions Calculator for Gas Turbines*, General Electric, https://www.ge.com/gas-power/future-of-energy/hydrogen-fueled-gas-turbines/hydrogen-calculator (last visited May 4, 2022). These figures were derived from use of the cited calculator and based on NRG's proposed GE H-Class 7HA.03 turbine and NRG's permitted 30 percent capacity factor. *See* AECOM, *Draft Supplemental Environmental Impact Statement: Astoria Replacement Projec*t 3-14 (2021), https://www.nrg.com/assets/documents/legal/astoria/00_2021/astoria-draft-dseis-06-30-2021.pdf.

[64] *Hydrogen and CO2 Emissions Calculator for Gas Turbines*, General Electric, https://www.ge.com/gas-power/future-of-energy/hydrogen-fueled-gas-turbines/hydrogen-calculator (last visited May 4, 2022) (choose "7HA.03" from question 1 dropdown; choose "simple" from question 2 dropdown; drag to "peaker" on question 3 bar; drag to "100%" on question 4 bar; choose "US New York(RGGI)" from question 5 dropdown; then follow the "Calculate my decarbonization savings" hyperlink; under results, find the "Electricity Required" section.).

[65] ICF, *Supplemental Greenhouse Gas Analysis of the Danskammer Energy Center* 11 (2020), https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={6C430CE8-D270-4D09-A4A0-031523905E63}.

[66] EIA, *Annual Energy Outlook 2022: with Projections to 2050*, at 17, 30 (2022), https://www.eia.gov/outlooks/aeo/pdf/AEO2022_Narrative.pdf.

[67] Hydrogen Report at 16; Energy Transitions Commission*, Making the Hydrogen Economy Possible: Accelerating Clean Hydrogen in an Electrified Economy*, at 22 n.42 (2021), https://www.energy-transitions.org/publications/making-clean-hydrogen-possible/.

And as a smaller molecule than methane, hydrogen has a propensity for leakage at perhaps three times the rate of fossil gas.[68] Its small size also enhances diffusion within the lattice structure of pipeline material, leading to embrittlement.[69] Researchers studying the potential for leakage and embrittlement of hydrogen in steel pipes found that the "numerical obtained results have shown that using pipelines designed for natural gas conduction to transport hydrogen is a risky choice" and recommended that the "replacement of the transported gas [with hydrogen] has to be preceded by feasibility studies taking in account both aspect of fatigue of material and pipeline failure due to overpressure and also due to hydrogen embrittlement."[70]

Hydrogen's corrosive and explosive tendencies, the need for higher pipeline pressure, and the risk of leakage could create serious safety issues.[71] These problems are compounded in New York due to its aging pipeline infrastructure. In New York, for example, in 2020, there were 18,330 gas leaks reported, or about 370 gas leaks per 1,000 miles of pipeline.[72] This crumbling infrastructure cannot handle an influx of a far more corrosive and leak prone fuel without significant costs to New York's taxpayers and to the environment.

* * *

Rather than invest in the false solution of RNG and hydrogen combustion, NYSERDA should instead direct its support and funding toward the aggressive pursuit of true, clean, long-duration storage solutions consistent with a zero-emissions grid.

V. Conclusion

In summary, the FSP should include recommendations to:

- Prohibit new gas generation with only the narrowest exception for unavoidable and NYISO and local transmission operator confirmed reliability needs.
- Proactively and deliberately phase out existing gas generation with a priority focus on reducing emissions and closing plants in disadvantaged communities.

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[68] Justin Mikulka, *Decoding the Hype Behind the Natural Gas Industry's Hydrogen Push*, Desmog (Jan. 14, 2021), https://www.desmog.com/2021/01/14/decoding-hype-behind-natural-gas-industry-hydrogen-push/ (citing M. W. Melaina et al., NREL; *Blending Hydrogen into Natural Gas Pipeline Networks: A Review of Key Issues* (2013)).
[69] Zahreddine Hafsi et al., *Hydrogen Embrittlement of Steel Pipelines during Transients*, 13 Procedia Structural Integrity 210, 210 (2018), https://www.sciencedirect.com/science/article/pii/S2452321618302683#.
[70] *Id.* at 210, 217.
[71] Mike Soraghan, *Hydrogen Could Fuel U.S. Energy Transition. But is it Safe?*, E&E News (Aug. 20, 2021), https://www.eenews.net/articles/hydrogen-could-fuel-u-s-energy-transition-but-is-it-safe/; P.K.A. Verdonck & M. Kammoun, *Is Hydrogen a Viable Alternative to Lithium Under the Current Energy Storage Regulatory Framework?*, Lexology (Jan. 27, 2021), https://www.lexology.com/library/detail.aspx?g=e908442d-8b33-462c-ae23-9c1dcb917127.
[72] U.S. Dep't of Transp., Pipeline and Hazardous Materials Safety Admin., *Gas Distribution, Gas Gathering, Gas Transmission, Hazardous Liquids, Liquefied Natural Gas (LNG), and Underground Natural Gas Storage (UNGS) Annual Report Data*, Gas Distribution Annual Data - 2010 to Present (2020) [Workbook], https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/data_statistics/pipeline/annual_gas_distribution_2010_present.zip.

- Accelerate the installation of renewables through continued refinements to the ORES siting and NYSERDA RFP processes and by proposing legislation to ensure the timely processing of renewable developers' interconnection requests.
- Invest in transmission and distribution system upgrades, with a focus on ameliorating impacts to disadvantaged communities.
- Expand deployment of battery storage and fund research and development of zero-emission long duration storage technologies.
- Reject and discontinue expenditures on the false solutions of RNG and hydrogen combustion, which are neither zero-emissions nor feasible at scale.

Sincerely,

Acadia Center
All Our Energy
Alliance for a Green Economy
Brookhaven Landfill Action and Remediation Group
Catskill Mountainkeeper
Clean Air Coalition of WNY
Climate Reality Project, Capital Region NY Chapter
Climate Reality Project, Finger Lakes Greater Region NY Chapter
Climate Reality Project, Hudson Valley and Catskills Chapter
Climate Reality Project, Long Island Chapter
Climate Reality Project, NYC
Climate Reality Project, Westchester NY Chapter
Climate Reality Project, Western New York Chapter
Climate Solutions Accelerator of the Genesee-Finger Lakes Region
Committee to Preserve the Finger Lakes
Community Food Advocates
CUNY Urban Food Policy Institute
Earthjustice
Environmental Advocates NY
Fossil Free Tompkins
Gas Free Seneca
Green Education and Legal Fund
HabitatMap
Hotshot Hotwires
Long Island Progressive Coalition
Nassau Hiking & Outdoor Club
Network for a Sustainable Tomorrow
New Clinicians for Climate Action
North Brooklyn Neighbors
NY Renews
People of Albany United for Safe Energy
PUSH Buffalo
Riverkeeper Inc.
Roctricity
Seneca Lake Guardian
Sierra Club
South Shore Audubon Society
Sustainable Finger Lakes
University Network for Human Rights
UPROSE
WE ACT for Environmental Justice