Comments from the New York City Environmental Justice Alliance, THE POINT CDC, UPROSE, Chhaya CDC, and Clean Energy Group, together with Sierra Club, New York Lawyers for the Public Interest, and Earthjustice regarding the Draft Title V Air Permit and the Draft Supplemental Environmental Impact Statement for the Astoria Replacement Project.

September 13, 2021

Submitted to New York State Department of Environmental Conservation
***via email*: comment.nrgastoriagas@dec.ny.gov**

Table of Contents

Appendices

Appendix A: Rachel Wilson & Erin Camp, Synapse Energy Econs., *The Proposed New Astoria Combustion Turbine Generator and New York State's Clean Energy Future* (Sept. 2021).

Appendix B: Bryndis Woods & Elizabeth A. Stanton, Applied Econs. Clinic, *Comments on Astoria Gas Turbine Power LLC's Proposed Gas-Fired Combustion Turbine* (Sept. 2021).

Appendix C: Stephen Metts, Geospex LLC, *Environmental Justice Findings Statement: NRG Astoria Replacement Project* (Sept. 2021).

Appendix D: Elementa Eng'g, *Replacing Peaker Plants: DER Strategies for Sunset Park, Gowanus, and Bay Ridge* (2021)

Earthjustice and New York Lawyers for the Public Interest, on behalf of the New York City Environmental Justice Alliance, THE POINT CDC, UPROSE, Chhaya CDC, and Clean Energy Group, together with Sierra Club, respectfully submit the following comments jointly addressing the Draft Title V Permit and the Draft Supplemental Environmental Impact Statement (DSEIS) for the Astoria Replacement Project (Proposed Project). These comments focus on the issues presented by the New York State Department of Environmental Conservation (DEC) regarding determinations it must make under New York's Climate Leadership and Community Protection Act (CLCPA or Climate Act), as stated in its Notice of Complete Application dated June 30, 2021:

> [T]he Department also seeks comments on the proposed [ ] Project's compliance with the Climate Act, including: (1) whether the proposed Replacement Project would be inconsistent with or would interfere with the attainment of the Statewide GHG emission limits; (2) the potential need or justification for the proposed [] Project; (3) appropriate alternatives or GHG mitigation measures to be required; and (4) the adequacy of the SDEIS [sic] in assessing the proposed [] Project's consistency with the Climate Act and reviewing the potential impacts from GHG emissions.[1]

The DEC must deny the permit before it because the Proposed Project is wholly inconsistent with the CLCPA and will interfere with attainment of its GHG emission limits, and NRG has not set forth a need, justification, or any GHG mitigation measure sufficient to allow approval of the Project despite that inconsistency. DEC must also deny the permits under CLCPA Section 7(3) because of the Proposed Project's disproportionate impacts on disadvantaged communities. Finally, as set forth below, not only does the DSEIS not support a finding that the project complies with the CLCPA, but it is also marred by numerous flaws that render it inadequate and further undercut any potential reliance on it to make a supportive CLCPA determination on the permits.

To achieve a zero-emissions electric sector by 2040 as required by the CLCPA, New York cannot continue to build new fossil fuel power plants like the Proposed Project. Instead, the State must begin now to phase out its fossil fuel generation and replace it with renewables and storage, and smart investments in transmission. The State is already taking steps in this direction. And indeed, recently approved transmission upgrades, as well as offshore wind projects and battery storage slated to come online in the coming years, mean that the Project is not needed to meet reliability demands locally or in Zone J.

NRG tacitly admits the project is not necessary to meet existing or near-term demand, and instead proposes a slew of other purported "justifications" for the project. As set forth below, these purported justifications are legally insufficient, overstated, lack support, and should be

---

[1] *ENB Region 2 Notices 6/30/2021: Notice of Complete Application, Availability of Draft Permits, Announcement of Public Comment Period, Acceptance of Draft Supplemental Environmental Impact Statement, and Intent to Hold a Public Hearing*, New York State Department of Environmental Conservation (June 30, 2021), https://www.dec.ny.gov/enb/20210630_not2.html. ("Notice of Complete Application").

rejected. Additionally, in its flawed DSEIS NRG attempts to hide the Proposed Project's disproportionate adverse impacts on disadvantaged communities currently living with elevated levels of air pollution and overburdened by fossil fuel combustion: another reason under the CLCPA that DEC must deny the permits. NRG also puts forth vague and unsupported claims about a future switch to hydrogen or RNG fuel, which is infeasible for numerous reasons, would not result in zero emissions as required by the CLCPA, and should not be relied upon in the CLCPA analysis.

Allowing the existing Astoria Gas Turbines facility to retire as planned in 2023 under the State's new NOx emissions limits *without* replacing it with a new fossil fuel facility is a feasible alternative to the Proposed Project that would be consistent with the CLCPA: it would be a step towards reducing air pollution in disadvantaged communities and phasing out fossil fuel reliance while building a more renewable, zero-emissions electric grid. Denying the permits for the Proposed Project is the only option consistent with State climate law. The Proposed Project presents DEC with a fundamental choice: Will it ensure the State's Climate Law is meaningfully implemented by denying the Title V permit, as required by the law, and facilitating the State's ability to achieve the CLCPA-mandated zero-emissions electricity sector by 2040? Or will the Department ignore the plain language and clear intent of the Climate Law, the urgency of the climate crisis, and the facts as applied to the Proposed Project, and allow an unnecessary power plant to be built that will lock in GHG emissions until 2040 and possibly beyond, setting a terrible precedent for other companies rushing to build ill-considered fossil fuel projects? For the reasons set forth below, DEC must deny the permits under CLCPA Section 7, and it has an ample record and strong legal grounds to do so.

I. THE PROPOSED PLANT IS INCONSISTENT WITH CLCPA EMISSIONS REDUCTION MANDATES AND A ZERO-EMISSIONS ELECTRICITY SECTOR.

The first and most important consideration when reviewing permits, approvals, or other decisions under CLCPA Section 7(2) is whether the agency decision is "inconsistent with or will interfere with the attainment of the statewide greenhouse gas emissions limits established in [the CLCPA]."[2] In its Notice of Complete Application, DEC recognized that "[B]ased on the information currently available, it appears that the proposed Replacement Project would be inconsistent with or would interfere with the attainment of the Statewide GHG emission limits established in the Climate Act. Environmental Conservation Law Article 75; 6 N.Y.C.R.R. Part 496."[3] DEC's initial observation is correct – NRG's proposed new gas plant in Astoria is inconsistent with the State Climate Law.

[2] CLCPA § 7(2), S.B. 6599, 242d Sess. (N.Y. 2019), https://legislation.nysenate.gov/pdf/bills/2019/S6599.

[3] Notice of Complete Application.

A. The CLCPA Requires a Zero-Emissions Electricity Sector by 2040 and Prioritization of Emission Reductions in Disadvantaged Communities.

Recognizing that "[c]limate change is adversely affecting economic well-being, public health, natural resources, and the environment of New York," the state legislature enacted the CLCPA to strengthen New York's statewide mandates for both emissions reductions and the adoption of renewable energy, setting some of the country's most ambitious targets to date.[4] The CLCPA mandates that New York obtain 70 percent of its power from renewable energy resources by 2030 and mandates 100 percent zero emissions electricity by 2040.[5] The law also establishes specific benchmarks for the adoption of renewables, including nine gigawatts (GW) of offshore wind by 2035, six GW of solar by 2025, and three GW of energy storage by 2030.[6] Across all sectors, the CLCPA limits greenhouse gas emissions to 60 percent of 1990 levels by 2030 and 15 percent of 1990 emissions by 2050 (with net zero emissions achieved through offsets to projects outside the electric sector).[7]

The CLCPA sets forth a process for the State to determine how to achieve the mandates created in the law, and to establish enforceable measures ensuring emissions reductions from specific sources and sectors. By 2024, DEC must promulgate binding regulations "to ensure compliance with the statewide emissions reduction limits."[8] These regulations shall "[i]nclude legally enforceable emissions limits, performance standards, or measures or other requirements to control emissions from greenhouse gas emission sources."[9] Similarly, the CLCPA requires the New York Public Service Commission (PSC) to establish programs by 2024 to ensure procurement of nine GW of offshore wind by 2035, six GW of solar by 2025, and three GW of energy storage by 2030.[10] In promulgating regulations and establishing the programs described above, the CLCPA explicitly requires the State to incorporate equity by, for example, prioritizing reduction of harmful co-pollutants in disadvantaged communities and ensuring that energy storage projects reduce the use of combustion-fired peaking facilities located in or near these communities.[11]

To ensure State actions help achieve GHG emissions reduction mandates rather than undermine them, particularly during the interim period before these regulations and programs are in effect, the state legislature further mandated that all state agencies—including DEC—evaluate each permit, license, or other administrative decision through the lens of the CLCPA. Specifically, CLCPA Section 7(2) requires all state agencies to "consider whether [their] decisions are inconsistent with or will interfere with the attainment of the statewide greenhouse gas emissions limits established in [the CLCPA]." For each inconsistent or interfering decision,

---

[4] CLCPA § 1.

[5] *Id.* § 4 (codified at N.Y. P.S.L. § 66-p(2)).

[6] *Id.* (codified at N.Y. P.S.L. § 66-p(5)).

[7] *Id.* §§ 1(4) & 2 (codified at NY. E.C.L. §§ 75-0107(1), 75-0109(4)(a)–(b), (f)).

[8] N.Y. E.C.L. § 75-0109(1).

[9] N.Y. E.C.L. § 75-0109(2)(b).

[10] N.Y. P.S.L. § 66-p(5).

[11] *See, e.g.*, N.Y. E.C.L. § 75-0109(3)(d); N.Y. P.S.L. § 66-p(7)(a).

the agency "shall provide a detailed statement of justification as to why such limits/criteria may not be met, and identify alternatives or greenhouse gas mitigation measures to be required where such project is located."[12] In the context of a proposed fossil-fuel fired power plant, a CLCPA justification requires a demonstration that the power plant is necessary for grid reliability, and a further demonstration that the reliability need cannot be addressed through any combination of CLCPA-consistent resources such as renewable energy, energy storage, demand response, energy efficiency, and transmission. An alternatives analysis for the purposes of the CLCPA must therefore look at the full range of possible alternatives that, together, could meet any demonstrated need for the project, rather than a limited examination of alternatives the company proposing the project could complete, in isolation, at a given site. Finally, given the CLCPA's aggressive GHG emissions reduction targets on a short timeline, requiring immediate reductions rather than additions of new sources of emissions, mitigation under the CLCPA should effectively zero out a project's new GHG emissions and cannot simply incrementally reduce them. Since New York will need to operate a fully reliable zero emissions grid by 2040, plans to simply retire a facility prior to that year are inadequate to mitigate the challenges that adding new fossil generation to the grid today create. Further, in the context of the electric generation sector, mitigation cannot include carbon offsets, which under the CLCPA are prohibited within the sector.

Finally, the CLCPA requires that agencies must also ensure that their decisions "shall not disproportionately burden disadvantaged communities. . . ."[13] Indeed, agencies must affirmatively "prioritize reductions of greenhouse gas emissions and co-pollutants" in such communities. The expected retirement of NRG's existing Astoria Gas Turbines facility in 2023 under new regulations designed to limit harmful NOx pollution from aging peaking power plants, without the introduction of a new gas-fired power plant at the site to "replace" it, would be exactly in line with this provision of the CLCPA.

B. A New Gas Power Plant Will Interfere with the Transition to a Zero-Emissions Electricity Sector.

New gas generation is inconsistent with the CLCPA and will frustrate efforts to reduce state GHG emissions and transition to a zero-emissions electricity sector. As stated above, the CLCPA requires 70 percent renewable energy by 2030 and zero emissions electricity by 2040. Neither electricity sector mandate can be met by adding additional gas generation. Despite NRG's claims of net GHG reductions, which should not be relied upon as discussed below in section II(B), the Proposed Plant requests permission to pollute up to 700,000 tons of GHG emissions per year. Yet the actual or maximum GHG emissions should not be the only consideration with regards to CLCPA consistency: regardless of emissions, construction of the plant will interfere with net zero sector because it will frustrate development of new resources.

[12] CLCPA § 7(2)

[13] *Id.* § 7(3).

In 2020, a mere 27.4 percent of statewide electric generation came from renewables, while 43.4 percent of generation came from fossil plants.[14] On a capacity basis, the situation is even worse, with the State relying on gas plants for more than half its electric capacity.[15] The State therefore must substantially *decrease*—not increase—reliance on fossil fuels in order to decrease greenhouse gas emissions and achieve 70 percent renewable generation by 2030 and zero emissions electricity by 2040.

The New York Independent System Operator (NYISO) projects that statewide electric demand will decrease slightly between 2020 and 2030.[16] As such, existing fossil resources must retire and/or significantly curb generation 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 percent renewable generation and ensure that overall statewide emission reductions reach 40 percent by 2040.

And new gas is flatly incompatible with a zero-emissions electricity 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 such as those proximate to the Proposed Project, is a core goal of the CLCPA.[17]

Nor would a commitment to retire any new plant 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. 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 peaker 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.

---

[14] *See* New York Independent System Operator ("NYISO"), *Gold Book: 2021 Load & Capacity Data Report* 73 (2021), https://www.nyiso.com/documents/20142/2226333/2021-Gold-Book-Final-Public.pdf/b08606d7-db88-c04b-b260-ab35c300ed64.

[15] *See New York State Profile and Energy Estimates*, U.S. Energy Info. Admin., https://www.eia.gov/state/analysis.php?sid=NY#20 (last updated Sept. 17, 2020).

[16] *See* 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* 34 (2020), https://www.nyiso.com/documents/20142/17044621/LT-Forecast-Update.pdf.

[17] *See*, *e.g.*, N.Y. E.C.L. § 75-0109(3)(d) (DEC must, in promulgating regulations, prioritize reduction of GHG & co-pollutant emissions in disadvantaged communities).

Rather than move forward with new gas generation that locks in greenhouse gas emissions for many years to come, the State must move aggressively toward a true zero emissions grid, pairing increased renewables and energy efficiency with transmission solutions and load flexibility resources like demand response and battery storage that reduce and/or shift peak demand. The Power Generation Advisory Panel to the State Climate Action Council (CAC) recommended that the Scoping Plan include measures to facilitate the rapid expansion of demand response and energy efficiency, particularly within constrained areas like Zone J and to benefit low-income households and people in disadvantaged communities.[18] It also recommended buildout of distributed energy resources and investment in research to advance long-duration storage technology.[19] While the Panel recommendations highlighted future challenges of ensuring reliability in a zero-emissions grid, it did not include in its recommendations to the Climate Action Council any support for constructing new fossil fuel generation. To ensure a reliable and flexible zero-emissions grid, the State should focus on building a mix of renewable generation resources, upgrading transmission, incorporating energy storage, and reducing demand through energy efficiency and demand response.[20] Extending the use of and reliance on fossil fuel generation until 2040 by building the Proposed Project will hold the State back in making the necessary progress on all these fronts to ensure a zero-emissions electricity sector.

II. NO JUSTIFICATION EXISTS FOR APPROVING THIS PLANT, WHICH IS INCONSISTENT WITH THE CLCPA.

Under Section 7(2), if DEC intends to approve a permit for a project that is inconsistent with or interferes with attainment of the CLCPA's statewide GHG emissions reductions mandates, it "shall provide a detailed statement of justification as to why such limits/criteria may not be met..." As DEC indicated in its Notice of Complete Application seeking comments on "the potential need or justification" for the Proposed Project, to comply with the "justification" requirement, agencies must provide a detailed statement showing that the project is necessary and explaining why the project is unable to meet the specified need without interfering with CLCPA emissions limits.

---

[18] *See Power Generation Advisory Panel*, N.Y. Climate Act, https://climate.ny.gov/-/media/CLCPA/Files/2021-05-03-Power-Generation-Advisory-Panel-Presentation-Slides.pdf 42–45 (last updated May 3, 2021).

[19] *Id*. at 35–38, 69–70.

[20] Rachel Wilson & Erin Camp, Synapse Energy Econs., *The Proposed New Astoria Combustion Turbine generator and New York State's Clean Energy Future* 12 (Sept. 2021), attached hereto as Appendix A. ("Synapse Report").

NRG puts forward five purported "justifications" that it claims would allow DEC to approve the permits even if the Project is inconsistent with or interferes with the attainment of statewide GHG emissions limits. Specifically, it claims the project is justified because it:

> 1. addresses reliability shortfalls in New York City;
> 2. reduces costs for electricity customers in New York City by providing economic capacity (without a ratepayer guaranteed support contract);
> 3. displaces higher emitting sources such that it will result in an overall net reduction in air emissions in the New York City area, including a reduction in statewide GHG emissions;
> 4. facilitates the integration of renewable energy resources by providing long-term, long duration backup power; and
> 5. preserves the Site's black start capability to facilitate electrical system restoration in New York City following major power outages.[21]

Each of these purported justifications is based on flawed analyses, unsupported projections, mischaracterization of the facts, or other arbitrary reasoning that DEC should not accept, as set forth below.

A. Transmission Improvements Obviate Any Purported Reliability Justification for the New Gas Plant.

NRG cannot claim that the Proposed Project is justified under Section 7(2) for reliability reasons, despite its inconsistency with the CLCPA. A new gas-fired power plant is simply not necessary to serve either short-term or long-term power generation reliability needs. Transmission upgrades within Zone J have been approved that address short-term local reliability and longer-term bulk power needs. New York State regulators have specifically stated that NRG's proposed gas plant at this site is not necessary because of those transmission upgrades. In addition, there are proposed transmission projects in the state-approval queue that will further address long-term local and bulk reliability needs.

i. ConEdison's Transmission Reliability and Clean Energy ("TRACE") Projects Obviate Any Purported Near-Term Local Reliability Need for the Proposed Project.

In April 2021, the New York Public Service Commission ("NY PSC") approved Con Edison's petition to proceed with three Transmission Reliability and Clean Energy ("TRACE") Projects – one in Queens, one in Brooklyn, and one in Staten Island – because they each address projected reliability needs stemming from the anticipated retirement of a number of Downstate peaker plants under regulations governing emissions of NOx from combustion turbines during the ozone season. 6 N.Y.C.R.R. Subpart 227-3. The TRACE Projects will unbottle local

[21] AECOM, *Draft Supplemental Environmental Impact Statement: Astoria Replacement Project* 3-64 (June 2021), https://www.nrg.com/assets/documents/legal/astoria/00_2021/astoria-draft-dseis-06-30-2021.pdf. ("DSEIS").

transmission into key transmission load areas and serve as an offramp for approximately 900 MW of additional power on the transmission system into the local system in Zone J.[22]

The TRACE Projects implement CLCPA mandates "by enabling the retirement of downstate fossil fuel-fired 'peaking' generation units by solving the associated reliability needs thus created without the addition of any new fossil-fueled power plants," as well as by enabling additional renewable energy to feed into these constrained load pockets.[23] Indeed, the Commission's press release about the approval of the TRACE Projects stated that the additional transmission capacity permitted "[t]he retirement of downstate fossil fuel-fired peaking generation units *without the addition of any new fossil-fueled power plants*."[24]

One of the three TRACE Projects is the Rainey-Corona Feeder Line, which will add approximately 300 MW of transfer capability to the immediate area of the Proposed Project.[25] The so-called "Rainey to Corona PAR-Controlled Feeder Project" is:

> a 6-mile long, 345 / 138 kV PAR controlled underground feeder. Con Edison plans to place this project in service by Summer 2023. … The need date coincides with the first deadline by which peaking units must comply with the Peaker Rule's new emissions standards… The new feeder will electrically connect the Company's 345 kV Rainey substation with its Corona 138 kV substation, increasing transfer capability by approximately 300 MW to solve the reliability need.[26]

The three TRACE Projects also include the creation of "open pathways ('off-ramps') into constrained Transmission Load Areas, a pre-requisite to being able to deliver renewable generation."[27] The off-ramps will "connect and fully deliver energy supplies from new resources such as offshore wind and new upstate renewable generation" as well as "provide sufficient capability to address potential future load growth from electrification and improve resilience on the Company's local system by providing redundancy to existing assets."[28] As discussed further

---

[22] Order Regarding Transmission Investment Petition ("PSC TRACE Order"), *Proceeding on Motion of the Commission as to the Rates, Charges, Rules & Regulations of Consolidated Edison Company of New York, Inc. for Electric Service* ("TRACE Proceeding"), Case No. 19-E-0065 (N.Y. Pub. Serv. Comm'n Apr. 15, 2021) (Dkt. No. 300); Petition of Consolidated Edison Company of New York, Inc. for Approval to Recover Costs of Certain Transmission Reliability & Clean Energy Projects at 17 ("ConEd TRACE Petition"), Case No. 19-E-0065 (N.Y. Pub. Serv. Comm'n Dec. 30, 2020) (Dkt. No. 268), at 14.

[23] ConEd TRACE Petition at 3.

[24] Press Release, N.Y. Pub. Serv. Comm'n ("PSC"), *PSC Approves $800 Million Investment to Maintain* and *Improve Reliability, Achieve Climate-Change Goals, Enhance Resiliency of NYC Transmission Grid* (Apr. 15, 2021), (emphasis added) https://www3.dps.ny.gov/pscweb/webfileroom.nsf/ArticlesByCategory/8822278FE4329E07852586B80055A831/$File/pr21040.pdf?OpenElement.

[25] ConEd TRACE Petition at 14.

[26] ConEd TRACE Petition at 17 & n.24.

[27] ConEd TRACE Petition at 4.

[28] ConEd TRACE Petition at 15.

below, there are several pending thousand-plus MW transmission proposals under State review as part of Tier 4 that plan to interconnect in Queens at Astoria or Rainey.

The TRACE Projects address local reliability needs and also help address bulk reliability needs (although bulk transmission needs are fully addressed by a separate Con Edison operating procedure, as discussed in the following section). The TRACE Projects "will potentially contribute to reducing the New York Bulk Power Transmission Facilities (BPTF) needs also caused by the Peaker Rule identified by the NYISO in the [Reliability Needs Assessment] beginning in year 2025, thereby helping to facilitate the resolution of those BPTF needs."[29] By providing additional transfer capability (about 900 MW) for renewable generation supplies, located on the bulk system to access the load connected to the local system, "the TRACE Projects will establish the off-ramps necessary for a reliable and clean State energy system."[30] It is also worth noting that the NY PSC provided expedited approval to the TRACE projects so that Con Edison could immediately commence the engineering, design and construction work.[31] NRG's argument that its Proposed Project is needed because there is a theoretical possibility that the TRACE projects will not be completed in time and that reliability may still be a concern lacks any supporting evidence and should be wholly disregarded. Moreover, as discussed below, even the potential for a slight delay in completion of the Rainey-Corona Feeder Line would not justify construction of a 30-year fossil fuel asset.

ii. The New York Independent System Operator Also Selected a Con Edison Regulated Transmission Solution to Meet Near-Term Bulk Reliability Needs Arising from the Retirement of NRG's Existing Plant.

The anticipated retirement of New York City combustion turbines is also projected to result in bulk transmission system reliability needs. Beyond the TRACE Projects, NYISO has approved additional reliability solutions to address those bulk system needs as well, fully obviating the need for the Proposed Project. NYISO selected Con Edison's proposed transmission upgrades as a Short-Term Reliability Solution to address the 2020 Quarter 3 STAR Near-Term Reliability Needs for the bulk power transmission system in Queens.[32] Then, in March 2021, NYISO analyzed and modeled both local and bulk reliability needs and concluded

---

[29] ConEd TRACE Petition at 4, citing 4 n.9.

[30] ConEd TRACE Petition at 19.

[31] PSC TRACE Order; *see also* ConEd TRACE Petition at 28.

[32] *See* NYISO, *Draft Short-Term Reliability Process Report: 2023 Near-Term Reliability Need* 7 (2021), https://www.nyiso.com/documents/20142/19159155/2020%20Quarter%203%20Short%20Term%20Reliability%20Process%20Report.pdf; Laura Popa & Keith Burrell, NYISO, *2020-2021 Reliability Planning Process: Post-RNA Base Case Updates* 13–14, 18 (2021), https://www.nyiso.com/documents/20142/19415353/07%202020-2021RPP_PostRNABaseCaseUpdates.pdf/b81547bc-0411-7958-de0c-7b74244904a5; NYISO, *UPNY-ConEd Voltage Collapse Transfer Limits Report* (2021), https://www.nyiso.com/documents/20142/3692483/UPNY-ConEd-Voltage-Collapse-FINAL.pdf/774b2e84-4fa3-11ca-33a2-976b4f552429.

that if local voltage issues are addressed according to plan prior to 2025, there will no longer be a bulk transmission reliability issue in 2029.[33]

In contrast, NYISO rejected this Proposed Project as a solution, stating "the proposed market-based generation project is not a viable solution for [near-term reliability needs arising in 2023] at this time," citing failure to meet critical project milestones.[34] NRG does not dispute it, noting in its DSEIS that: "[t]o address the near term BPTF issues, the NYISO selected an alternative Con Edison operating procedure for summer 2023."[35]

iii. Tier 4 Transmission Projects Bringing Power from Upstate Obviate Any Purported Intermediate or Long-Term Need for this New Gas Plant.

Tier 4 of the Clean Energy Standard, which is nowhere addressed in NRG's DSEIS or supporting appendices, further undercuts any purported reliability need for the Proposed Project. In response to New York State's solicitation for infrastructure projects to "increase the penetration of renewable energy into New York City (NYISO Zone J)," NYSERDA received bids for approximately 7,500 megawatts of new renewable transmission capacity.[36] Each proposed project interconnects in Western Queens, into Sub-load pocket J2.

Regardless of which transmission project is chosen, the Queens load (and beyond) will be served by an additional 1,200 to 1,300 MW from outside of the region. All proposals will interconnect in western Queens. First, the Excelsior Connect proposal seeks to deliver 1,200 MW of electricity from Monticello, NY to Rainey substation in Queens.[37] Second, the Clean Path proposal seeks to deliver 1,300 MW of renewable energy from Delaware County, NY to the Rainey Substation in Queens by June 30, 2026.[38] Third, the Champlain Hudson Power Express proposal seeks to deliver 1,250 MW of energy from Québec to the Astoria Annex Substation located in Queens by December 2025.[39] Fourth, the Catskills Renewable Connector proposal

---

[33] *See* NYISO, *2020-2021 Reliability Planning Process: Post-RNA Base Case Updates – Dynamics* 10 (2021) https://www.nyiso.com/documents/20142/20255668/03%202020-2021RPP_PostRNABaseCaseUpdates_Dynamics.pdf/60e9535a-a5c2-2b43-7d24-97046c54575e; Popa & Burrell, *2020-2021 Reliability Planning Process: Post-RNA Base Case Update*.

[34] NYISO, *Draft Short-Term Reliability Process Report: 2023 Near-Term Reliability Need* at 7.

[35] DSEIS at 1-16.

[36] *Tier 4 – New York City Renewable Energy*, N.Y.S. Energy Rsch. & Dev. Auth. ("NYSERDA"), https://www.nyserda.ny.gov/All-Programs/Programs/Clean-Energy-Standard/Renewable-Generators-and-Developers/Tier-Four (last visited Sept. 8, 2021).

[37] *See* Avangrid Networks, T4RFP21-1, *Purchase of New York Tier 4 Eligible Renewable Energy Certificates* 19, 56–57 (2021), https://www.nyserda.ny.gov/-/media/Files/Programs/Clean-Energy-Standard/Tier4-Step-2-Bid-Submission-Response/Excelsior-Connect.pdf (Excelsior Connect Project Proposal).

[38] *See* Clean Path NY, T4RFP21-1, *Purchase of New York Tier 4 Eligible Renewable Energy Certificates (RECs)* 119–20, 129 (2021), .

[39] *See* Hydro-Québec & Transmission Dev., *Champlain Hudson Power Express Project Proposal* 5-2, 5-14 (2021), .

seeks to deliver 1,200 MW of energy from upstate to the Ravenswood Generating Station in Long Island City and is expected to be in-service in 2026.[40]

NRG, in its offshore wind interconnection analysis ("Alternative 8") analysis or any of its other alternatives analyses, references *none* of the upstate transmission lines being proposed to interconnect in Queens, either at the Astoria or the Rainey substations.[41] This glaring omission ignores 1,200 to 1,300 MW of renewable energy that will likely interconnect in Queens by 2025 or 2026. Failure to consider the implications of Tier 4 for the Proposed Project greatly undermines the validity and credibility of NRG's analyses.

The residents of Queens want new transmission bringing clean energy, not a new fossil-fuel-fired power plant. As a recent press article noted:

> Leaders from the [New York City Housing Authority ("NYCHA")] branch of the NAACP and more than 1,000 residents from western Queens NYCHA developments on July 12 endorsed the proposed Catskills Renewable Connector – a 1,200 MW renewable energy transmission line from upstate to New York City – saying it was the best opportunity for the state to prioritize environmental justice and protect the health of residents across the city.[42]

Not only is Tier 4 transmission interconnection far more consistent with the CLCPA than construction of a new gas-fired power plant, but it is also better supported by the local community.

iv. Transmission Projects Bringing Offshore Wind Power Further Obviate Any Purported Intermediate or Long-Term Need for this New Gas Plant.

In addition to the anticipated transmission of up to several thousand megawatts of Upstate or Canadian zero emission power into New York City via Tier 4, new transmission lines will bring thousands of megawatts of offshore wind generation to Zone J [43] further obviating the need for fossil fuel generation at the Proposed Project site.

---

[40] *See* Rise Light & Power, *Proposal for the Sale and Purchase of New York Tier 4 Eligible Renewable Energy Certificates* 1, 47, 97 (2021), https://www.nyserda.ny.gov/-/media/Files/Programs/Clean-Energy-Standard/Tier4-Step-2-Bid-Submission-Response/Catskills-Renewable-Connector.pdf (Catskills Renewable Connector Proposal); Press Release, Rise Light & Power, *Rise Plans Innovative Solution to Power 15% of NYC with Upstate Clean Energy* (May 12, 2021), https://riselight.com/rise-plans-innovative-solution-to-power-15-of-nyc-with-upstate-clean-energy/.

[41] DSEIS at § 4.0: Alternatives.

[42] *Residents Endorse Catskills Renewable Connector*, Queens Gazette, https://www.qgazette.com/articles/residents-endorse-catskills-renewable-connector/ (last updated July 21, 2021); *See also Western Queens Community Leaders Support Plan to Turn Big Allis into Renewable Energy Hub*, QNS, https://qns.com/2021/05/western-queens-community-leaders-support-plan-to-turn-big-allis-into-renewable-energy-hub/ (last updated May 19, 2021).

[43] *See Offshore Wind Projects*, NYSERDA, https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/Focus-Areas/NY-Offshore-Wind-Projects (last visited Sept. 8, 2021).

Under the CLCPA, New York is obligated to develop 9 GW of offshore wind by 2035,[44] all or nearly all of which is anticipated to be built offshore near New York City and Long Island. At least one offshore wind project, Equinor Wind US LLC's 1,230 MW Beacon Wind project, plans to interconnect to the Astoria Substation, bringing new renewable generation to the area in 2028.[45] Other points of interconnection elsewhere in the City from offshore wind transmission lines will also help resolve local and bulk Zone J constraints.

The State believes that these transmission lines connecting offshore wind to the city will "[d]eliver significant economic benefits to disadvantaged communities and support the responsible retirement of aging fossil-fuel power plants near key environmental justice communities."[46]

v. Renewable Rikers May Further Obviate the Need for Generation.

The Proposed Project is approximately 600 meters from Rikers Island. New York City recently passed legislation, the Renewable Rikers Act, that transitions Rikers Island away from Department of Corrections operations and commits the city to:

> study how building renewable resources paired with battery storage on the island can tie into the city's long-term energy plan to phase out fossil fuel-fired power plants established as part of the Climate Mobilization Act. According to a preliminary analysis by Sustainable CUNY, 35 acres of solar PV panels installed on Rikers Island would have a capacity of 14.6 megawatts and generate about 17.2 gigawatt hours annually. A mere 12 acres, or 4% of the island's total area, meanwhile, could potentially hold 1520 megawatts worth of storage, or about one half of the goal set for the entire state by the Climate Leadership and Community Protection Act.[47]

The City is conducting that study of renewable energy capacity on Rikers Island now. Should that study, which is expected to finish in 2022, find that a solar farm is feasible, "it could

---

[44] N.Y. P.S.L. § 66-p(5).

[45] *See* NYSERDA, *2020 Offshore Wind Solicitation Awards* (2020), https://www.nyserda.ny.gov/-/media/Files/Programs/offshore-wind/LSR-OSW-sol20proj-fs.pdf.

[46] *Offshore Wind Projects*, NYSERDA.

[47] Press Release, N.Y. Laws. for the Pub. Int. ("NYLPI"), *NYLPI Celebrates as City Council Passes The Renewable Rikers Act* (Feb, 12, 2021), https://www.nylpi.org/nylpi-celebrates-as-city-council-passes-the-renewable-rikers-act/; *See also 'An Important, Historic Moment': Mayor Signs Queens Councilman's Renewable Rikers Act into Law*, QNS, https://qns.com/2021/03/mayor-signs-queens-councilman-renewable-rikers-act-into-law/ (last updated Mar. 1, 2021); *Renewable Rikers Island*, N.Y.C. Env'tl Just. All., https://www.nyc-eja.org/wp-content/uploads/2020/12/Renewable-Rikers-Infographic-updated-7.17.20.pdf (last updated July 17, 2020).

eventually generate enough electricity to reduce reliance on and potentially close one or more of the city's fossil fuel-burning power plants."[48]

vi. NRG's Artificially Limited Alternatives Analysis Fails to Fully Account for Transmission's Role in Relieving Reliability Constraints in Queens.

As discussed above, DEC cannot rely on NRG's "Alternative 8" analysis in the DSEIS for its evaluation of whether this Proposed Project is justified because it does not reference any of the Upstate transmission lines being proposed to interconnect into Queens, either at the Astoria or the Rainey substations, through Tier 4. This glaring omission ignores 1,200 to 1,300 MW of renewable energy that will interconnect in Queens by 2025 or 2026. See sections II(A)(iii)-(iv).

Similarly, DEC should not rely on NRG's flawed analysis of potential transmission for its evaluation of whether this plant is justified, which also artificially limited its analysis to interconnection on the small site of the Proposed Project, ignoring nearby substations where transmission can, and is scheduled to, interconnect. In the analysis, NRG also ignores or dismisses the role of other potential transmission improvements in the area.

NRG's analysis of offshore wind transmission and interconnection is likewise flawed. NRG, in its "Alternative 8" analysis, purports to review the interconnection options for transmission lines connecting offshore wind energy to Astoria. NRG manages to both obscure the facts on the ground, as well as ignore both the transmission approved and the transmission proposed to serve the clean energy needs of the residents of Queens.

NRG first agrees that "the three onsite feeders connecting to Con Edison's Astoria East 138 kV substation could be considered for interconnection of an offshore wind project"[49] but also complains that any ability to expand the Astoria East 138 kV substation "is uncertain at best," [50] citing nothing – no feasibility studies or analysis.

---

[48] *How Rikers Island Became a Vehicle for Justice (Once It Started Shutting Down)*, Nat. Res. Def. Council, https://www.nrdc.org/stories/how-rikers-island-became-vehicle-justice-once-it-started-shutting-down (last updated May 03, 2021).

[49] DSEIS at 4-22

[50] *Id*. at 4-29.

NRG argues that the infrastructure on the specific 15-acre site it owns is insufficient to serve as an interconnection point, referring to only the red outlined site in the map below:

NRG fails to include in its analysis the existing or potential transmission interconnection infrastructure on the full 300-acre Astoria ConEd Complex (the blue outline), which includes both the Astoria East 138 kV substation and the NYPA Astoria Annex 345 kV substation. NRG's "Alternative 8" analysis also conspicuously ignores the off-ramp feeders in the TRACE projects described above that will facilitate the integration of the upstate and offshore wind lines within Zone J, as outlined in Sections II(A)(i)–(iv) above.

Throughout the entire "Alternative 8" analysis, NRG completely ignores the possible interconnection points nearby, the NYPA Astoria Annex 345 kV substation and the 345 kV Rainey substation just down the road. And as described above, it completely ignores at least four transmission project proposals currently under review that plan to interconnect at Rainey or at the Astoria Annex, if selected by New York State.

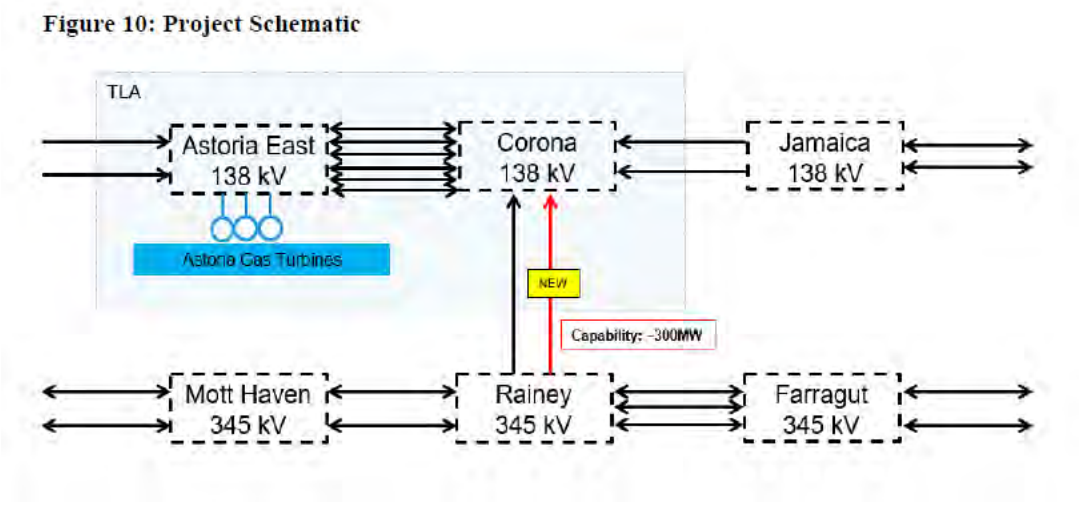
NRG also obscures the timelines in its "Alternative 8" analysis. Its analysis emphasizes that offshore wind transmission projects "are not expected to achieve commercial operation until the mid- to late-2020s," but neglects to clearly delineate the different projects planning to interconnect in Queens and their timelines together: (1) the Rainey-Corona Feeder Line is planned to be in operation by May 2023; (2) a selected upstate project is planned to be in operation by 2025 or 2026 depending on the project; and (3) the Beacon Wind project is planned to be in operation by 2028. See Section II(A)(iii), supra. This progressive addition of transmission capacity to sub load pocket J2 and beyond is designed to meet both near-term and long-term reliability needs. See Section II(A)(iii), supra.

NRG also references the Power Grid Study, which was a study designed to "identify distribution upgrades, local transmission upgrades, and bulk transmission investments that are

necessary or appropriate for the power grid for the State of New York"[51] in its "Alternative 8" analysis.[52] But in its discussion of the Power Grid Study, NRG omits the Upstate transmission lines planning to interconnect at the nearby Rainey substation, the proximity of the Rainey substation to the Astoria site, and the TRACE projects' planned improvements to the lines in and out of Rainey. It does acknowledge that the Rainey interconnection point has one of "the most promising performance [features], i.e., fewest adverse system impacts based on reliability security analysis" for up to 1,250 MW.[53] Yet NRG's "conclusion" is that no study "identifies the [Astoria 138 kV] substation as a Point of Interconnection for new offshore wind" – ignoring that that the Beacon Wind project does plan to interconnect to the NYPA Astoria Annex Substation.

NRG's "Alternative 8" analysis also discusses the potential for Clean Energy Hubs and notes that Con Edison has two proposals for such hubs that can incorporate the new offshore and upstate transmission. NRG does not describe why these proposed Clean Energy Hubs would not displace any need for the Proposed Project. Instead, the analysis myopically focuses on the Astoria East 138 kV substation, and again makes no mention of the NYPA 345 kV Astoria Annex GIS Substation[54] [55] nearby, the 345 kV Rainey substation nearby, or the 345 kV substations that Rainey connects to Mott Haven and Farragut, as depicted below.[56]

Figure 10: Project Schematic



[51] *Power Grid Study*, NYSERDA, https://www.nyserda.ny.gov/About/Publications/New-York-Power-Grid-Study (last visited Sept. 9, 2021).

[52] DSEIS at 4-26–27.

[53] *Id.* at 4-27–28 (citing OSW Study).

[54] *See* Consol. Edison Co. of N.Y., Inc., *The Long-Range Transmission Plan 2018-2028* (2018), coned.com/-/media/files/coned/documents/business-partners/transmission-planning/long-range-transmission-plan-2018.pdf.

[55] This image does not include the NYPA 345kV Astoria Annex GIS Substation.

[56] *See* NYISO, *2020 RNA Report: Reliability Needs Assessment* (2020), https://www.nyiso.com/documents/20142/2248793/2020-RNAReport-Nov2020.pdf.

vii. The Many Transmission Projects in Queens, Already Approved or Awaiting Near-Term Approval, Are Significantly More CLCPA-Compliant Than a New Gas Plant.

Both the NY PSC and the NYISO have definitively stated transmission upgrades are vastly preferable to new fossil gas power generation under both Section 7(2) and Section 7(3).

With respect to both emissions and local air quality and public health concerns, the NY PSC stated as it approved the TRACE Projects:

> The retirement of downstate fossil fuel-fired peaking generation units without the addition of any new fossil-fueled power plants is itself a significant, first step towards achieving New York's clean energy future. This is because the peaking units are located in and near to environmental justice communities and facilitating their retirement will bring near-term air quality improvement to those communities on the worst air quality days.[57]

With the TRACE Projects, 900 MW of transfer capability will be added in Zone J by May 2023. Soon thereafter, the TRACE off-ramp infrastructure will permit up to 1,300 MW from Upstate into Queens, and up to 1,230 MW from offshore wind into Queens. There is no reliability need for a 437 MW gas plant now, in 2023 or beyond.

In addition, NYISO recently completed its 2021-2030 Comprehensive Reliability Plan, which included the determination that there are no resource adequacy and transmission security reliability needs expected between now and 2030, when all the above local and bulk transmission plans will be in service and fully operating.[58]

viii. New York's Strict Reliability Rules Provide for Far More Excess Capacity than Other Parts of the Country, Belying Comparisons to the Texas Blackouts.

There are many reasons why the fear tactics of the fossil fuel industry, including NRG, ring hollow in New York, particularly when pointing to what happened in Texas during the winter storm in early 2021.[59]

---

[57] PSC, *PSC Approves $800 Million Investment to Maintain* and *Improve Reliability, Achieve Climate-Change Goals, Enhance Resiliency of NYC Transmission Grid* (emphasis added).

[58] *See* NYISO, *2021-2030 Draft Comprehensive Reliability Plan* (2021), https://www.nyiso.com/documents/20142/23873690/02%202021-2030_CRP.pdf/29eb0cce-f689-3b05-4c69-d3fbfae5e0e9.

[59] *See, e.g.*, DSEIS at 1-17 ("Otherwise, New York City could experience reliability issues similar to those faced by Texas in Winter 2021 or California in Summer 2020.")

First, New York's reliability rules are more stringent than anywhere else in the country:

> The NYISO operates the New York power system to the strictest reliability standards in the nation, and is overseen by the North American Electric Reliability Corporation (NERC) and the Northeast Power Coordinating Council (NPCC). Further, unique to New York, the New York State Reliability Council (NYSRC) establishes state-specific reliability rules that are more stringent than the rest of the United States.[60]

For example, New York state's Locational Installed Capacity Requirements mandate that each New York electric power supplier obtain at least 80 percent of its load requirements from generation or transmission resources located within New York City.[61] Even more stringent local reliability rules have been adopted that apply to New York City.[62]

Second, it was mostly the natural gas infrastructure in Texas that failed to provide reliable service in the most recent winter storm.[63] NRG's arguments about its own purported reliability benefits should be viewed with appropriate skepticism.

Third, unlike Texas, New York can import energy from several neighboring states. And unlike California, NYISO does not share resource management decisions with other entities and has all necessary information about energy sources and their emergency capacity and capabilities. NYISO's planning processes include generator deactivation studies and periodic assessments of both resource adequacy and transmission system needs to identify risks to reliability and to act if necessary.

Finally, New York has an Installed Capacity Market, while Texas and California do not. The Installed Capacity Market works to ensure resource adequacy by making sure enough generating capability is available to meet grid demand at peak times of electricity consumption. "One critical element of the capacity market is the NYS reserve margin … [which] ensures a sufficient amount of capacity is available to the grid under the most extreme weather conditions.

---

[60] NYISO, *Power Trends 2021: New York's Clean Energy Grid of the Future, Annual Grid & Markets Report* at 7.

[61] *See* NYISO, *Locational Minimum Installed Capacity Requirements Study* 2 (2019) https://www.nyiso.com/documents/20142/3679493/LCR2019-Report2-clean.pdf/d6ffe9be-a058-7cde-4bd3-725cce0105ef.

[62] *See* NYISO, *Draft Annual Assessment of Resource Adequacy* (2019), https://www.nysrc.org/pdf/MeetingMaterial/RCMSMeetingMaterial/RCMS%20Agenda%20232/2019_RCMS_A3(R1)%20Annual%20Assessment%20Report.pdf.

[63] *See, e.g.*, Erin Douglas, *Texas Largely Relies on Natural Gas for Power. It Wasn't Ready for the Extreme Cold*, Texas Trib. (Feb. 16, 2021), https://www.texastribune.org/2021/02/16/natural-gas-power-storm/ ("Officials for the Electric Reliability Council of Texas, which manages most of Texas' grid, said the primary cause of the outages Tuesday appeared to be the state's natural gas providers."); *Texas Natural Gas Production Fell By Almost Half During Recent Cold Snap*, U.S. Energy Info. Admin., https://www.eia.gov/todayinenergy/detail.php?id=46896 (last updated Feb. 25, 2021).

Re-evaluating the reserve margin annually allows for adjustments to reflect changes in demand, supply, and transmission capability."[64]

Despite the trumped-up reliability concerns voiced by NRG and other fossil fuel generation owners,[65] "[t]he NYISO is committed to reaching the renewable investment and decarbonization goals as mandated under the CLCPA. Important market design changes have recently been approved or are under development by the NYISO that will support the state's pursuit of the CLCPA goals." A new gas plant is not the solution. As the above discussion of transmission upgrades meeting both near-term and long-term locational reliability needs demonstrates, this gas plant is not necessary to meet reliability needs. Therefore, DEC should not conclude that the project is justified despite its inconsistency with CLCPA emissions reductions mandates, and it must deny the Title V permit under Section 7(2).

B. The Plant's Purported Overall GHG Reductions Are Vastly Overstated and Do Not Justify This Project.

i. NRG's GHG Modeling is Flawed.

NRG claims that purported net GHG emission reductions (both direct, upstream, and indirect) justify the construction of the facility. However, purported direct GHG benefits are very small and extremely short-lived. They are also plagued by flaws in NRG's modeling. NRG's so-called "indirect" benefits are entirely unjustified. These claimed indirect GHG reductions are the result of the addition of a hypothetical 543 MW offshore wind facility and not from NRG's 437 MW gas peaking plant at all. If anything, NRG's GHG modeling results demonstrate that zero emission renewable energy projects like offshore wind facilities are far more effective GHG mitigation strategies than new fossil fuel power plants and fail to justify construction of the Proposed Project.

ii. NRG's Claims Regarding Direct Emission Benefits from the Proposed Project Are Small and Overstated.

NRG provided two sets of GHG modeling to support its claim that emission reductions stemming from the Proposed Project justify its development. The initial modeling, conducted in April 2020 (Appendix E.1), projected 1.2 million tons of direct GHG reductions from the Proposed Project over NRG's study period of 2023 to 2035.[66] The revised modeling, conducted in February 2021 with updated assumptions about other resource additions (Appendix E.2), reduced projected direct GHG emissions by nearly 2/3rd to just 421,000 tons.[67] Moreover, nearly all of the purported direct GHG emission benefits under the updated modeling occur between 2023 and 2027. Between 2028 and 2035, the facility is modeled to result in a mere 125,000 ton GHG reduction, or only about 15,000 tons per year. For a facility that would emit over 611,000

---

[64] NYISO, *The New York ISO & Grid Reliability* 3 (2021), https://www.nyiso.com/documents/20142/2224547/The-New-York-ISO-and-Grid-Reliability.pdf/1c5987ea-81f5-9db9-615c-16f8201192a7.

[65] *See supra* note 41 (citing DSEIS at 1-17).

[66] DSEIS Appendix E.1 at 17 tbl.2.

[67] DSEIS Appendix E.2 at 12 tbl.3.

tons per year of CO2eq operating at a 30 percent capacity factor,[68] a 15,000 ton/year reduction is essentially meaningless; either the NRG facility operates and emits 611,000 tons of CO2eq per year, or other fossil fuel-fired generators provide that same energy and emit 626,000 tons of CO2eq. Neither is a recipe for meaningful GHG reductions commensurate with the aggressive mandates of the CLCPA.

Not only are the projected direct GHG emission benefits of the Proposed Project small, NRG's modeling suffers from multiple flaws that undermine the credibility of the results. For NRG's direct emissions modeling there are two primary limitations. First, as discussed in the attached report by Synapse Energy Economics (attached as Appendix A), NRG's consultant Guidehouse used a simplified approach to evaluating which resources would be displaced by the Proposed Project when it operates that tends to overstate emission benefits. As Synapse explains, Guidehouse developed a forecast of locational marginal prices (LMPs) using an electric system dispatch (production cost) model called PROMOD IV and then used a proprietary Electric Value Model to dispatch the Proposed Project against forecasted LMPs.[69] The model assumed that the Proposed Project would operate during hours in which its variable operating costs were below the LMP. To evaluate emission impacts, Guidehouse attempted to identify which units would come offline during hours in which the Proposed Project was projected to operate. To accomplish this, Guidehouse used a simplified supply stack that ordered generators in New York City according to their variable operating costs and then presumed that the Proposed Project would displace the highest marginal cost unit.[70] The GHG emissions from the Proposed Project were subtracted from the GHG emissions the Proposed Project was assumed to displace when it operates to provide the direct emissions reduction estimate. Guidehouse's estimates are unreliable because its simplified approach to the dispatch stack ignores transmission constraints that will affect which facilities are actually dispatched. This inaccuracy will overstate the emission benefits of the facility by assuming that the highest variable cost (and likely highest emission) unit is always displaced. In reality, due to transmission constraints, other more efficient units are likely to be displaced some of the time, rendering Guidehouse's estimate too high.

Second, and likely even more consequential, the Guidehouse modeling appears to ignore the potential for Tier 4 resources to contribute to new capacity additions in New York City.[71] Given the potentially very large quantities of zero emission generation that may be entering the New York City area as a result of Tier 4, this is a significant omission. As noted above, in response to its initial Tier 4 request for proposals, NYSERDA received proposals from seven sets of bidders comprising 35 configurations and totaling over 35 million MWh of renewable energy per year and nearly 7,500 MW of new renewable transmission capacity.[72] Operating at a

---

[68] Table 3.1-3 of the DSEIS identifies the Estimated Maximum Hourly Emissions (lb/hr) for the CTG During Steady-State Operation. When firing natural gas, the facility would emit 232.55 tons/hour. If the facility emitted 232.55 tons/hour * 8,760 hours/year * 0.3 capacity factor, it would emit 611,000 tons of CO2eq/year. DSEIS at 3-15 tbl.3.1-3.

[69] Synapse Report at 3.

[70] Synapse Report at 6–7.

[71] Synapse Report at 6.

[72] *See Tier 4 – New York City Renewable Energy*, NYSERDA.

30 percent capacity factor, the Proposed Project would generate only slightly over 1 million MWh per year[73] so its generation would be dwarfed by the potential zero emissions Tier 4 resources entering the New York City market in the same general time frame as the Proposed Project. As discussed below, the addition of zero emission resources, such as those that will be brought into New York City via Tier 4 transmission lines, has a far larger salutary impact on power sector emissions than does adding a new gas-fired combustion turbine like the Proposed Project.

In addition, it is noteworthy that NRG offers no principled basis for truncating its GHG analysis in 2035 rather than extending it through the full economic life of the facility or at least through 2040. NRG's failure to model GHG emission impacts beyond 2035 is concerning because it appears, based on the emission reduction trajectory in Table 3 of Attachment E.2 to the DSEIS, that modeled direct GHG emission reductions might drop below zero (i.e., the plant might be *adding* greenhouse gas emissions) in those later years. Based on NRG's modeling, annual direct emission reductions decline from a high of 88,000 tons in 2024 to a mere 5,000 tons in 2035. If the declining trend from the 2023-2035 period were to continue beyond 2035, NRG's table provides every indication that claimed cumulative reductions would begin to be erased.

iii. Inclusion of "Indirect" GHG Reductions is not Appropriate and the Claimed Reductions are not Properly Calculated.

Nearly all of NRG's claimed emission benefits associated with the Proposed Project stem from so-called "indirect" emissions. However, the company's "indirect" emissions analysis lacks any credible basis and, if anything, shows that building zero emission renewable resources is a far superior strategy for mitigating climate emissions than building a new fossil gas plant. Moreover, even assuming the approach to evaluating indirect emissions had any credibility, the analysis itself is flawed in ways that greatly overstate the impacts.

NRG's projected "indirect" emissions benefits rely on a Rube Goldberg-like chain of events that strays far from the Proposed Project and does not represent a credible modeling or analytical approach. NRG's consultant, Guidehouse, begins its "indirect" emissions analysis by attributing "savings" to the Proposed Project based on poorly supported claims regarding how much incremental battery storage resources would need to be installed if the Project were not constructed. Guidehouse then assumes that these "savings" are used to accelerate the deployment of an additional 543 MW of offshore wind, which, Guidehouse assumes, generates zero emission electricity at a 50 percent capacity factor and displaces 2,400 GWh of fossil generation.[74] Guidehouse then credits the emission reductions resulting from this hypothetical wind facility displacing hypothetical fossil fuel generation to the Proposed Project, claiming up to approximately one million tons per year of carbon dioxide reductions.

[73] 437 MW * 8,760 hrs/year * 30% capacity factor = 1,148,438 MWh.

[74] Synapse Report at 7.

This non-standard and "unorthodox" approach[75] lacks any limiting principle and is therefore meaningless. Under NRG and Guidehouse's theory, simply because money is fungible, any action that can be monetized can be converted into any other action of equal cost, no matter how disconnected, and that latter action used to assert an emissions benefit. But Guidehouse's choices are entirely arbitrary. Why assume that the purported savings from the project are used to build an offshore wind farm? Why not an airplane or an office building (which would have adverse rather than beneficial impacts on greenhouse gas emissions)? It is simply not analytically valid to attribute to a gas plant the emission reductions from a hypothetical offshore wind farm that NRG is not itself committed to building, and for which there is no evidence the Proposed Project will induce its development.

Moreover, not only is NRG's approach to indirect emissions bankrupt in theory, it is also flawed in practice. As Synapse demonstrates, the Guidehouse analysis dramatically overstates the cost of building storage as an alternative to the Proposed Project and therefore massively inflates the size of the hypothetical wind farm that could be constructed in lieu of this battery storage and the attendant GHG impacts. For example, Guidehouse fails to take into account the most current battery cost projections or adequately account for the rapidly falling costs of battery energy storage resources or expected technological improvements.[76] Indeed, the battery cost figures used by Guidehouse are 30 percent higher than those from the Energy Information Administration, more than quadruple those projected by Bloomberg New Energy Finance, and nearly 12 times higher than some of the promising technology in development.[77] In addition, the Guidehouse analysis ignores significant costs associated with the Proposed Project, including both fuel and emission costs, as well as important benefits associated with storage resources, including their ability to defer or avoid transmission investments.[78] If Guidehouse had used more realistic cost projections for energy storage and fully accounted for the costs of the Proposed Project and full range of benefits of storage, the purported "indirect" GHG benefit of the project would have been largely if not completely eliminated.

iv. Even With Modest Near-Term Reductions in GHG Emissions, the Project is Still not Justified.

Setting aside the fatal limitations with NRG's GHG emissions analysis, building a fossil fuel generation resource in the mid-2020's is not a reasonable or effective GHG mitigation strategy where the State is obligated to reach zero electric sector emissions by 2040. As discussed above, looking out to 2040, adding new pollution-emitting resources like the Proposed Project is a dead end for the electric grid because it will impair New York's ability to achieve CLCPA zero emissions electricity mandates.

At the same time, adding fossil fuel facilities is also an ineffective GHG mitigation strategy in the short term. Claimed direct GHG emission benefits of the Proposed Project are minimal. This is because the Proposed Project's carbon dioxide emission rate is only modestly

[75] Synapse Report at 7.

[76] Synapse Report at 8.

[77] Synapse Report at 8.

[78] Synapse Report at 8–9.

lower than that of the current marginal unit (i.e., the last dispatched unit that is setting the clearing price in the energy market; today, generally another gas unit) thus doing far less to reduce GHG emissions when it operates than would a new zero-emission resource. And the emission rate of the marginal unit will continue to decrease as additional zero emission resources are added to New York's grid to comply with the Clean Energy Standard and other CLCPA requirements. Each new resource will displace higher emitting resources and further diminish any limited near-term emission benefit.

NRG's own emissions analysis highlights the ineffectiveness of the Proposed Project as a greenhouse gas reduction strategy. NRG proposes to construct a 437 MW gas plant that it projects will, through 2035, have a direct emission reduction benefit of slightly over 400,000 tons of CO2. At the same time, NRG estimates that a 543 MW offshore wind facility—only slightly larger than the proposed combustion turbine—would have a GHG benefit of up to approximately one million tons of CO2 *per year* despite coming online in 2030 when the marginal emission rate of the electric generation fleet is far lower. Based on NRG's own numbers and even with the later in-service date for the offshore wind, building the offshore wind farm would be up to 25 times as effective as a greenhouse gas mitigation strategy on a per-MW basis than building the Proposed Project. The Proposed Project simply cannot be justified on a GHG reduction basis.

C. The Fossil Gas-Fired Plant Is Not Justified as Necessary to Support Expansion of Renewables.

i. There are Superior Ways to Support Renewable Energy Integration Than Building a Fossil Fuel Peaking Plant.

NRG mischaracterizes purported renewable integration benefits of a fossil-fueled plant, as the Proposed Project has no role to play in New York's post-2040 zero-emission landscape and is not the best long-term strategy for CLCPA-compliant renewable integration. The proposed plant does nothing to help New York reach zero-emissions mandates; rather, it prolongs and deepens the State's problematic overreliance on burning fossil fuels. Petitioners' proposed gas investment is legally time-limited under the CLCPA and, practically, time-barred by the rapidly worsening climate crisis. Alternative portfolios of renewable generation, storage, and transmission resources represent a better and more CLCPA-compliant approach to supporting a renewable energy-dominated grid.

Although NRG's anemic alternatives analysis failed to evaluate them, there are portfolios of resources that are better positioned to facilitate renewable energy integration while also supporting long-term CLCPA compliance. As Synapse explains, "[t]he best way to facilitate renewable integration is not to build new fossil generation but to deploy a number of different approaches that instead increase the flexibility of the grid on both the electricity supply and demand sides."[79] These approaches include: (1) relying on a diversity of renewable resources (solar, wind, hydropower, geothermal) to balance variability in production; (2) relying on energy storage to further balance variability in renewable output; (3) relying on transmission upgrades to

[79] Synapse Report at 12.

improve the transfer of electricity, particularly within constrained areas; (4) relying on demand-side management to reduce peak demand and shift flexible loads.[80] Notably, unlike the Proposed Project, which will result in both smokestack and upstream greenhouse gas and convention pollutant emissions, the resources in the Synapse portfolio are all emissions-free and CLCPA-consistent.

In its alternatives analysis, NRG simply focused on individual alternative resources (e.g., battery storage) in isolation. But as Synapse notes, a "full consideration of alternatives" would have evaluated portfolios of resources such as those identified above. Based on its deficient alternatives analysis, NRG is unable to claim that its facility is preferentially suited to facilitate renewable resource integration.

ii. Battery Storage Will Expand Over the Coming Years and Can Meet Peak Demand Needs in Zone J Without a New Gas-Burning Plant.

Moreover, NRG underestimates the ability of existing battery storage technologies to meet reliability needs in the short term. Utility-scale battery storage that is more than sufficient to address the needs contemplated in this area is well underway. Battery storage has already been approved for Con Edison, partnering with 174 Power Global, to install New York State's largest battery system, in Astoria at the site of the former Charles Poletti fossil fuel plant.[81] Con Edison has put out a call for at least 200 MW of battery storage in New York City and Westchester,[82] and a NYPA-owned battery project has also been approved.[83] Battery storage installations will expand over the next decade. The CLCPA requires three GW of statewide energy storage to be

---

[80] *Id*.

[81] *See* Andy Colthorpe, *Approval for 100MW / 400MWh Battery Storage Project at Site of New York Fossil Fuel Plant*, Energy Storage News (July 16, 2021), https://www.energy-storage.news/approval-for-100mw-400mwh-battery-storage-project-at-site-of-new-york-fossil-fuel-plant/; Bill Parry, *State approves plan for Astoria clean energy hub at old Poletti power plant site*, QNS (July 16, 2021), https://qns.com/2021/07/state-approves-plan-for-astoria-clean-energy-hub-at-old-poletti-power-plant-site/; *Con Edison to Build New York State's Biggest Battery Storage System in Queens*, T&D World (Dec. 18, 2020), https://www.tdworld.com/distributed-energy-resources/energy-storage/article/21150750/con-edison-to-build-new-york-states-biggest-battery-storage-system-in-queens.

[82] *See Con Edison & O&R Utilities Seeking Battery Projects to Aid Clean Energy Push*, ConEdison (Aug. 2, 2021), https://www.coned.com/en/about-us/media-center/news/20210802/con-edison-and-oru-utilities-seeking--battery-projects-to-aid-clean-energy-push; David Wagman, *RFP Alert: Con Edison and Orange & Rockland are Looking for Battery Energy Storage Capacity*, PV Magazine (Aug. 2, 2021), https://pv-magazine-usa.com/2021/08/02/rfp-alert-con-edison-and-orange-rockland-are-looking-for-battery-energy-storage-capacity/; Dave Kovaleski, *Con Edison of New York Issues RFP for Installation of Battery Storage Systems*, Daily Energy Insider (Aug. 2021), https://dailyenergyinsider.com/news/31400-con-edison-of-new-york-issues-rfp-for-installation-of-battery-storage-systems/?amp.

[83] *See* Press Release, N.Y. Power Auth. ("NYPA"), *NYPA Announces North Country Large-Scale Energy Storage Project Construction Start* (Aug. 26, 2020), https://www.nypa.gov/news/press-releases/2020/20200826-northcountry; Andy Colthorpe, *Publicly-Owned and Operated 20MW Battery Project Begins Construction in New York*, Energy Storage News (Aug. 28, 2020), https://www.energy-storage.news/publicly-owned-and-operated-20mw-battery-project-begins-construction-in-new-york/.

installed by 2030, and specifically calls for the PSC to direct that storage be prioritized to replace fossil-fuel peaker plants operating in disadvantaged communities.[84]

Combining current battery technology with renewables can efficiently meet peak demand.[85] The National Renewable Energy Laboratory has found "significant potential for energy storage to replace peaking capacity," using available four-hour battery storage technology and emphasizing that the peaking capacity of renewables plus storage "grows as a function of PV deployment."[86] This means that, as the penetration of solar increases within a region, battery storage becomes increasingly effective at bridging capacity shortfalls. The trend toward narrower capacity gaps becomes even more pronounced when solar and wind are combined, as the resources complement each other by typically peaking at different times of day. And, as described above, as the Tier 4 transmissions projects bring renewable power from Upstate down into Zone J, offshore vs land-based wind and solar and wind from different locations throughout the State may have different peak demand times, providing greater reliability.

iii. Contrary to NRG's Statements, Storage Can Indeed Facilitate Integration of Renewable Energy Sources into the Grid.

NRG claims that battery storage would provide inadequate support to New York State and New York City in achieving our climate limits, targets and goals because battery storage would not provide long-term, long-duration backup power, and thus would have limited ability to facilitate integration of renewable energy resources.[87] This argument fails to account for rapidly developing long-duration storage technologies that, while not needed until a far greater share of New York's generation mix consists of renewables, are projected to be widely available and cost effective by then.

There are already alternative, zero emission resources being piloted that can provide several days of power. The highest profile example of this is a rechargeable iron-air battery developed by the company Form Energy, which states that it will be able to provide 100 hours of capacity at 1/10th the cost of lithium-ion batteries.[88] The U.S. Department of Energy has also committed to a Long Duration Storage Shot tasked with reducing the cost of long-duration energy storage by 90 percent within the decade.[89] Furthermore, price reductions for lithium-ion

---

[84] N.Y. P.S.L. 66-p(5); (7).

[85] *See* Paul Denholm et al., Nat'l Renewable Energy Lab. ("NREL"), NREL/TP-6A20-74184, *The Potential for Battery Energy Storage to Provide Peaking Capacity in the United States* (2019) https://www.nrel.gov/docs/fy19osti/74184.pdf.

[86] Denholm, et al., *id*. at 15.

[87] DSEIS at 4-13.

[88] *See* News Release, Form Energy Inc., *Form Energy Unveils Chemistry of Multi-day Storage Battery Technology* (July 22, 2021), https://www.prnewswire.com/news-releases/form-energy-unveils-chemistry-of-multi-day-storage-battery-technology-301339075.html.

[89] *See* Julian Spector, *The 5 Most Promising Long-Duration Storage Technologies Left Standing*, Greentech Media (Mar. 31, 2020), https://www.greentechmedia.com/articles/read/most-promising-long-duration-storage-technologies-left-standing.

batteries are expected to continue, making longer-duration applications even more economically feasible for existing commercially available storage technologies.[90]

Even in a worst-case scenario, there are plenty of existing gas-fired resources similar to the Proposed Plant available to meet multi-day needs for electricity generation as the State transitions to a clean grid over the next two decades. There is no reason to build a new fossil fuel-fired power plant to address those needs when the concern for longer-term renewable gaps is a post-2030 issue at the earliest.

iv. NRG's Analysis Ignores the Untapped Potential of Demand Response.

The industry is just scratching the surface of the benefits available through managing demand response. New York has extensive large building loads, which represent high potential to tap a flexible resource. Con Edison is currently pursuing demand management in Brooklyn and Queens to identify resources to avoid the need to invest in further upgrades.[91] In a Summer 2020 effort, New York City's Department of Citywide Administrative Services used a demand response program that produced 106 MW of load reductions.[92] And as a further indicator of promising and extensive potential, as part of a 2020 Demand Response Forum presentation on unrealized commercial demand response, Con Edison reported that the "majority of customers enroll less than 20% of their highest summertime kW demand."[93]

A recent analysis focused on load curtailment, prepared for NYSERDA by Elementa Engineering in collaboration with PEAK Coalition partners UPROSE and NYC-EJA ("Replacing Peaker Plants: DER Strategies for Sunset Park, Gowanus, and Bay Ridge"), showed significant reduction in peak demand for the study areas of Sunset Park, Gowanus, and Bay Ridge, using reports from Summit Blue Consulting and the Electric Power Research Institute that project savings through boosting participation in DER programs. The office and industrial sectors demonstrated particularly high opportunities for load reduction, though the report also flagged that pandemic-motivated increases in working from home heralded even more potential in residential buildings: "[A]s the COVID-19 pandemic has shifted energy use from offices to residential buildings, the multifamily sector represents an equally strong opportunity for significant demand response savings."[94] The analysis also noted the additional potential of energy efficiency retrofits, indicating that when buildings performed in compliance with modern

---

[90] *See* Andy Colthorpe, *US National Renewable Energy Lab Forecasts Rapid Cost Reduction for Battery Storage to 2030*, Energy Storage News (July 14, 2021), https://www.energy-storage.news/us-national-renewable-energy-lab-forecasts-rapid-cost-reduction-for-battery-storage-to-2030/?utm_source=Sailthru.

[91] *See Brooklyn Queens Demand Management Demand Response Program*, ConEdison, https://www.coned.com/en/business-partners/business-opportunities/brooklyn-queens-demand-management-demand-response-program (last visited Sept. 9, 2021).

[92] *See Demand Response Program*, N.Y.C. Dep't Citywide Amin. Serv., https://www1.nyc.gov/site/dcas/agencies/demand-response.page (last visited Sept. 9, 2021).

[93] ConEdison, *2020 Demand Response Forum* 11 (2020), https://www.coned.com/-/media/files/coned/documents/save-energy-money/rebates-incentives-tax-credits/smart-usage-rewards/demand-response-forum.pdf.

[94] Elementa Eng'g, *Replacing Peaker Plants: DER Strategies for Sunset Park, Gowanus, and Bay Ridge* 20 (2021), attached as Appendix D.

energy codes, "which could be achieved through envelope and system upgrades," peak demand dropped by 11%.[95] Relatedly, NYSERDA has been advancing efficiency upgrades to reduce demand. For example, Business Energy Pro[96] is just one new pay-for-performance pilot "collaboration among NYSERDA, Con Edison, and energy efficiency service providers that aims to transform the energy efficiency market by using smart meter technology."[97]

In sum, an analysis that fails to include demand response and efficiency upgrades results in an utterly inadequate forecast.

D. NRG'S Other Stated Justifications Are Unsupported and Insufficient.

i. Contrary to NRG's Claims, the Proposed Plant is Not Needed as Black Start Resource.

NRG claims that the Proposed Project is further justified because it "preserves the Site's black start capability."[98] NRG is careful not to claim that the Proposed Project itself will provide black start capability, and indeed, it will not. Any localized benefit of retaining black start capability at the Site stems from NRG's proposal to temporarily retain an existing Pratt & Whitney (P&W) Twin Pac (composed of two combustion turbines and an electric generator)[99] until an on-site battery energy storage system can be developed and is therefore not a justification for approving the Proposed Project.

In its NOx peaker regulation, DEC defined a black start resource as "[a]n electric generating unit used to bring a facility from shutdown to operational without reliance on external supplies or the electrical system."[100] Black start capability is valuable to the grid because it can help to facilitate electrical system restoration in New York City following major power outages.[101] The NOx peaker regulations exempt black start resources from the control requirements of Section 227-3.[102]

Regardless of whether retention of black start capability has value at the Site, it cannot justify NRG's proposed 437 MW gas peaker. As NRG itself explains in the DSEIS, the black start capability that will exist after completion of its replacement project stems, initially, from the retention of two existing P&W units, and, subsequently, from its proposal to replace the remaining P&W Twin Pac with an approximately 24 MWe battery energy storage system.[103]

---

[95] *Id*. at 21.

[96] *See Business Energy Pro*, NYSERDA, https://www.nyserda.ny.gov/All-Programs/Programs/Business-Energy-Pro (last visited Sept. 9, 2021).

[97] *Id*.

[98] DSEIS at 3-64.

[99] *Id.* at 4-1 n.105.

[100] 6 N.Y.C.R.R. § 227-3.2(b)(1).

[101] DSEIS at 3-64.

[102] 6 N.Y.C.R.R. § 227-3.1(c) ("The provisions of this Subpart do not apply to black start resources.").

[103] DSEIS at 3-67.

Indeed, the P&W Twin Pac "will remain operational solely to enable black start capability for the Site."[104] If black start capability at this location is deemed sufficiently important, NRG can—precisely as it proposes—temporarily retain the existing P&W Twin Pac as a black start resource consistent with the NOx peaker regulations until the company is able to replace it with a non-emitting battery energy storage facility *without also building a massive new gas peaking turbine at the site*.

ii. NRG's Reliance on Purported Cost Reductions to Justify the Proposed Project is Legally Invalid and Factually Unsupported.

NRG claims that the Proposed Project is justified because it will reduce costs for New York City electric customers by providing "economic capacity" without a ratepayer guaranteed support contract.[105] However, the CLCPA makes no provision for purported cost reductions to justify an otherwise CLCPA-inconsistent project. Moreover, NRG's cost claims lack a compelling analytical foundation.

As an initial matter, NRG's cost "justification" rests on a misinterpretation of CLCPA Section 7(2), which states that DEC must "provide a detailed statement of justification as to why [the statute's GHG emissions] limits/criteria may not be met" by an applicant for a license or permit. Reading the CLCPA as a whole, it is clear that the cost reduction claimed by NRG is not a permissible justification for the failure of an applicant to meet the statute's emissions targets.[106]

The New York State legislature passed the CLCPA with a primary objective: "to reduce greenhouse gas emissions from all anthropogenic sources."[107] This predominant policy goal is reflected throughout CLCPA Section 7, which states that:

> state agencies shall assess and implement strategies to reduce their greenhouse gas emissions… shall consider whether [administrative approvals and decisions] are inconsistent with or will interfere with the attainment of the statewide greenhouse gas emissions limits… [and] prioritize reductions of greenhouse gas emissions… in disadvantaged communities.[108]

Notably, the legislature did not directly mention electric customer costs in particular or economics in general when writing this section of the statute. That silence is further evidence that the drafters of the CLCPA did not intend for customer cost reductions to excuse noncompliance with CLCPA emissions limits when evaluating actions under Section 7(2). Where, in a statutory provision, "a general statement of policy is qualified by an exception" the

---

[104] *Id.*

[105] *Id.* at 3-64.

[106] "[I]n interpreting a statute, a court 'must not be guided by a single sentence or member of a sentence, but look to the provisions of the whole law, and to its object and policy.'" *Czyzewski v. Jevic Holding Corp.*, 137 S. Ct. 973, 985 (2017) (quoting *Kelly v. Robinson*, 479 U.S. 36, 43 (1986)).

[107] CLCPA § 1(4).

[108] Id. § 7.

presumption should be that the legislature drew up "the exception narrowly in order to preserve the primary operation of the provision."[109]

Generalized electric customer cost reductions are not listed among the secondary policy objectives of the CLCPA either. Ancillary goals listed in the statutory preamble include the adoption of "complementary adaptation measures" to improve the state's resiliency against climate impacts, as well as the promotion of the interests of disadvantaged communities and communities that have faced racial and ethnic discrimination.[110] The only economic objectives identified by the legislature relate to green job creation, workers' welfare, and the equitable distribution of economic opportunities across the diverse communities of the state.[111] The broad consumer benefits asserted by NRG fall outside of the narrow scope of these labor-and-equity-oriented policies. Thus, it is apparent that the legislature deliberately excluded the kind of economic benefit described by NRG from the CLCPA's series of policy objectives,[112] and therefore NRG's justification of its failure to comply with the statute on these grounds would be wholly inappropriate.

Second, even if cost reductions were a valid justification for CLCPA inconsistency under the statute—which they are not—NRG's cost claims lack a compelling foundation. As Synapse explains, NRG's cost analysis by Navigant suffers from multiple defects that undermine its credibility. Navigant's analysis is fundamentally incomplete because it does not look at *net* economic impacts. Rather than analyzing the benefits and costs of the Proposed Project and comparing them, Navigant evaluated only the benefits.[113] Synapse notes that "[a] full analysis would also incorporate the cost components" including categories such as displaced generation from the Proposed Project and retired resources from the Proposed Project.[114] Compounding this flaw, Navigant's analysis also failed to compare the Proposed Project to any alternative resource investment.[115] Navigant replicated this latter flaw in its analysis of Zone J wholesale electricity and capacity price impacts of the project, failing to compare the modeled price effects of the Proposed Project to any alternative resource or set of resources.[116] Together, these omissions render the analysis valueless. As Synapse notes, "any large investment will create some degree of economic benefit; to claim those benefits justify an otherwise CLCPA-inconsistent project would require more analysis of the economic benefits of the alternatives."[117]

Finally, again assuming economic benefits were a valid justification under the CLCPA, the test should not be whether NRG believes it will be profitable to the company to construct the

---

[109] *Comm'r v. Clark*, 489 U.S. 726, 739 (1989).

[110] CLCPA §§ 1(5)–(7).

[111] *Id.* §§ 1(10) –(11).

[112] "[E]xpressing one item of an associated group or series excludes another left unmentioned." *Johnson v. Guzman Chavez*, 141 S. Ct. 2271, 2291 (2021) (quoting *NLRB v. SW General, Inc.*, 137 S.Ct. 929, 940 (2017)).

[113] Synapse Report at 11.

[114] *Id.*

[115] *Id.*

[116] *Id.*

[117] *Id.* Moreover, NRG & Navigant declined to provide any of the raw data they used as primary inputs in the JEDI model, rendering impossible an evaluation of the reasonableness of these assumptions. *See id.*

project. The fact that NRG is pressing to construct the facility indicates that NRG anticipates recovering more money from New York electric customers through its returns in the energy, capacity, and ancillary services markets, than it is investing in the Proposed Project. Indeed, historically, the Downstate capacity market has been lucrative for peaking resources, which have recovered billions of dollars from local electric customers through capacity payments. According to the *Dirty Energy, Big Money* report from the PEAK Coalition, the existing Astoria Gas Turbines collected approximately $453 million in capacity payments during the years 2010 through 2019 alone.[118] Any private investment in the project will be recouped from New York ratepayers, with interest, in the form of capacity and energy payments.

iii. NRG's Rationale That it Purportedly Provides Localized Air Quality Benefits Falls Short and Does not Justify the Proposed Project.

NRG additionally claims that construction of the Proposed Project "will result in an overall net reduction in air emissions in the New York City area."[119] NRG reasons that, because NYISO dispatches the bulk power system based on a marginal cost stack, the Proposed Project would displace older, less efficient generation in New York City and reduce overall emissions. There are multiple problems with NRG's purported justification, both as pertains to the regional emissions impacts of the Proposed Project and also regarding its local air quality and health impacts.

First, as discussed in Section II(B)(ii) above, NRG's simplistic discussion of the dispatch stack is insufficient to quantify, and certainly overstates, the regional emissions benefit of the facility, which are quite small to begin with. Dispatch in a congested region like New York City is impacted not simply by dispatch stack order, but also by transmission constraints. To determine the emissions impact of the Proposed Project, it would be necessary to run a production cost model with all the transmission constraints in place. NRG failed to do that, instead using a simple dispatch stack and assuming that the highest cost generators are displaced. If more realistic constraints were used, the claimed emission benefits would likely be smaller.[120]

Second, NRG ignores the time-limited nature of any regional emission benefits from the addition of the Proposed Project. While the Proposed Project is modestly more efficient than the least efficient fossil fuel units operating in the region today, those older, dirtier units are, increasingly, going to be retiring in the coming years. Indeed, many of the most poorly controlled units in the New York City area have already indicated retiring in response to DEC's NOx peaker regulation.[121] Others will be compelled to retire as New York moves toward a 100 percent zero emission grid given the Downstate grid's current heavy reliance on highly emitting

---

[118] *See* PEAK Coalition, *Dirty Energy, Big Money* (2020), https://www.cleanegroup.org/ceg-resources/resource/dirty-energy-big-money/.

[119] DSEIS at ES-6; *see also id.* at 3-64.

[120] Synapse Report at 6-7.

[121] As ConEd summarizes, "[t]he [compliance] plans indicate approximately 1,800 MW of peaker nameplate capability (approximately 1,500 MW of net operating capability), mainly in the lower Hudson Valley, New York City, and Long Island, would be unavailable during the summer by 2025 to comply with the emission regulations. A subset of those peakers would be unavailable starting in 2023." ConEd TRACE Petition at 5 n.11.

fossil fuel generation. Meanwhile, as discussed in detail above, new zero emission resources will continue to be added in the New York City area or interconnected into Zone J, including through Tier 4 and the offshore wind components of the Clean Energy Standard. [122,123]As a result, the incremental emission reduction associated with the Proposed Project will be small and short-lived.

Third, NRG ignores the adverse localized air quality impacts of the project. Any purported air quality benefit from the project would not be experienced by the community living in proximity to the plant, which would instead suffer from incremental criteria pollution coming from the Site. Synapse used the U.S. EPA's Co-Benefits Risk Assessment (COBRA) Health Impacts Screening and Mapping Tool to monetize the adverse human health impacts of the pollution associated with the Proposed Project for the years 2023 to 2039 and found that the adverse health impacts attributable to the pollution from the Proposed Project are between $8.4 and $19.1 million dollars.[124]

NRG's contrary claims about the air quality impacts of the project stem from the company's failure to clearly and properly identify the baseline for comparison. The company's discussion of the "No Action" alternatives reveals that the proper baseline absent construction of the Proposed Project is simply retirement of the existing P&W combustion turbines.[125] NRG identifies three "options" for its "No Action" alternative analysis: (A) retiring the existing P&W combustion turbines; (B) installing controls to meet the peaker regulation NOx limits; and (C) agreeing to a permit condition prohibiting operation of the P&W turbines during the summer ozone season.[126] Only one of these—Option A—is a viable alternative. NRG concedes that Option B is not cost effective, as "the capital cost of Option B approaches that of the Project."[127] Consequently, as a NOx control strategy, Option B would cost $938,800/ton of NOx controlled, which is orders of magnitude above what New York DEC has determined to be economically feasible as Reasonably Available Control Technology (RACT).[128] Option C is likewise not viable because it would remove the P&W turbines from the system precisely when they would be called on to operate. NRG explains that between 2015 and 2019, 59 percent of the P&W turbines' annual generation occurred during the ozone season, which is the peak season for electric demand in New York.[129] Moreover, even if Option C were a viable alternative, from a localized air quality perspective, it is functionally similar to Option A, as it would result in no on-Site emissions during the summer ozone season.

---

[122] *Tier 4 – New York City Renewable Energy*, NYSERDA.

[123] N.Y. E.C.L. § 75-0103(13)(e); N.Y. P.S.L. § 66-p(5).

[124] Synapse used pollutant quantities from page 4 of Appendix F of the DSEIS & an annual discount rate of 3 percent.

[125] As discussed in Section II(D)(ii), if some black start capability is needed at the site, NRG could temporarily keep 2 P&W units as black start units while complying with the NOx peaker regs, & while developing battery energy storage at the site.

[126] DSEIS at 4-2.

[127] *Id.* at 4-5.

[128] *Id.*

[129] *Id.* at 4-6.

When a comparison to an accurate baseline is made—that is, zero on-site emissions beyond 2023, it is clear that the proposed project increases localized emissions.

III. FEASIBLE ALTERNATIVES TO THE PROJECT EXIST AND NO MITIGATION CAN COMPENSATE FOR THE PLANT'S INTERFERENCE WITH CLCPA MANDATES.

If an agency finds that a project is necessary despite its inconsistency with CLCPA emissions reductions mandates, and has provided a detailed statement of justification, it must also "identify alternatives or greenhouse gas mitigation measures to be required where such project is located."[130] Here, DEC need not reach this step because, as described above, there is no need or justification for the project. In any event, there are numerous zero-emissions alternatives to building a new 437 MW gas-fired power plant; NRG's alternatives analysis in the DSEIS solely examining the use of its existing plant site is far too limited to be applicable to the analysis required under Section 7(2), which requires DEC to look at system-wide alternatives. Similarly, none of the mitigation proposals put forward by NRG come even close to offsetting the huge projected GHG emissions from the project, nor mitigating its overall effect of making it harder for the state to achieve a zero-emissions electricity sector. Additionally, the mitigation proposals are far too vague for DEC to make a reasoned decision regarding their adequacy. If it were to reach this step of the analysis, DEC should conclude there is insufficient mitigation and feasible zero-emissions alternatives exist, and thus it need not approve permits for a project that is inconsistent with the state climate law. In no event can DEC issue a Title V permit conditioned on NRG developing mitigation measures to be submitted and evaluated after permit issuance (see Section III(B)(iii) below).

A. NRG'S Alternatives Analysis Is Flawed and Too Limited to Be Applicable to DEC's Analysis under the CLCPA.

In addition to the many flaws with NRG's alternative analyses identified in the discussions of specific alternatives related to reliability above, there are several cross-cutting issues that pervade NRG's alternatives analysis and greatly undermine its credibility.

i. The Alternatives Analysis Arbitrarily Assumes 437 MW of Generation at this Site Is Necessary.

First, NRG's analysis of all alternatives in its DSEIS is hobbled by its assumption that 437 MW of additional dispatchable generation is required at the site by 2023 to avoid reliability issues. As detailed in Section II(A) above, that is incorrect in all regards: No replacement generation is required at any point in time given the planned and already occurring local and bulk transmission projects in the area. Consequently, projects of any size could be constructed at the site and maintenance of local and bulk reliability will be maintained; these considerations do not provide a meaningful basis for distinguishing between the alternatives.

---

[130] CLCPA § 7(2).

Moreover, even if some delay were to occur in the completion of the relevant TRACE Project such that its in-service date slipped beyond 2023, as NRG itself notes,[131] some subset of the existing units could be briefly retained as a backup to ensure system reliability. NRG fails to rationally compare the risks of locking the Astoria community into decades of additional fossil fuel combustion emissions by constructing a brand-new gas combustion turbine at the site to the risk that the Rainey-Corona Feeder Line might take longer than expected and the retirement date of some of the existing turbines might be briefly delayed. The former would cause lasting harm to a community that has already hosted polluting fossil fuel facilities for more than half a century while the latter would risk a small number of hours of reliability-driven operation of some existing turbines for a brief additional time until the TRACE Project was completed.

In addition, NRG's assumption that output exactly matching that of its proposed 437 MW gas plant must be achieved by (some but not all) other alternatives is both arbitrary and illogical. As an initial matter, because there is no projected reliability need for generation at the site once the local and bulk transmission upgrades are completed, there is no logical basis for requiring alternatives to match any specific generation output, let alone exactly that of the Proposed Project. Nevertheless, NRG claims that a battery energy storage alternative is infeasible because *in order to match the output of the Proposed Project*, 1,024 MW of 4-hour battery storage would be required and there is insufficient space onsite; only 293 MW of 4-hour battery storage resources would fit.[132] In addition to being arbitrary, NRG's decision to hold battery storage to exactly matching the output of the Proposed Project is particularly hypocritical given that NRG has dramatically altered the size of its own proposals for the site over the past 13 years. Rather than faulting the Proposed Project for failing to match the output of its 2010 proposal (now Alternative 2) or its 2017 proposal (now Alternative 3), NRG instead faults the higher output Alternatives 2 and 3 for resulting in greater direct air and GHG emissions.[133]

ii. The Alternatives Analysis Arbitrarily Faults Alternatives for Not Including Black Start Capability, which is Unrelated to Building the Proposed Project.

NRG also arbitrarily faults numerous alternatives for failing to incorporate black start capability. This criticism is remarkably unfair because, as discussed above, black start capability does not derive from the Proposed Project itself, but instead from NRG's proposal to retain two of the existing P&W units on the site. Plainly, black start capability could be added to any alternative by retaining two P&W units until a battery energy storage system could be completed—just as in NRG's actual proposal—and is not a legitimate basis for distinguishing between alternatives.

Further, in its Alternative 4 analysis, NRG inaccurately concludes—without discussion—that installing a battery storage system rather than the Proposed Project would eliminate black start capability that the site currently can provide, jeopardizing New York City's ability to

---

[131] DSEIS at 4-4.

[132] *Id.* at 4-12–13.

[133] DSEIS at 4-8–9.

recover from a major outage.[134] But batteries have been proven as black start resources,[135] and, indeed, NRG itself proposes to add a battery energy storage system at the site specifically to retain black start capability after it retires the last two existing P&W combustion turbines. Moreover, even if a new large-scale battery energy storage system at the site did not provide black start capability, NRG fails to explain why it could not temporarily retain two P&W combustion turbines for that purpose, exactly as it proposes to provide black start capability for its own Proposed Project.

iii. The Alternatives Analysis Arbitrarily Rejects Battery Storage.

Although it rejects stand-alone battery storage at the site as a currently feasible resource, NRG itself notes that the "best long-term use of the Site" would be "future development of stand alone battery energy storage."[136]

Strangely, NRG grounds its rejection of stand-alone battery storage on the premise that stand-alone battery storage "would not resolve known reliability shortfalls in NYC"[137] – ignoring the fact that, as discussed above, the NY PSC and NYISO have already approved local and bulk system transmission projects to address those reliability issues. Those transmission project approvals specifically state that the transmission will negate the need for the NRG Astoria GT capacity.[138] NRG's analysis and rejection of Alternative 4 does not appear to account for the new transmission.

Relatedly, it is not at all clear that NRG has conducted the modeling that would be needed to determine whether batteries are a viable alternative to NRG's proposed gas turbines. As it ignores the Con Edison transmission projects, the company holds up the 2019 E3 study, "The Potential for Energy Storage to Repower or Replace Peaking Units in New York State," as evidence that the turbines cannot be replaced – though that study actually states that some turbines could be replaced with batteries.[139] The E3 study isolated and focused on "the peak NYISO demand year, and the correspondingly high levels of peaker operation."[140] It furthermore analyzed each turbine in isolation, on a unit-by-unit basis, as opposed to assessing the operation of each power plant as a whole or the interconnected relationship between power plants within the same region, which underestimates the potential of energy storage to replace peaker plants. It

---

[134] *Id.* at 4-16.

[135] *See, e.g.*, Andy Colthorpe, *California Battery's Black Start Capability Hailed as 'Major Accomplishment in the Energy Industry'*, Energy Storage News (May 17, 2017), https://www.energy-storage.news/california-batterys-black-start-capability-hailed-as-major-accomplishment-in-the-energy-industry/ ("The battery energy storage system did not only provide startup power, but converted it, allowing the generator to achieve synchronisation"; noting other such successes in Europe.).

[136] DSEIS at 4-10.

[137] *Id.* at 4-16.

[138] *See* PSC, *PSC Approves $800 Million Investment to Maintain* and *Improve Reliability, Achieve Climate-Change Goals, Enhance Resiliency of NYC Transmission Grid.*

[139] *See* Energy and Env'tl Econ. ("E3 Report"), *The Potential for Energy Storage to Repower or Replace Peaking Units in New York State* (2019), https://www.ethree.com/wp-content/uploads/2019/08/E3_The_Potential_for_Energy_Storage_to_Repower_or_Replace_Peaking_Units_in_New_York_State_July_2019.pdf

[140] *Id*. at 4.

nonetheless found that storage or storage-plus-solar could replace all of the Astoria Gas Turbines units.[141] This E3 finding is significant, demonstrating that E3 determined it is technically feasible to replace all the Astoria turbines with no more than 8-hour duration storage, which can be done with existing lithium-ion battery technologies, including some present-day examples in this region.[142]

NRG also attempts to undercut stand-alone battery storage by asserting storage would not reduce costs for New York City electricity customers by providing economic capacity (without a ratepayer guaranteed support contract).[143] NRG inadequately supports this assertion. Even if batteries were to require a larger upfront investment, over time they can provide more value to the grid than gas peakers can, because they can operate to deliver numerous ancillary services to the grid that a gas power plant is not capable of providing,[144] resulting in increased revenue and potentially lower lifetime costs and because, unlike a gas-fired power plant, they can continue to operate beyond 2040 and provide benefits to the New York grid throughout their economic life.

iv. The DSEIS Alternatives Analysis is Too Limited to be the Basis for a CLCPA Determination.

Separate and apart from the serious cross-cutting and alternative-specific flaws with NRG's Alternatives Analysis discussed above, the approach to evaluating alternatives followed by NRG is inadequate to support a finding that the Proposed Project meets the requirements of the CLCPA. The Alternatives Analysis in the DSEIS follows the historic model for an environmental impact statement: if the company does not build the project as proposed, it examines alternative configurations the company might build on the site or similar sites owned by the company for the limited purpose proposed. And it evaluates each alternative in isolation, with the assumption that only one alternative can proceed.

This type of limited alternatives analysis is not well-suited to the consideration required under CLCPA Section 7(2), particularly in the electricity sector where a system-wide, long-term analysis is necessary. As discussed throughout these comments, offsite solutions like transmission upgrades as well as potential renewable and storage installation onsite must all be considered together as a portfolio of alternatives to the Proposed Project. NRG's analysis in the DSEIS fails to incorporate the more comprehensive and sophisticated approach that agencies must employ when analyzing whether feasible, more CLCPA-consistent alternatives to a project or decision exist.

Ultimately, NRG's self-serving alternatives analysis is riddled with inconsistencies and cannot be regarded as a meaningful evaluation of any of the numerous CLCPA-compliant alternative uses for this valuable and strategically located site.

---

[141] *See id*. at 40.

[142] *See id.*

[143] DSEIS at 4-15–16.

[144] NREL, *Greening the Grid: Grid-Scale Battery Storage Frequently Asked Questions* 3–4 (2019), https://www.nrel.gov/docs/fy19osti/74426.pdf.

B. The GHG Mitigation Proposals Do Not Satisfy Obligations under the CLCPA.

This section details how NRG's proposed GHG mitigation measures in both the DSEIS and the draft Title V permit fail to bring the project into compliance with the requirements of either E.C.L. Section 75-0107 or CLCPA Section 7(2).

In a cursory manner, NRG proposes five potential mitigation measures for the Project's GHG emissions in its DSEIS. These proposed measures are 1) the purchase of carbon offsets, 2) efficiency upgrades to two P&W turbines, 3) the eventual replacement of the same P&W turbines with a battery storage facility, 4) the conversion of the Project from a fossil gas to an alternative fuel facility, and 5) a stipulation in DEC's permit that the facility's emissions must steadily decline between now and 2040. These measures do not meet the requirements of the CLCPA for two reasons. First, none of the proposed mitigation measures would zero out the GHG emissions of the Proposed Project, and under the CLCPA's aggressive emissions cap partial or incremental emissions reductions for new fossil fuel infrastructure in the electricity sector are simply impermissible. Second, the measures outlined in the DSEIS lack the requisite detail to allow DEC to make a reasoned determination that the Proposed Project is consistent with the CLCPA under Section 7(2).

Finally, in its draft Title V permit DEC suggests that NRG can provide a mitigation plan within 120 days of the issuance of that permit. This approach is both illogical and unlawful. Issuing the permit prior to NRG's articulation of the mitigation plan would plainly violate CLCPA Section 7(2), which requires agencies to identify GHG mitigation measures to be required where the project is located before issuing a permit approval.

i. Mitigation Proposals in the DSEIS Fail to Zero Out the Project's GHG Emissions.

Approving a permit for any new facility that adds GHG emissions when New York must act to significantly reduce emissions by 2030 and zero out emissions by 2040 under the CLCPA is unacceptable. And even if NRG could mitigate 100 percent of the Proposed Project's GHG emissions, construction of a new gas-fired power plant would still interfere with the State's ability to build out the zero-emissions resources needed by 2040, as described above in Section I.

NRG does not propose any mitigation measures that sufficiently offset or reduce the Proposed Project's new GHG emissions of up to 716,520 tons per year.[145] Even with the most stringent mitigation measures currently available, the company would be unable to reduce the plant's GHG emissions to zero before 2040 and this failure will make it more difficult for the state to meet its 2030 target.

The only feasible near-term measure proposed by NRG to zero out emissions from the Proposed Project involves the use of carbon offsets. Unfortunately for NRG, this measure is expressly prohibited by the CLCPA which states that "sources in the electric generation sector

[145] DSEIS at 3-18 tbl.3.1-6: Project & Facility Potential Annual Emissions.

shall not be eligible to participate in" the offset program established under the law.[146] The company also proposes the conversion of the Proposed Project from fossil gas to hydrogen or "renewable" natural gas; however, as explained further in Section V, these alternative fuels do not zero out emissions and are economically infeasible, in addition to posing serious logistical, safety, and air pollution problems.[147] Indeed, NRG itself in its alternatives analysis rejects both RNG and hydrogen as viable alternatives to the Proposed Project. Finally, the company proposes making efficiency upgrades to two retained P&W turbines or replacing them with a battery storage facility. These extremely modest "mitigation" measures also fail to zero out emissions from the Proposed Project or to do anything to address the main emissions sources: the proposed 437 MW gas-fired combustion turbine. NRG estimates that the first proposal to upgrade the turbines would only reduce emissions by 1,077 CO2eq, a tiny fraction of one percent of the Proposed Project's GHG emissions.[148] More importantly, neither the proposal to upgrade the turbines nor the proposal to replace the turbines with battery storage should qualify as mitigation because the measures do not require construction of a new power plant. The turbines are already part of the existing facility and can be upgraded or replaced without proceeding with the project.

NRG also proposes a "declining carbon emissions cap" which would lock in GHG emissions from the project for almost two decades.[149] While emissions would reach zero by 2040 under the proposal, this can hardly be described as mitigation. Astoria is already required by statute to draw emissions down to zero by 2040. And new emissions from the Proposed Project between now and 2030 will make it more difficult for the state to meet its intermediate deadline in eight and a half years. Finally, the declining emissions cap could also require the retirement of the Proposed Project, which is expected to operate economically through 2053, 13 years early.[150] This raises questions about the feasibility of this particular mitigation proposal. In any event, even a proposal to retire the Proposed Project in 2040 would not mitigate its adverse impacts on New York's ability to achieve a zero-emission grid in 2040 because, as discussed above in Section I(B), the existence of the facility between 2023 and 2040 would seriously impede efforts to develop zero-emission resources in the area.

ii. Mitigation Proposals Mentioned in the DSEIS Lack Sufficient Information for DEC to Conduct a Reasoned Analysis of Their Feasibility or Adequacy.

The cursory and speculative proposals for mitigation outlined by NRG in its draft DSEIS fail to satisfy Section 7(2) of the Climate Act. The public should have the opportunity to read,

[146] N.Y. E.C.L. § 75-0109(4)(f).

[147] *See infra* Section V.

[148] DSEIS at 3-64.

[149] *Id.* at 3-65.

[150] *Id*. at 3-109.

digest and comment on these proposals,[151] and DEC must issue a detailed statement of these GHG mitigation measures and how they satisfy the Climate Act, *before* issuing the permit. Based on the information provided to date, DEC can easily conclude that the proposals in the DSEIS do not meet the requirements of CLCPA.

Even if one or a combination of NRG's mitigation proposals had the potential to zero out GHG emissions associated with the Project consistent with the limits set under the CLCPA, the company has not provided DEC with enough information about these proposals to make a reasoned determination that the project will not "interfere with the attainment of" these limits.[152] For example, in the subsection of the DSEIS dealing with GHG mitigation, NRG's carbon offsets proposal contains no details about how much emissions would be offset or how the company plans to offset the emissions.[153] Similarly, the proposal for a declining emissions cap lacks details on the amount of allowed GHG emissions per year contemplated by NRG in the interval prior to 2040. [154] The declining emissions cap proposal also lacks any description of the monitoring and enforcement mechanism through which compliance would be assured.[155] This lack of specificity and elaboration is characteristic of the DSEIS's entire discussion of GHG mitigation.[156] DEC cannot approve the project absent the submission of additional information on the mitigation proposals.

iii. The CLCPA Prohibits DEC from Approving NRG's Draft Title V Permit Prior to the Submission of the Company's Mitigation Plan.

The draft Title V permit contains a condition requiring NRG to submit a GHG mitigation plan outlining a "strategy or strategies for reducing the greenhouse gas emissions generated by and associated with the facility's operations" within 120 days of the issuance of the permit.[157] This proposal is unlawful because it would circumvent the requirements of CLCPA Section 7(2), which clearly provide that DEC must consider an applicant's proposed mitigation measures before the permit is issued. As discussed above, pursuant to CLCPA Section 7(2), DEC cannot issue the Title V permit unless and until it determines that the Proposed Facility is consistent and would not interfere with the attainment of the state's GHG limits, and, if inconsistency is found

---

[151] N.Y. E.C.L. § 8-0109(4) ("The purpose of a draft environmental statement is… to inform the public… as early as possible about proposed actions that may significantly affect the quality of the environment, and to solicit comments which will assist the agency in the decision making process in determining the environmental consequences of the proposed action"); *id.* § 70-0103(4) ("It is the intent of the legislature to encourage public participation in government review and decision-making processes and to promote public understanding of all government activities").

[152] CLCPA § 7(2).

[153] DSEIS at 3-65.

[154] *Id*.

[155] *Id*.

[156] DSEIS at 3-63–3-65.

[157] NYDEC, Div. of Air Res., *Air Title V Facility Permit* 6 (2021), https://www.nrg.com/assets/documents/legal/astoria/00_2021/astoria-draft-title-v-permit-06-30-2021.pdf. ("Draft Title V Permit").

as DEC has already indicated appears to be the case here,[158] until DEC has provided a detailed statement of justification *and identified* "greenhouse gas mitigation measures to be required where such project is located." CLCPA Section 7(2).

Indeed, DEC's guidance on implementing this provision affirms as much, stating that the agency's CLCPA analysis "should be included in the project description portion of the DEC permit" and that a "similar discussion," including an analysis of possible mitigation measures, "should be included in the basis for monitoring section of the permit review report (PRR) for Title V facilities."[159] As is such, DEC cannot grant NRG a Title V permit for the Proposed Project until after the company submits its complete mitigation plan to the agency, and the public has read and digested the measures and commented,[160] and DEC determines that they satisfy Section 7(2) of the Climate Act.

IV. THE FACILITY WILL HAVE DISPROPORTIONATE IMPACTS ON DISADVANTAGED COMMUNITIES IN VIOLATION OF CLCPA SECTION 7(3).

A parallel provision of the CLCPA, Section 7(3), prohibits agencies from imposing disproportionate impacts on disadvantaged communities when considering and issuing permits, licenses and other administrative approvals and decisions pursuant to the Climate Law. NRG's flawed environmental justice analysis in its DSEIS attempts to hide the adverse and disproportionate impacts this plant would have on neighboring communities that are designated as interim "disadvantaged communities" for CLCPA purposes and have for decades suffered disproportionate impacts of fossil fuel combustion at nearby power plants and congested highways. As discussed below, DEC cannot rely on this flawed environmental justice analysis and NRG's similar dismissal of potential disproportionate impacts on disadvantaged communities. Instead, it must deny the permit due to the impermissible burden the Proposed Project would have on disadvantaged communities.

A. DEC Must Not Approve a Project that Disproportionately Impacts Overburdened Communities under CLCPA Section 7(3).

Under the CLCPA as well as under longstanding DEC policy, New York must avoid imposing disproportionate adverse environmental impacts on overburdened low-income communities and communities of color. Section 7(3) of the CLCPA contains two complementary requirements. First, state agencies, "in considering and issuing permits, licenses, and other administrative approvals and decisions . . . shall not disproportionately burden disadvantaged

---

[158] According to NYSDEC's Notice of Complete Application, *supra* note 1, "it appears that the proposed Replacement Project would be inconsistent with or would interfere with the attainment of the Statewide GHG emission limits established in the Climate Act. Environmental Conservation Law Article 75; 6 NYCRR Part 496."

[159] DEC, *DAR Technical Guidance Memo* 2 (2020), https://climate.law.columbia.edu/sites/default/files/content/CLCPA%20Permit%20Applications%20TGM.pdf.

communities."[161] Second, state agencies "shall also prioritize reductions of greenhouse gas emissions and co-pollutants in disadvantaged communities."[162] Together, these mandates give state agencies and other state entities responsibility to ensure that New York's transition to a net-zero emissions economy will be equitable. Agencies' permitting and other decisions must not only avoid harm to overburdened and climate-vulnerable communities but must also prioritize localized reductions of co-pollutants to improve public health and advance equity.

Section 7(3) holds state agencies accountable to the numerous equity goals enshrined throughout the CLCPA. The law recognizes that communities where fossil fuel combustion has been concentrated – such as the Astoria neighborhood, which hosts six power plants alone – have experienced decades of poor air quality from co-pollutants and that a transition to clean energy should prioritize these communities. It creates a Climate Justice Working Group tasked with defining criteria to designate "disadvantaged communities" within the state for special protection and prioritization. Disadvantaged communities are defined as communities "that bear burdens of negative public health effects, environmental pollution, impacts of climate change, and possess certain socioeconomic criteria, or comprise high-concentrations of low- and moderate- income households."[163] Although the working group has not yet finalized the criteria or list of disadvantaged communities, New York has developed an interim definition to guide policymaking for the time being.[164]

The CLCPA requires the state to target benefits and protections to disadvantaged communities in all measures related to achieving the law's GHG reduction mandates. In crafting the scoping plan, for example, the Climate Action Council must "[i]dentify measures to maximize reductions of both greenhouse gas emissions and co-pollutants in disadvantaged communities."[165] Similarly, in developing and promulgating regulations to require GHG emissions reductions, DEC must ensure that "activities undertaken to comply with the regulations do not result in a net increase in co-pollutant emissions or otherwise disproportionately burden disadvantaged communities," as well as "[p]rioritize measures to maximize net reductions of greenhouse gas emissions and co-pollutants in disadvantaged communities."[166] The state must include in its implementation reporting an assessment of whether regulations have resulted in any disproportionate burdens on disadvantaged communities and an assessment of localized co-pollutant reductions.[167] The law creates a community air monitoring system for certain disadvantaged communities around the state, with the goal of identifying areas with high levels of air pollution and implementing measures to reduce pollution.[168] It requires the state to invest climate-related programmatic resources to

---

[161] CLCPA § 7(3).

[162] *Id*.

[163] N.Y. E.C.L. § 75-0101(5).

[164] See https://www.nyserda.ny.gov/ny/disadvantaged-communities.

[165] N.Y. E.C.L. § 75-0103(14)(d).

[166] *Id*. § 75-0109(3)(c), (d).

[167] *Id*. § 75-0119.

[168] *Id*. § 75-0115.

provide a minimum of 35 percent of all benefits to disadvantaged communities.[169] Finally, the law directs the NY PSC, in designing energy efficiency programs and programs to procure renewable energy and storage resources, to design the programs in a manner that benefits disadvantaged communities, including that the Commission shall "[t]o the extent practicable, specify that a minimum percentage of energy storage projects should deliver clean energy benefits into NYISO zones that serve disadvantaged communities . . . and that energy storage projects be deployed to reduce the usage of combustion-powered peaking facilities located in or near disadvantaged communities."[170]

In addition to the newly created obligations under CLCPA Section 7(3), DEC Commissioner's Policy 29 (CP-29) requires a full analysis of cumulative and disproportionate adverse impacts in an Environmental Impact Statement under SEQRA where a proposed project or major permit modification may impact Potential Environmental Justice Areas (PEJAs). The agency must ensure the applicant conducts a screen to determine whether any census block groups within the geographic area that might be impacted by the proposed project have at least 52.42 percent minority population (in urban environments) or at least 22.82 percent population living below the federal poverty level. If such areas are identified, the applicant must provide an enhanced public participation process. The EIS itself must review the existing environmental burdens impacting any PEJAs and evaluate the additional burdens the proposed project might create.[171] Any adverse environmental impact identified through this analysis must be "avoided or minimized to the greatest extent practicable."[172]

Taken together, the CLCPA and CP-29, as well as additional rigorous environmental justice standards for the siting of major electric generation projects as described further in Section IV(G) below – demonstrate that New York takes environmental justice seriously and that projects must be carefully scrutinized for disproportionate impacts on low-income communities and communities of color. These Article 10 requirements would have been applicable to the Proposed Project had NRG not sought to evade that scrutiny by relying on a completely different, earlier proposed project to obtain a determination that its 2017 proposed project was exempt from Article 10 review. Any adverse disproportionate impacts must be avoided to the greatest extent practicable under CP-29 and SEQR, and under CLCPA Section 7(3), DEC cannot approve a project that has a disproportionate adverse impact on disadvantaged communities.

The analysis in the DSEIS fails to meet New York's standards for environmental justice as it appears intentionally skewed to mask the disproportionate adverse impacts the Project will have on people living in both PEJAs and Disadvantaged Communities. In its review under Section 7(3), DEC should not rely on or be distracted by the flawed analysis in the DSEIS. A more thorough and transparent analysis shows the project will disproportionately harm air quality in disadvantaged communities, and thus DEC cannot approve the permits. Instead, by denying the permits, DEC can advance Section 7(3)'s mandate to prioritize reductions of GHGs

---

[169] *Id.* § 75-0117.

[170] N.Y. P.S.L. § 66-p(7)(a).

[171] DEC, *DEC Policy: CP-29 Environmental Justice and Permitting* §V(J) (Mar. 2003), https://www.dec.ny.gov /docs/permits_ej_operations_pdf/cp29a.pdf. ("CP-29").

[172] *Id.* at § V(M).

and co-pollutants in disadvantaged communities, and make room for non-discriminatory, zero emissions alternatives to move forward.

B. NRG'S Arbitrarily Limited Study Area Attempts to Mask the Project's Full Impacts on Disadvantaged and Environmental Justice Communities.

It is undisputed that the Project would impact both DEC-designated PEJAs and NY-designated disadvantaged communities. NRG's analysis shows that even within its artificially limited study area, restricted to the parts of Queens County that lie wholly within a 1-mile radius from the plant, there are six census block areas (based on 2010 census data) that meet the criteria for PEJAs,[173] and five census block groups that meet the interim definition of "disadvantaged communities" set by New York State.[174] Together, approximately half of the census block groups in Queens that lie wholly within a 1-mile radius from the plant are either PEJAs or disadvantaged communities. That limited population, however, is just a fraction of those living in PEJAs and disadvantaged communities likely to be impacted by the project.

By restricting the study area to the portion of the 1-mile radius from the site that falls within Queens County, NRG has created a study area that is extremely limited compared to other similar projects in recent years. Because the project is located in a non-residential industrial site next to the water at the edge of Queens County, bordering both Bronx and New York Counties, the populated area NRG actually studied is only 1.24 square miles, or the equivalent of a 0.6 mile radius.[175] Additionally, the *entire area* within the 1-mile radius but *outside* Queens County is designated as a PEJA or a disadvantaged community. Simply by excluding the areas within the 1-mile radius that fall within the Bronx or Manhattan, NRG artificially excluded significant PEJAs from consideration. Directly across the channel from the proposed power plant is Rikers Island, where people in pre-trial detention can be held for years awaiting trial. On DEC maps, the entirety of Rikers Island is designated as a PEJA.[176] Similarly, the portion of the Port Morris neighborhood of the Bronx that falls within the 1-mile radius is designated as a PEJA by DEC[177] and as a disadvantaged community under the interim definition.[178]

For a more comprehensive environmental justice analysis in line with other recent similar projects and best practice under CP-29, the study area should also be expanded beyond the 1-mile radius to capture the full geographic area that would experience air pollution impacts from the plant. By comparison, other recently proposed gas plants have used study areas of 2 to 5

---

[173] DSEIS at 3-67; *see also* 3-49 fig. 3.3-3.

[174] *Id.* at 3-47; *see also* 3-48 fig.3.2-5.

[175] Stephen Metts, Geospex LLC, *Environmental Justice Findings Statement: NRG Astoria Replacement Project* 4–5 (Sept. 2020), attached hereto as Appendix C. ("Metts Report").

[176] *See Potential Environmental Justice Area PEJA Communities*, ArcGIS, https://www.arcgis.com/home/webmap/viewer.html?url=https://services6.arcgis.com/DZHaqZm9cxOD4CWM/ArcGIS/rest/services/Potential_Environmental_Justice_Area__PEJA__Communities/FeatureServer&source=sd (last visited Sept. 9, 2021).

[177] *Id*.

[178] *See* map at *Disadvantaged Communities*, NYSERDA, https://www.nyserda.ny.gov/ny/disadvantaged-communities (last visited Sept. 9, 2021).

miles, based on the likely range of air pollution impacts from the plants.[179] The 1-mile radius NRG uses to limit the study area has no basis in the law, regulations, or on-the-ground reality. Section 7(3) of the CLCPA does not prescribe a geographic limitation on which communities might be burdened by a project, policy or activity being considered by a state agency. Similarly, under CP-29, the appropriate study area for an environmental justice analysis is not pre-defined and should be based on the scope of likely impacts of the project.[180] Here, the primary potential adverse environmental impact from the project is air pollution, which can spread far from the source of emissions. For NRG's air quality analysis, a standard AERMOD distance of 3-km was used to model steady-state dispersion of air emissions.[181] While the map included in the body of the Environmental Justice analysis section attempts to mask the full geographic impact of potential air pollution by showing only a single point of maximum air impact for each criteria pollutant,[182] maps produced for its air quality analysis show emissions affecting a much larger geographic area that extends beyond the 1-mile radius.[183] In addition, the 1-mile radius does not even encompass the maximum air impact for all criteria pollutants, while a 3-km radius would.[184]

Based on the 3-km radius area NRG itself used to model likely air impacts, for the purpose of comparison Geospex LLC mapped the PEJA and disadvantaged communities, as well as existing environmental burdens and health outcomes, within a conservative alternative study area of a 3-km (1.82-mile) radius from the plant. Within a 3-km radius, the proportion of PEJAs and disadvantaged communities is far higher than within the 1-mile radius. First, the total population within a 3-km radius is nearly *ten times* the total population within NRG's 1-mile radius study area.[185] The limited total population within the 1-mile radius and huge increase in population just a short distance farther out demonstrates that a study area of at least a 3-km radius from the plant is critical to capturing the true impacts on proximate communities. Within a 3-km radius from the plant, 66 percent of the population qualifies as PEJA, and 58 percent of the Census Block Groups (CBGs) are PEJAs, compared to only 38 percent of population and 32 percent of CBGs in NRG's limited study area.[186] Similarly, within a 3-km radius 84 CBGs are designated disadvantaged communities under the CLCPA for a total of 53 percent of all CBGs, while the 1-mile radius contains just 6 CBGs that are disadvantaged communities.[187] The following figure demonstrates the high concentration of PEJAs within a 3-km radius.

---

[179] Metts Report at 4.

[180] *See* CP-29 at § V(B)(1).

[181] *See* DSEIS at 3-24; AECOM, *Title V Air Permit Major Modification Turbine Replacement Project: Astoria Gas Turbine Power LLC* 5-12 fig. 5-2, https://www.nrg.com/assets/documents/legal/astoria/astoria-gas-turbine-llc-air-permit-application-revision-5-28-2021.pdf.

[182] *See* DSEIS at 3-82 fig.3.3-6.

[183] *See* AECOM, *DSEIS Appendix K: Modeling Results Concentration Isopleths* (2021), https://www.nrg.com/assets/documents/legal/astoria/00_2021/appendices-e-m-06-30-21.pdf.

[184] Metts Report at 8.

[185] *Id*. at 7 tbl.3.

[186] *Id*.

[187] *Id*. at 11 tbl.5.

Figure 5: NYSDEC OEJ 2021 PEJA at 1 mi and 3 km radii [188]

[188] *Id.* at 10 fig.5.

C. The DSEIS Arbitrarily Excludes Existing Sources of Pollution Impacting the Area.

A key step in an environmental justice analysis is to identify all existing sources of pollution and ambient pollution levels within the area, to determine how impacts from the proposed project would add to the existing burden on a community.[189] In its DSEIS, NRG appears to account for cumulative impacts from multiple existing pollution sources, but it uses some sleight-of-hand to exclude most sources of pollution that actually burden communities that would be impacted by the proposed plant.

The affected area is home to many power plants, contaminated sites undergoing remediation, industrial facilities, highways and an airport – and by limiting the study area to a 1-mile radius NRG arbitrarily excludes additional pollution sources. At the Astoria Industrial Complex alone, where the proposed plant would be sited, there are three other power plants, with a fourth, Astoria Energy, just outside the Complex.[190] A large portion of the Complex is undergoing remediation for legacy contamination. The Hell Gate power plant in the South Bronx is within the 1-mile radius, but is not mentioned at all in the DSEIS analysis; a neighboring power plant, the Harlem River Yard plant, is just on the border of the 1-mile radius and again not mentioned at all.[191] Not far outside the 3 km radius are several additional large power plants in southern Astoria/Long Island City, whose emissions likely impact people living within PEJAs in a 3 km radius.[192]

NRG attempts to downplay the significance of the many sources of pollution—including air emissions—within even its own limited study area by arguing that facilities and polluted sites that are not physically located *within* the PEJAs in the study area should not be considered as an existing burden on the PEJAs.[193] This argument is nonsensical for several reasons. First, sources of air emissions need not be sited within a PEJA in order to impact people living within a PEJA, since air pollution travels off the site of a facility and affects the air quality of the surrounding area. Second, many of the most polluted sites are in industrial-zoned areas that would never be designated as a PEJA in any circumstance because they have no residential population.[194] The DSEIS also ignores the fact that within NRG's limited study area, most of the PEJAs are concentrated on the fenceline, directly adjacent to the Astoria Industrial Complex where the majority of polluting facilities and sites under remediation are located.[195]

---

[189] CP-29 at § V(J).

[190] DSEIS at 3-75; *id.* at 3-77 fig.3.3-4.

[191] *See Opportunities for Replacing Peaker Plants with Energy Storage in New York State*, PSE, https://www.psehealthyenergy.org/our-work/energy-storage-peaker-plant-replacement-project/new-york/ (last visited Sept. 9, 2021) (interactive map).

[192] Ravenswood Generating Station, a 2,480 MW power generating station in Long Island City; Vernon Boulevard power plant also located in Long Island City (*see* map at *id.*).

[193] *See* DSEIS at 3-74 & tbl.3.3-2.

[194] *See id.* at 3-77 fig.3.3-4 (all major air emissions sources in industrial, non-residential areas); *id.* at 3-78 fig.3.3-5 (all remediation sites either in industrial, non-residential areas or within PEJA).

[195] *See id* at 3-78 fig.3.3-5.

While the DSEIS identifies stationary sources of pollution and contaminated sites, it fails to include other important contributors to air pollution in New York City: concentrations of car and truck emissions along highways and near distribution centers. Tailpipe emissions from cars, trucks, and buses are a leading source of harmful air pollution in NY state and significantly impact communities of color.[196] Within a 3-km radius, directly adjacent to PEJAs, lie highly congested highways: the Grand Central Parkway leading to LaGuardia Airport and the Robert F. Kennedy Bridge, and the Bruckner Expressway leading to the Major Deegan Expressway in the Bronx.[197] The DSEIS also arbitrarily excludes LaGuardia Airport, located just outside the 1-mile radius and partially within a 3-km radius from the plant. Also located partially within and impacting the 3-km radius area is the Hunts Point Distribution Center, one of the largest wholesale distribution facilities in the world, which brings about 15,000 trucks traveling in and out of the Hunts Point neighborhood each day.[198]

Finally, the DSEIS fails to consider localized concentrations of air pollution in its environmental justice analysis. The New York City Community Air Survey (NYCCAS), the largest ongoing air monitoring program of any U.S. city, has a network of 100 air monitors throughout the city and has collected data on concentrations of air pollutants since 2008 which is published in publicly available maps and reports.[199] NYCCAS data, which the DSEIS completely and arbitrarily ignores, show elevated concentrations of Black Carbon, Nitric Oxide, Nitrogen Dioxide, and PM 2.5 compared to the rest of the city in many parts of the study area, even within the 1-mile radius, and especially in the PEJAs of the South Bronx encompassed by both the 1-mile and 3-km radii.[200] The mean concentrations for all these pollutants within the 3-km radius is consistently higher than the NYC mean, and higher than within the 1-mile radius.[201] An analysis shows that the Proposed Project will add air pollution on top of consistently elevated air pollution in neighboring environmental justice communities – particularly those *just outside* the 1-mile radius line chosen by the company.

D. The DSEIS Fails to Consider a Representative Health Baseline.

In its study of health outcomes in the DSEIS, NRG uses health data only from the 11205 Astoria zip code as its baseline for comparison with other areas in Queens County and the city. Like the 1-mile radius for the study area, this baseline is not actually representative of the

---

[196] Union of Concerned Scientists, *Inequitable Exposure to Air Pollution from Vehicles in New York State* 1 (2019), https://www.ucsusa.org/sites/default/files/attach/2019/06/Inequitable-Exposure-to-Vehicle-Pollution-NY.pdf.

[197] *See Traffic Data Viewer*, New York State, https://gisportalny.dot.ny.gov/portalny/apps/webappviewer/index.html?id=28537cbc8b5941e19cf8e959b16797b4 (last visited Sept. 9, 2021.

[198] Cynthia Rosenzweig & William Solecki, *Special Issue: Advancing Tools & Methods for Flexible Adaptation Pathways & Science Policy Integration*, The New York Academy of Sciences (March 2019), https://www.nyas.org/annals/special-issue-advancing-tools-and-methods-for-flexible-adaptation-pathways-and-science-policy-integration-new-york-city-panel-on-climate-change-2019-report-vol-1439/.

[199] *See The New York City Community Air Survey*, City of New York, https://nyccas.cityofnewyork.us/nyccas2020/web/report (last visited Sept. 9, 2021).

[200] Metts Report at 14 fig.7, 15 fig.8, 16 fig.9, 17 fig.10.

[201] *Id*. at 18 tbls.6–9.

proximate communities that will be impacted by the plant, which lies on the very border of Queens across the channel from areas of the South Bronx and East Harlem that have far different health profiles.

To demonstrate a health profile that is more representative of those proximate communities, Geospex LLC examined data for the same or similar health burdens as those included in the HOD analysis in the DSEIS pulled from New York City Community Health Profiles for Community Districts intersecting with the 3-km radius from the Proposed Project.[202] For nearly all health burdens examined (life expectancy, infant mortality, premature mortality, and colorectal cancer and lung cancer premature deaths), the three community districts within the 3-km radius from the plant in the Bronx and New York County, which were excluded from the analysis in the DSEIS, have definitively worse health outcomes.[203] Again, excluding these communities from study in the DSEIS is a significant shortcoming that skews the outcome, allowing NRG to falsely claim that impacted communities do not have significantly worse existing health burdens than other similar neighborhoods or the city as a whole.

E. The DSEIS Arbitrarily Concludes There Are No Adverse Environmental Impacts.

The environmental justice analysis in the DSEIS attempts to obscure adverse impacts from the project by glossing over the projected air emissions from the facility, where the draft air permit would allow it to emit up to 97.5 tons of nitrogen oxides per year and 52.6 tons of particulate matter per year,[204] and by continuing to compare the project to either the existing facility or the configuration proposed in 2010 but never built, rather than the "no action" alternative of no power plant on the site (see Section II(D)(iii), above).

There is no question that, even with "state of the art" technology, the proposed new power plant would emit criteria and other harmful pollutants. The plant is also seeking a permit to run as a backup on diesel fuel (ULSD), which has higher emissions levels for nearly all criteria pollutants, for up to 720 hours a year. The baseline for comparison for these potential emissions from the proposed plant is not a project proposed over a decade ago that was never built and is not contemplated to be built now. The frequent references in the DSEIS environmental justice analysis to reductions of likely impacts as well as reductions of ambient air pollution from the 2010 project are completely irrelevant to the analysis and serve to obscure likely impacts of this project. As stated above in Section II(D)(iii), the relevant baseline here is a no action alternative, where the existing plant retires or ceases operations during the ozone season under 6 N.Y.C.R.R. Part 227-3, and thus there are no air emissions. Compared to the baseline, the proposed plant will certainly increase air emissions within the study area, causing an adverse environmental impact.

---

[202] *Id*. at 19–22. Intersecting Community Districts excluded from analysis in the DSEIS are: Mott Haven & Melrose - Bronx CD 201; Hunts Point & Longwood - Bronx CD 202; East Harlem - Manhattan CD 111.

[203] *Id*. at 21.

[204] *See* Draft Title V permit at 24–26 (https://www.nrg.com/assets/documents/legal/astoria/00_2021/astoria-draft-title-v-permit-06-30-2021.pdf).

Contrary to NRG's assumption, air emissions that fall below EPA Significant Impact Levels (SILs) can still be significant adverse impacts under SEQR and must be considered in an environmental justice analysis to assess localized, cumulative impacts on disadvantaged communities. Under SEQR regulations, the significance of a likely consequence of a proposed project must be assessed in terms of numerous factors not considered in determining whether air emissions exceed SILs, including setting (urban or rural), the probability of occurrence, duration, irreversibility, geographic scope of impact and the number of people affected.[205] Here, we know air emissions will definitely occur when the plant runs, will continue every time it is operating, and will irreversibly add to air contamination over a relatively large geographic area that is very densely populated. Under those factors, the air emissions from the proposed plant should be considered a significant, adverse environmental impact in any situation. For an environmental justice analysis, it is even more critical to take a hard look at the impact of any level of emissions in terms of localized, cumulative impacts on particular communities in light of health conditions, other vulnerabilities, and other environmental harms, none of which are captured in SILs.

Finally, as more fully described in Section II(D)(iii) above, NRG's claim in the DSEIS that the Proposed Project will have an overall benefit by reducing air pollution from other power plants has no bearing on the issue of disproportionate impacts on environmental justice or disadvantaged communities because NRG has failed to demonstrate where local air pollution reductions are projected to occur. Most likely, any localized air quality benefits will not be experienced by people living close to the Proposed Project. Without knowing whether these projected air quality improvements will take place in PEJAs or disadvantaged communities, and whether they would result in pollution reductions for the PEJAs and disadvantaged communities impacted by *this* project, DEC cannot conclude that the direct air impacts from the Proposed Project are mitigated or that significant adverse impacts within the study area will be avoided. Vague claims of air quality improvements in other areas of New York City are simply not relevant to determining whether there are disproportionate impacts in the specific disadvantaged communities likely to be impacted by this project.

F. Adverse Impacts from the Project Fall Disproportionately on People Living in Potential Environmental Justice Areas and Disadvantaged Communities.

After artificially limiting the study area to mask the project's impacts on people of color and low-income communities in Queens, East Harlem and the South Bronx, arbitrarily excluding existing sources of pollution within the area from its analysis, ignoring citywide data showing existing disproportionate levels of air pollution in PEJAs within the area likely to be impacted by the project, and attempting to downplay the significance of air emissions from the project by comparing them to a 2010 plant that was never constructed, NRG blithely claims the Proposed Project cannot have disproportionate impacts on communities of color and low-income communities because areas not falling under these designations would also be impacted by the Proposed Project. This is not the correct standard for disproportionate impact. In fact, the

[205] 6 N.Y.C.R.R. § 617.7(c)(3).

Proposed Project disproportionately impacts people in PEJAs and disadvantaged communities in several ways.

First, a glance at the maps in the DSEIS Figures 3.3-3 and 3.2-5 shows that the areas designated as PEJAs and disadvantaged communities within the 1-mile radius and within Queens County are all concentrated directly adjacent to or just one block away from the Astoria Industrial Complex where the existing plant, the Proposed Project, and three other power plants are located. These communities are, quite literally, "fenceline communities," while non-PEJA areas mostly lie farther from the project site. This is one way in which the Proposed Project disproportionately impacts people living in PEJA and disadvantaged communities: within the immediate neighborhood of northern Astoria, people of color and low-income people live clustered closer to the project site and thus are more likely to experience concentrated air pollution as well as noise, visual impacts, and impacts of construction of the plant. The fact that several blocks on the fenceline of the facility are not designated as PEJA or disadvantaged communities does not erase this disproportionate impact, because *the majority* of the fenceline communities are designated as PEJA, while those in the northern Astoria neighborhood farther from the project and other power plants on the same site are not.

Outside the immediate northern Astoria neighborhood near the plant, the disproportionate impact of the project plays out in another way: within the 3-km radius likely to experience direct air emissions impacts, as stated above, a disproportionate share of the area is designated as a PEJA and disadvantaged community. In other words, the air emissions from the plant will adversely impact more areas designated as PEJAs and disadvantaged communities than not, and more people of color and low-income people than white, higher-income people.

Finally, the Proposed Project will disproportionately impact PEJAs and disadvantaged communities because it will add harmful air pollutants to the disproportionate pollution these communities already experience. In particular, the parts of the South Bronx that lie within the 1-mile and 3-km radii from the project already have much higher concentrations of NO, NO2, and PM2.5 than many other areas in New York City.[206] Additional NOx and PM 2.5 emissions from the project will exacerbate the existing disparity in air pollution within these communities – even if overall NAAQS across the region are not exceeded. In the same way, the additional air emissions will exacerbate health disparities in neighboring communities where cumulative burdens already lead to worse health outcomes than in other parts of the city.

The reasoning in the DSEIS supporting NRG's conclusion that the Proposed Project will not disproportionately impact environmental justice communities fundamentally misunderstands the nature of disproportionate impact. Even accepting, as the DSEIS claims, that the "overall portion of the population of Astoria within the EJ Study Area falls well outside of the characteristics of EJ review criteria (poverty and minority) and are [sic] subject to the same net environmental burden as are the persons living within the defined EJ areas,"[207] does not negate

---

[206] *See* maps at *The New York City Community Air Survey*, City of New York, https://nyccas.cityofnewyork.us/nyccas2020/web/report (last visited Sept. 9, 2021) (scroll down to "Pollutant Maps"; select year "2019" on drop-down menu; select NO, NO2, and PM 2.5 from top bar).

[207] DSEIS at 3-74.

the possibility that the impacts of this Project will be more harmful to communities of color and low-income communities. Similarly, the DSEIS makes the fallacious argument that because the entire New York Metro Area, including parts of New Jersey, New York City, Westchester and Connecticut, is designated as being in nonattainment status for the 2008 ozone NAAQS, the PEJA and non-PEJA areas are both exposed to high levels of ozone and "[t]herefore, the PEJA population within the Study Area PEJA [sic] is not disproportionately exposed to ozone concentrations above the NAAQS."[208] Accepting such an argument would make it impossible to demonstrate disproportionate impact for ozone or its contributors like NOx and VOCs anywhere within the entire nonattainment area. The argument is also demonstrably false as a nonattainment area does not mean that there is uniform poor air quality across the entire area. Instead, a nonattainment area encompasses places where air monitors show levels of pollutants above the NAAQS as well as nearby places where monitors show levels meeting the NAAQS but pollution from those areas contributes to the nearby nonattaining monitors. Additionally, disparate impacts from NOx and ozone have been well documented[209] and publicly available data from local air monitors map local concentrations of ozone across the city showing significant disparities from one neighborhood to the next.

G. CLCPA Section 7(3) Requires DEC to Deny the Permit to Avoid Disproportionate Burdens and Prioritize GHG and Co-Pollutant Reductions in Disadvantaged Communities.

DEC's obligation under Section 7(3) of the CLCPA is twofold: it cannot disproportionately burden disadvantaged communities, and it must prioritize GHG and co-pollutant reductions within those communities. Because of the myriad flaws in the DSEIS's environmental justice analysis described above, DEC cannot rely on that analysis or its disingenuous conclusion that the project will have no disproportionate adverse impacts on PEJAs or disadvantaged communities. Nor can DEC rely on NRG's vague claims that the project will result in "overall" air quality improvements, because nowhere are those claims supported by details showing the geographical extent of the purported reduction in pollution or demonstrating the localized impact of the purported benefits. As described above in Section II(D)(iii), these purported air quality benefits are also likely to be short-lived, as the "dirtier" peakers this Proposed Project would replace themselves retire by 2025 under the NOx limits or are rendered unnecessary by transmission improvements, increased renewables, and expansion of energy storage and demand response – all of which will necessarily occur under the CLCPA. There is insufficient information for DEC to determine that these purported benefits will mitigate the disproportionate impacts of this Project on the disadvantaged communities impacted by this Project, or otherwise benefit disadvantaged communities in the city.

---

[208] *Id*. at 3-75.

[209] For example, in New York City, ozone-attributable asthma hospitalization rates & emergency department visits vary based on a neighborhood's relative poverty rate, with ozone-attributable asthma hospitalization rates four times higher in high-poverty neighborhoods compared to low-poverty neighborhoods. Iyad Kheirbek et al., N.Y.C. Dep't of Health & Mental Hygiene, *Air Pollution & the Health of New Yorkers: The Impact of Fine Particles & Ozone* 33 figs.28 & 29 (2011), https://www1.nyc.gov/assets/doh/downloads/pdf/eode/eode-air-quality-impact.pdf.

A key element in determining whether disparate impacts can be justified or allowed as unavoidable under civil rights laws is whether less discriminatory alternatives are available. Here, there is a clear alternative that would align with overall CLCPA mandates and with Section 7(3): not building this plant is a feasible alternative that would avoid disproportionate burdens of additional air pollution on disadvantaged communities, particularly those in the South Bronx already overburdened by air pollution. It would also prioritize reductions of GHG and co-pollutant emissions in and near the disadvantaged communities surrounding the proposed plant. Transmission, demand response, wind and solar generation, and battery storage are all zero-emissions alternatives that would advance CLCPA goals and would not have disproportionate adverse impacts on disadvantaged communities.

To comply with the CLCPA and live up to the strong equity commitments New York made in enacting this law, DEC should not overlook the disproportionate impacts of the Proposed Project on communities already suffering from poor air quality due to concentrations of fossil fuel combusting power plants and vehicle emissions. In light of the disproportionate impacts of the Proposed Project on air quality in disadvantaged communities, which NRG attempts to mask in its flawed EJ analysis in the DSEIS, DEC must not approve the Title V or other relevant permits for this Project under CLCPA Section 7(3).

V. ADDITIONAL CONSIDERATIONS FOR DEC IN DENYING THE TITLE V PERMIT.

A. DEC Should Disregard All Discussion of a Possible Switch to Hydrogen or RNG Fuel Because NRG Has Not Demonstrated Conversion to Either Fuel Is Technically or Economically Feasible at the Site or That Either Fuel Would Result in Zero Emissions, as Required by the CLCPA.

With its purported analysis of the potential use of hydrogen or renewable natural gas (RNG) fuel at the plant, NRG seeks to both have its cake and eat it too. Out of one side of its mouth, it states repeatedly that it is "not relying on a transition to a renewable fuel to demonstrate consistency with the CLCPA,"[210] while out of the other side of its mouth,[211] in the

[210] DSEIS at 3-49. *See also id*. at 3-64 n.82 ("It should be noted the Project is not seeking to permit operation on hydrogen fuel at this time …."); DSEIS App. E.1 at 2 ("whether (and when) the Project starts to generate electricity using hydrogen fuel. … Building the Project is also consistent with the long-term targets & goals of the CLCPA, which require 70% of electricity statewide to be sourced from renewables by 2030, shifting to zero-carbon emission generation by 2040, as the Project's CTG technology is already capable of being converted to use zero emission hydrogen as fuel once it becomes commercially available in sufficient quantities via a commercial delivery system such as the existing natural gas pipeline system.); *id*. at 22 ("It is not yet clear what technologies will emerge, but one key option includes converting gas generation to hydrogen fuel. The turbine technology selected by the Astoria Replacement Project is capable of being converted to use hydrogen in the future instead of natural gas or fuel oil. This positions the Project to operate post 2040 within a zero-carbon electric grid (consistent with the CLCPA) while continuing to provide multiple benefits to the bulk power system."); *id* at 13 ("Based on available data, Guidehouse projects that the annual average capacity factor for the Project operating on green hydrogen after 2040 would be ~1.3%, with a few starts in the shoulder months & a moderate amount of generation during the summer peak period in July 2050.")

[211] DSEIS at § 4.8.

mitigation section of the DSEIS, it states that "if deemed necessary, potential mitigation options include … the use of hydrogen or renewable natural gas once commercially available."[212] But NRG itself dismisses the fuels as potential alternatives due to technological and commercial infeasibility[213] and has not demonstrated that they would be any more feasible as a CLCPA compliance strategy in the future. Moreover, NRG fails to establish that either fuel would result in zero emissions, as required by the CLCPA.

i. Pure Hydrogen Combustion Is Not Technologically Feasible with the Project's Proposed Technology.

NRG's claim that it could one day transition to burning green hydrogen lacks meaningful consideration of the substantial barriers to retrofit a gas plant to wholly or even partially run on green hydrogen.[214] No commercially available power plant turbines can burn pure hydrogen, meaning that even power plants with access to green hydrogen will continue to burn a mixture of hydrogen and fossil gas. Even burning a 50/50 gas blend of green hydrogen and methane would 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),"[215] all pose challenges to retrofitting gas plants to run on green hydrogen, and those challenges multiply with increasing concentrations of hydrogen in the power plant's fuel blend. 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.[216] Many of these are also needed for high blends of hydrogen mixed with traditional gas.[217]

ii. Anything More Than a 50 Percent Hydrogen Blend is Not Possible with Existing Technology Proposed for This Plant.

NRG states in its DSEIS that its "H-class CTG is also expected to be fully convertible to operate utilizing hydrogen created from renewable sources as fuel to generate zero-carbon electricity, if and when green hydrogen fuel is available in the future."[218] However, the DSEIS buries the fact that the existing turbines are nowhere near able to run on 100% hydrogen, and in fact an Appendix regarding the turbines' ability to burn hydrogen clearly states that a "complete

---

[212] *Id.* at ES-6.

[213] *Id.* at § 4.8.2: Limitations of Alternative 7.

[214] Sasan Saadat & Sara Gersen, Earthjustice, *Reclaiming Hydrogen for a Renewable Future: Distinguishing Oil & Gas Industry Spin from Zero-Emission Solutions* 24–26 (2021), https://earthjustice.org/sites/default/files/files/hydrogen_earthjustice.pdf. ("Reclaiming Hydrogen Report").

[215] Reclaiming Hydrogen Report at 24, citing Jeffrey Goldmeer et al., Gen. Elec., *Hydrogen as a Fuel for Gas Turbines* 3 (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.

[216] *Id*. at 24–25 (citing Goldmeer et al.).

[217] *Id*.

[218] DSEIS at 3-63–64.

replacement of the combustion system in the gas turbine" would be required sometime in the next 15 to 20 years in order to use hydrogen at the higher blends promised.[219]

iii. Even the Aspirational 50 Percent Hydrogen Blend Would Only Achieve Modest CO2 Reductions.

Even if the logistical challenges can be overcome to allow gas-fired power plants to burn a gas blend and green hydrogen, this feat will have only a modest effect on greenhouse gas emissions. A 10 percent hydrogen blend, which is all the current Proposed Project could accomplish without major modifications, would only result in 3 percent CO2 emissions savings.[220] A 50 percent hydrogen blend would only achieve a 20 to 25 percent CO2 reduction, while at the same time, increase NOx emissions (See Section V(A)(ix), infra).[221]

The modest CO2 reductions are due to hydrogen's low energy density – "large volumes of hydrogen deliver less energy than the methane in fossil gas."[222] Such meager reductions in CO2 emissions, accompanied by increased NOx emissions, in the face of exorbitant cost, immense logistical hurdles, and potential local safety and flammability concerns is not only not CLCPA-compliant, but entirely nonsensical.

iv. Sufficient Renewable Energy is Not Available to Produce Green Hydrogen.

NRG spends less than two paragraphs discussing the vast supply of renewable energy needed to produce "green" hydrogen needed for the Proposed Project.[223] NRG acknowledges that "[t]he majority of today's hydrogen is produced and consumed on the same site" and that is not green hydrogen at all, but fossil-fuel generated hydrogen.[224] For those reasons, NRG also notes that for the Proposed Project's "green hydrogen fuel will need to be transported to the Site." [225]

NRG notes the extremely large "quantity of hydrogen required to operate the Proposed Project (12.47 MMft3)" [226] and that "[b]ased on current electrolysis technology, the amount of

---

[219] AECOM, *DSEIS Appendix L: Information from General Electric Regarding Use of Green Hydrogen* (2021), https://www.nrg.com/assets/documents/legal/astoria/00_2021/appendices-e-m-06-30-21.pdf.

[220] Bryndis Woods & Elizabeth A. Stanton, Applied Econs. Clinic, *Comments on Astoria Gas Turbine Power LLC's Proposed Gas-Fired Combustion Turbine* 5 (Sept. 2020) (citing Jeffrey Goldmeer, Gen. Elec. Power, *Power to Gas: Hydrogen for Power Generation* (Feb. 2019), https://www.ge.com/content/dam/gepower/global/en_US/documents/fuel-flexibility/GEA33861%20Power%20to%20Gas%20-%20Hydrogen%20for%20Power%20Generation.pdf.), attached hereto as Appendix B ("AEC Report"); Reclaiming Hydrogen Report at 25 fig.7.

[221] Goldmeer et al., *supra* note 215, at 5.

[222] Reclaiming Hydrogen Report at 25.

[223] DSEIS at 3-50.

[224] *Id*.

[225] *Id*.

[226] *Id*.

renewable energy required to produce the necessary quantity of fuel would be 1,825 MWh."[227] The generation of green hydrogen through electrolysis requires large amounts of surplus renewable energy.[228] Using today's technology it would take over 1,800 MW of nearby wind or solar power to generate approximately 130 MW of energy through hydrogen electrolyzers.[229] The Proposed Project is a 437 MW facility.

The diversion of New York's currently limited supply of wind and solar energy towards the energy-intensive production of green hydrogen for the Proposed Project would make it significantly harder to meet the CLCPA's target of a 70 percent renewable grid by 2030. This is especially true as demand on New York's limited renewable energy supplies grows as electrification becomes more widespread throughout the state and as agencies work to meet the 2040 target of a zero emissions grid. [230]

v. NRG does not Elaborate on how It Will Safely Transport Green Hydrogen to the Site.

As mentioned above, NRG also notes that the Proposed Project's "green hydrogen fuel will need to be transported to the Site." [231] NRG admits that "[t]here are [no pipelines] currently located in *or proposed for* New York State" designed for transporting hydrogen to the site.[232]

In the absence of such pipelines, the company proposes using existing natural gas pipelines. NRG claims that these pipelines can "transport hydrogen in blends up to 10 to 20% without requiring any major modifications."[233] NRG's estimate is optimistic, and there is reason

---

[227] *Id*.

[228] *See, e.g.*, *Hydrogen in the Northwest European Energy System*, Aurora Energy Research (Aug. 31, 2020), https://auroraer.com/insight/hydrogen-in-the-northwest-european-energy-system; Sonal Patel, *Why Power-to-Gas May Flourish in a Renewables-Heavy World*, Power Magazine (Dec. 2, 2019) https://www.powermag.com/why-power-to-gas-may-flourish-in-a-renewables-heavy-world/; *High-Volume Hydrogen Gas Turbines Take Shape*, Power Magazine (May 1, 2019), https://www.powermag.com/high-volume-hydrogen-gas-turbines-take-shape ("running electrolysis to produce 50 MW for one hour at a CCGT running at 50% efficiency could require 175 MW of renewable power & 3,400 kilograms (more than 14,000 gallons) of hydrogen.").

[229] *Hydrogen Fueled Gas Turbines*, General Electric, https://www.ge.com/power/gas/fuel-capability/hydrogen-fueled-gas-turbines. These figures were derived from use of the cited calculator.

[230] 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 (citing M.W. Melaina et al., Nat'l Renewable Energy Lab'y, *Blending Hydrogen into Natural Gas Pipeline Networks: A Review of Key Issues* (Mar. 2013), https://wwwnrel.gov/docs/fy13osti/51995.pdf); *see also* E3, *Pathways to Deep Decarbonization in New York State* 29–33 (June 2020), https://climate.ny.gov/-/media/CLCPA/Files/2020-06-24-NYS-Decarbonization-Pathways-Report.pdf (describing increased electricity demand as building and transportation electrification expands).

[231] DSEIS at 3-50.

[232] *Id*. (emphasis added).

[233] *Id.*

to think that the maximum blend absent modifications to the existing pipeline network falls in a lower range.[234]

The problem with any proposal to transport hydrogen via pipeline lies with the gas's molecular properties. Hydrogen is a smaller molecule than methane and has a propensity for leakage at perhaps three times the rate of fossil gas. Furthermore, hydrogen tends to corrode and embrittle pipeline infrastructure.[235] This corrosive tendency, degrading pipeline integrity, the need for higher pipeline pressure, and the risk of leakage could create serious safety issues.[236] These problems are compounded in New York due to its aging pipeline infrastructure. In New York, for example, "[i]n 2020, there were 18,330 gas leaks reported, or about 370 gas leaks per 1,000 miles of pipeline, leaving a volume of gas equal to almost 20 percent of total gas demand lost or unaccounted for."[237] 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.

vi. NRG Does Not Elaborate on How It Will Safely Store and Burn Hydrogen on Site.

Additionally, there are safety and flammability issues with hydrogen storage and combustion that neither the DSEIS nor its appendices explain with any specificity. For example, in Appendix L, NRG and GE merely state: "equipment, piping sizing and materials, and enclosure ventilation. Additionally, changes to the gas turbine control software, flame detectors, fire protection and area classification will be required at higher levels of H_2."[238] It goes on to state that "[f]or concentrations of H_2 above 5 percent, advanced purge and nitrogen-based sealing systems will be required. In addition, enclosure ventilation and fire protection systems will need to be upgraded."[239]

It is unacceptable for NRG to address safety at the Project site in such a cursory manner. Hydrogen is also much more flammable than methane gas.[240] It requires less air to burn than methane and when hydrogen ignites the flames have the potential to spread much faster.[241]

---

[234] Justin Mikulka, *Decoding the Hype Behind the Natural Gas Industry's Hydrogen Push*, Desmog Blog (Jan. 14, 2021), https://www.desmogblog.com/2021/01/14/decoding-hype-behind-natural-gas-industry-hydrogen-push.

[235] *Id*. (citing Zahreddine Hafsia et al., *Hydrogen embrittlement of steel pipelines during transients*, Procedia Structural Integrity, Vol. 13 (2018)).

[236] Patrick Verdonck & Martha Kammoun, *Is Hydrogen a Viable Alternative to Lithium Under the Current Energy Storage Regulatory Framework?*, 18 Oil, Gas & Energy Law Intelligence (2020), https://www.lexology.com/library/detail.aspx?g=e908442d-8b33-462c-ae23-9c1dcb917127.

[237] AEC Report at 7.

[238] DSEIS Appendix L at "Technology Stages".

[239] *Id.* at "Technology Stage 1".

[240] AEC Report at 10.

[241] *Id.*

NRG must develop a comprehensive safety plan to deal with the clear risks posed by transporting, storing and combusting hydrogen fuel at the Proposed Project site.

vii. NRG Accepts That It Cannot Store Large Amounts of Hydrogen On Site but can Point to no Specific Alternative Location.

The proposed gas plant at Astoria will serve as a peaking plant for approximately 2-4 percent of the year. However, in the DSEIS, NRG does not even consider as a possibility that hydrogen would be stored on site in anticipation of and during those few days it might get called upon to serve the grid. Instead, NRG states that some unknown and undescribed "electrolysis system is installed in upstate New York" might be able to transport sufficient green hydrogen "to operate the Project for the full year ...."[242] The lack of detail here is astounding, especially in light of the concerns raised above about what is likely to be a tight supply of surplus renewable energy in New York State.[243] A serious proposal to utilize green hydrogen for the Project would include a detailed explanation of how NRG expects to have an adequate supply of fuel for the days of the year the Project would be used. In doing so, NRG would need to identify a reasonably nearby location for hydrogen fuel storage. Unfortunately, the company's options are limited and include only limited-capacity above-ground.[244] New York City is quite unlike the relatively rare locales where some have argued that green hydrogen storage is viable, such as a site with neighboring salt caverns and no proximate population centers.[245]

viii. NRG Does Not Elaborate on the Proposed Plant's Water Use to Combust Gas or Hydrogen.

Nowhere in NRG's DSEIS or Appendices does the company address the water usage the plant will need to cool the high-burning fuels the plant proposes to combust on the site, yet a green hydrogen burning generator would use a substantial amount of New York's water resources. The production of green hydrogen for the Project could end up requiring "as much as nine kilograms of high-purity water per kilogram of hydrogen."[246] Adding to the water resource stress would be the water used at the Project site upon combustion. Fossil-fueled power plants are the nation's top user of fresh water and demand tremendous amounts of water for cooling.[247] New York State has experienced at least five drought emergencies since the 1960's and climate change could put the state at heightened risk of future water shortages.[248] For these reasons it is critical for NRG to consider steps that can be taken to minimize water use at the Project site, as

---

[242] DSEIS at 3-50.

[243] *See infra* Section V(B)(ii).

[244] McNamara, *supra* note 230.

[245] Reclaiming Hydrogen Report at 20 & 25.

[246] Feroze Abbas et al., *Water Resource Considerations for a Hydrogen Economy*, JDSupra (Dec. 17, 2020), https://www.jdsupra.com/legalnews/water-resource-considerations-for-the-84603/.

[247] Poulomi Ganguli et al., *US Power Production at Risk from Water Stress in a Changing Climate*, 7 Sci. Reps. 11983 (2017), https://www.nature.com/articles/s41598-017-12133-9.

[248] Heather R. Damiano et al., *NYC's Risk Landscape: a Guide to Hazard Mitigation* 121–123 (2014), https://www1.nyc.gov/assets/em/downloads/pdf/hazard_mitigation/nycs_risk_landscape_chapter_4.7_watershortage.pdf.

well as whether or not alternatives to the project may place less water stress on the state of New York.

ix. Hydrogen Combustion Will Increase NOx Emissions, an Environmental Justice Issue Due to an Unacceptable Impact on Local Air Quality and Public Health.

Local air quality and local public health outcomes will worsen with hydrogen combustion at the Proposed Plant, absent significant advances in emission control technology. This localized air emissions issue is not addressed at all by NRG in its DSEIS or Air Permit Application. Hydrogen combustion (whether a blend or 100 percent green hydrogen) can produce up to six times the level of NOx emissions as methane combustion, and these emissions can in turn cause adverse health effects.[249]

NOx emissions are of special concern because:

> NOx does significant damage to the respiratory system over time. In areas affected by smog resulting from NOx emissions, symptoms including coughing, increased rates of asthma, and comorbidities with other respiratory illness develop. This impact is readily apparent in many frontline communities dealing with heavy NOx emissions emitted by nearby high-polluting peaker power plants and other sources. These communities have developed stark health disparities as a result of elevated NOx exposure.[250]

Hydrogen burns at a higher temperature than methane.[251] A study conducted by General Electric on its combustion turbines found that a 50/50 mixture of hydrogen and fossil gas (by volume) increased concentrations of NOx in gas exhaust by 35 percent.[252] A recent report by a gas turbine industry association warned that these higher flame temperatures will produce more health-harming nitrogen oxide (NOx) emissions "if no additional measures are undertaken."[253]

Spiking NOx emissions are especially a problem for local air quality during startup periods. Gas turbine NOx emissions spike significantly before the plant's pollution controls warm up. If this Proposed Project is only to come online during peak periods, the problematic startup NOx emissions will be a fairly regular occurrence, especially in the summer, when the ozone concerns are highest. Air permits generally exempt the start-up emissions, despite the harmful air quality and public health impacts they cause, an unconscionable status quo that will

---

[249] AEC Report at 10.

[250] AEC Report at 11 (quoting Response of Clean Energy Group to DOE Hydrogen Program Request for Information #DE-FOA-0002529 at 3 (July 7, 2021), https://www.cleanegroup.org/wp-content/uploads/CEG-Response-to-DOE-Hydrogen-RFI.pdf.)

[251] Reclaiming Hydrogen Report at 25.

[252] Goldmeer et al., *supra* note 215, at 5.

[253] ETN Global, *Hydrogen Gas Turbines: The Path Towards a Zero-Carbon Gas Turbine* 8 (2020), https://etn.global/wp-content/uploads/2020/01/ETN-Hydrogen-Gas-Turbines-report.pdf.

be worsened by a hydrogen blend combusting in this densely populated urban area. A comprehensive review of the adequacy of a facility's emission controls and emissions monitoring program is needed before any blending can begin.

NOx is a precursor of both ground-level ozone and fine particulate matter.[254] Any increase in localized NOx emissions from this Proposed Project will make achieving attainment of the 2008 ozone NAAQS in the New York Metropolitan Area (NYMA) even more difficult.[255] The NYMA has been in serious nonattainment and now will be reclassified as being in severe nonattainment due to the state's failure to achieve attainment by the July 2021 deadline. Reducing NOx emissions and resulting ozone is critical for public health, environmental equity, and compliance with the Clean Air Act, and the impact of poor air quality falls disproportionately on low-income New Yorkers and New Yorkers of color. The Proposed Project would do the opposite of that.

NOx emissions leading to ozone formation are a major health concern for New Yorkers. For example, 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 with respiratory and cardiovascular illness and death, and establishes a goal to "reduce exposure to outdoor air pollutants," with an emphasis on vulnerable groups.[256] Reducing emissions by preventing the Proposed Project's potential NOx emissions from combusting hydrogen will be important to meet the state's public health goals, in addition to being CLCPA-compliant.

x. Because Hydrogen Combustion is not Emissions-Free, It Is Inconsistent with the CLCPA.

Hydrogen combustion is not emissions-free. First, anything less than 100 percent green hydrogen still results in the emissions of significant amounts of GHG emissions. For example, a 50 percent hydrogen-blend – which is the most hydrogen the Proposed Project will be able to utilize after major modification (*see* sections V(A)(ii)–(iii) *supra*) – would still be 50 percent methane. Methane's global warming potential over a 20 year timeframe is 86 times that of CO2.[257] Second, even pure hydrogen has GHG emissions, particularly when the gas leaks, as it is prone to do.[258] Hydrogen itself is an indirect GHG, which contributes to climate change.[259]

---

[254] AEC Report at 10.

[255] DEC, *New York State Implementation Plan for the 2008 Ozone National Ambient Air Quality Standards: New York-N. New Jersey-Long Island, NY-NJ-CT Serious Nonattainment Area Draft Proposed Revision* § 8 p. 1 (June 2021), https://www.dec.ny.gov/docs/air_pdf/sipseriouso3nyma.pdf.

[256] N.Y. Dep't of Health, *New York State's Health Improvement Plan: Prevention Agenda 2019–24* 72–73 (updated Sept. 2, 2021), https://www.health.ny.gov/prevention/prevention_agenda/2019-2024/docs/ship/nys_pa.pdf.

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

[258] Mikulka, *supra* note 234 (citing Zahreddine Hafsi et al., *Hydrogen Embrittlement of Steel Pipelines During Transients*, 13 Procedia Structural Integrity 210 (2018)).

[259] *See infra* ___.

Unburned, leaked hydrogen is a potent GHG with a 20 year global warming potential that is likely more than 5 times greater than that of CO2.[260] Third, as described above, hydrogen combustion generates NOx emissions, a harmful co-pollutant covered by the CLCPA.

B. Because RNG Combustion Is Not Emissions Free, It Is Not Consistent with the CLCPA.

i. Combusting RNG, Like Combusting Fossil Gas, Emits CO2 and is not Zero Emissions.

RNG as an alternative to fossil gas is still methane, a potent GHG. [261] NRG admits that the so-called renewable fuel is "interchangeable with conventional natural gas" with respect to "onsite GHG emissions."[262] RNG emits just as much carbon dioxide when burned and leaks just as much methane when transported as the fossil gas produced from non-biological sources like hydraulic fracturing (fracking).

Methane's global warming potential is approximately 86 times that of carbon dioxide over a 20-year time horizon and approximately 25 times that of carbon dioxide over a 100-year time horizon.[263]

Given methane's large, adverse climate impacts during transport and combustion, there is no realistic scenario where RNG combustion can be consistent with the CLCPA.

ii. Sufficient RNG Sources do not Exist.

Quantities of RNG are far too small for power plant combustion in New York. NRG itself estimates the combustion turbine at the Proposed Project would require 3.9 MMcf of natural gas per hour to operate at full load.[264] On an annualized basis, if the facility operated at a 100 percent capacity factor, that single gas turbine would require 34.2 Bcf of RNG, or *more than half of current total US RNG production*. Indeed, 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.[265] Powering a single medium-sized gas turbine would require 62 times as much RNG as is produced by the world's largest landfill. The supply of this waste methane is vanishingly small.[266] Perhaps this is why NRG itself expresses doubts about whether

---

[260] Richard Derwent et al., *Global Environmental Impacts of the Hydrogen Economy*, 1 Int'l J. Nuclear Hydrogen Prod. & Applications 57, 57 (2006), https://www.geos.ed.ac.uk/~dstevens/Presentations/Papers/derwent_ijhr06.pdf.

[261] DSEIS at 3-51.

[262] *Id*.

[263] *Overview of Greenhouse Gases: Methane*, EPA, https://www.epa.gov/ghgemissions/overview-greenhouse-gases#methane (last updated July 27, 2021); Vaidyanathan, *supra* note 257.

[264] DSEIS at 4-21.

[265] *Id*.

[266] *Id*.

RNG would be CLCPA compliant by stating: "it remains unclear if [RNG's] use will be determined to be a zero-carbon fuel under the CLCPA."[267]

iii. The CLCPA Explicitly Prohibits Offset Schemes in the Electric Sector and Prohibits Using Biofuels for Power Generation.

NRG's hydrogen and RNG proposals could not comply with the CLCPA mandates for emissions reduction measures or mitigation because neither hydrogen nor RNG combustion result in emissions reductions that are "real, permanent, quantifiable, verifiable, and enforceable by the [DEC]" as required by the CLCPA.[268] In order to comply with this provision of the CLCPA hydrogen would need to be commercially feasible. But NRG has itself stated, both 100 percent green hydrogen and RNG combustion is commercially unavailable.[269]

NRG's proposal runs afoul of E.C.L. 75-0109(3)(b) because using hydrogen to power the Project is logistically infeasible for the many reasons described above. First, the reality of a scarce supply of renewable energy is an insurmountable obstacle to this project. Whatever surplus renewable energy exists in this state between now and 2024 will need to be diverted to more efficient uses, such as electrification, rather than 100 percent green hydrogen production for this Project.[270] Second, even if green hydrogen were available to NRG in abundance, New York simply lacks the infrastructure – and a plan to build out the infrastructure – to deliver the requisite amount of fuel to NRG.[271]For all of the reasons stated above, and as NRG itself concluded, the company's hydrogen and RNG proposals cannot be considered a valid alternative, nor as any potential mitigation measure, under the plain terms of the CLCPA.

Moreover, 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,"[272] it explicitly bars both electric generation sources generally, and biofuels specifically, from participation in such a mechanism.[273] Though an offset/netting approach may be used to achieve the final 15 percent of emissions reductions under the CLCPA's sector-wide 2050 greenhouse gas limit, the CLCPA electric sector limits afford no such flexibility.[274] NRG's proposal also therefore runs afoul of E.C.L. Section 75-0109(4)

---

[267] *Id*. at 3-51.

[268] N.Y. E.C.L. 75-0109(3)(b).

[269] DSEIS at 3-65.

[270] *See supra,* Section V(A)(v).

[271] *See supra*, Section V(A)(v).

[272] N.Y. E.C.L. § 75-0109(4)(a)

[273] *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.").

[274] *Compare* CLCPA § 1(4) & CLCPA § 2, codified at N.Y. E.C.L. § 75-0107(1) (sector-wide greenhouse gas emission limit requires reducing emissions by 85% of 1990 levels & eliminating net emissions by 2050), *with* CLCPA § 4, codified at N.Y. P.S.L. § 66-p(2) (electric sector must be zero emissions by 2040).

because it explicitly prohibits offset schemes in the electric sector and prohibits using biofuels for power generation.

iv. Many RNG Sources Risk Increasing Rather than Decreasing Climate Pollution.

Even if RNG were available in commercially relevant quantities in New York, significant further analysis would be required to ascertain its true emissions impacts and what, if any, RNG could properly be compliant with the CLCPA. Upstream GHG emissions from RNG can vary substantially because RNG can come from a variety of sources. Most combustion of RNG is climate additional unless it is captured from waste "methane that would otherwise be emitted into the atmosphere" and therefore non-compliant with the CLCPA.[275]

Some sources, such as wastewater treatment, can potentially have a positive climate impact.[276] Other sources, such as forestry residues, risk *increasing* climate pollution, especially if any gas is leaked during transport.[277] Many sources of RNG have other climate-adverse environmental and land use impacts that offset any potential climate benefits during combustion. For example, energy crops grown for biomass often compete with food production or biodiverse landscapes and confined animal feeding operations create a host of air and water pollution problems.[278]

C. The Proposed Project Is Inconsistent with New York City Executive Order 52.

NRG's Proposed Project is directly inconsistent with NYC Executive Order (EO) 52, the Statement of Administration Against Addition of Infrastructure that Expands the Supply of Fossil Fuels in NYC. EO52 provides in relevant part: "the City will not support the addition of infrastructure within its energy shed that expands the supply of fossil fuels via pipelines or terminals for the transfer of fossil fuels *or via construction of new fossil-fuel-based electric generating capacity*." (emphasis added.)

Despite the EO's plain language, NRG claims that the Proposed Project is consistent because its nameplate capacity (437 MW) is smaller than that of the turbines presently on site and soon-to-retire (502 MW) and thus, if the existing turbines retire when the Proposed Project comes online, there will be no net increase in fossil fuel based electric generating capacity.[279] Setting aside whether netting of capacity is permissible under EO52, NRG's argument is directly

---

[275] Sasan Saadat et al., Earthjustice & Sierra Club, *Rhetoric v Reality: The Myth of "Renewable Natural Gas" for Building Decarbonization* 9 (July 2020), https://earthjustice.org/sites/default/files/feature/2020/report-decarb/Report_Building-Decarbonization-2020.pdf.

[276] NRDC, *Issue Brief: A Pipe Dream or Climate Solution? The Opportunities and Limits of Biogas and Synthetic Gas to Replace Fossil Fuels* 3 (June 2020), https://www.nrdc.org/sites/default/files/pipe-dream-climate-solution-bio-synthetic-gas-ib.pdf; Saadat et al., *Rhetoric v Reality*.

[277] NRDC, *Issue Brief*, *supra* note 276, at 2.

[278] *See id*. at 3.

[279] DSEIS at 3-53.

undermined by its acknowledgment that the "No Action" alternative here is retirement of the existing units due to their inability to comply with the NOx peaker regulations and the prohibitive cost of upgrading them to do so.[280] Consequently, absent the Proposed Project, fossil-fuel-fired generating capacity in New York City would decrease by 502 MW in 2023 when the existing P&W units retire, as planned. Constructing the Proposed Project would therefore *add* 437 MW of new fossil-fuel-based electric generating capacity above the "no action" baseline. Since retirement of the existing units is not linked to the construction of the Proposed Project, netting of megawatts in the manner done by NRG is plainly inappropriate here, and the Proposed Project violates EO52.

D. DEC Cannot Approve the Title V Permit Now for Additional Procedural Reasons.

i. The Current Astoria Replacement Project Is Completely Different from the Previous Project and Has Not Been Found to be Exempt from Article 10.

In an attempt to avoid the Proposed Project undergoing Article 10 review, NRG relies on a 2019 decision by the Siting Board that NRG's then-proposed repowering project was exempt from Article 10 review because it was a continuation of a 2010 project. However, the 2019 decision, issued before the New York legislature passed the CLCPA, was based on a project markedly different from the company's current proposal for the Astoria Replacement Project. In 2017, NRG submitted a Petition for Declaratory Ruling to the Siting Board seeking a determination that a modified version of its 2010 replacement project, which went through SEQRA review but was never built, was exempt from Article 10 review under PSL Section 162(4)(d).[281] The replacement project described in the 2017 Petition had more in common with the original 2010 proposed project than the current Astoria Replacement Project. The modifications from the 2010 project described in the 2017 Petition involved reducing the number of turbines from 4 to 3, reducing the overall nameplate capacity from 1040 MW to 579 MW, and proposing that "the units will be operated in simple cycle rather than combined cycle."[282] Otherwise, the turbine technology, fuel, emissions control system and overall design of the 2017 project were the same as the 2010 project. On this basis the Siting Board found that the 2017 project was "an extension, amendment or continuation of the originally proposed project" and NRG did not need to seek approval under Article 10.[283]

The current Proposed Project is substantially different from both the 2017 proposal and the 2010 proposal and thus is not exempt from Article 10, despite NRG moving ahead without Article 10 review. The current Proposed Project includes different technology, a different

---

[280] *See id.* at 4-2 & Section II(D)(ii), *supra*.

[281] Petition for Declaratory Ruling, Petition of NRG Astoria Power LLC for a Declaratory Ruling that its Proposed Replacement Project is Exempt from Article 10, Case No. 17-F-0451 (N.Y. Pub. Serv. Comm'n July 24, 2017) (Dkt. No. 1).

[282] *Id*. at 9.

[283] Declaratory Ruling Concerning Jurisdiction Over Proposed Generating Facilities at 12, Case No. 17-F-0451 (N.Y. Pub. Serv. Comm'n June 12, 2019) (Dkt. No. 4).

number of turbines, and the potential use of a different, untested, and unproven fuel (combustible hydrogen). The current Proposed Project involves a different turbine—the GE H-Class 7HA.03—and involves a single large (437 MW) unit rather than several smaller 193-MW units.[284] NRG states that the project "will be a highly efficient, quick start, fast-ramping" peaking facility.[285] Table 1.1-2 in the DSEIS provides a succinct comparison of the three distinct project configurations from 2010, 2017, and the current Proposed Project.[286]

NRG functionally acknowledges that it has changed the proposal, in that it has included both the 2010 proposed project and the 2017 proposed project as two distinct alternatives in the DSEIS.[287] In the DSEIS, NRG describes the 2010 project, included as "Alternative 2," as completely different in nature from the current project in terms of size, operations, and environmental impacts. Critically, the DSEIS contrasts the purpose of the 2010 project, which was meant as a baseload plant and was permitted based on a 98 percent capacity factor, to the current proposal's purpose as a peaking facility primarily intended "to provide backup/stand by service for intermittent renewable resources by participating in the Ten Minute Non-Synchronous Reserves ('TMNSR') market."[288]

In its discussion of "Alternative 3," the 2017 project configuration found by the Siting Board in 2019 to be exempt from Article 10 review, the DSEIS also treats the 2017 project as a completely distinct facility from the current Proposed Project. It claims that because of the larger size of the 2017 project, with three units rather than one and a larger capacity, construction would take longer than the current Project.[289] It also claims the air emissions from the 2017 project would be higher due to less efficient technology and the larger size plant.[290] It concludes that the 2017 project is not preferred or feasible to construct at the site at this time.[291] Yet NRG has progressed with just a DSEIS based on an assumption that the current Proposed Project is simply the same as or an extension of the 2017 project, rather than go back to the Siting Board to seek an exemption for this new, distinct Project from Article 10 review.

Nearly a decade after Article 10 was enacted, a supplement to a decade-old environmental impact statement reviewing a completely different project is not sufficient to ensure to the public that this new facility is necessary, safe for the environment and residents of surrounding neighborhoods, and in the public interest. In addition to submitting permits for DEC review and completing the SEIS, NRG must go back to the Siting Board to seek a determination of whether the *current* Astoria Project is exempt from Article 10 review under P.S.L. § 164(2)(d).

---

[284] DSEIS at ES-3.

[285] *Id*.

[286] *Id*. at 1-10 tbl.1.1-2.

[287] *Id.* at 4-7–8.

[288] *Id*. at 4-7.

[289] *Id*. at 4-9.

[290] *Id*.

[291] *Id*.

E. Substantive and Significant Issues Exist That Merit an Adjudicatory Hearing.

For all the reasons described above, DEC should deny the Title V permit for the Project. If the agency is not ready to deny the permit at this stage, the agency must refer this matter for an adjudicatory hearing because "comments received from members of the public or other interested parties raise substantive and significant issues relating to the application, and resolution of any such issue may result in denial of the permit application, or the imposition of significant conditions thereon."[292] In addition to the strong opposition raised by the public at the public hearings on the Draft Title V permit and DSEIS, this comment alone raises substantive and significant issues related to the Project's inconsistency with the emissions caps set by the CLCPA, the failure of the company to justify the project in light of those inconsistencies, the infeasibility and inadequacy of the alternatives and mitigation measure proposed by the company, violations of legal obligations to disadvantaged communities under the CLCPA, and various other important questions of law and fact.

The resolution of any one of these issues "may result in denial of the permit application, or the imposition of significant conditions thereon."[293] Moreover, the commenters have "explain[ed] the basis of [their] opposition and identif[ied] the specific grounds which could lead the department to deny or impose significant conditions on the permit."[294] Specifically, this comment identifies specific grounds for DEC to deny the permit for the Proposed Project under CLCPA Sections 7(2) and 7(3). It sets forth that building a new gas plant now, when the CLCPA requires a sharp reduction in GHG emissions, 70% of energy needs to be supplied by renewable sources by 2030 and a transition to a zero-emissions electricity sector by 2040, is contrary to the law and will interfere with achievement of each of these CLCPA mandates. The comment explains that there is no need or justification for the plant due to transmission upgrades that resolve short-term local and bulk reliability issues, and long-term plans to develop a portfolio of varied renewable resources, greater transmission, short- and long-duration energy storage, and energy efficiency and demand response solutions. As set forth in this comment, NRG's claims that the plant will reduce overall GHG emissions are unreliable and at best any net GHG reductions will be extremely short-lived. The comment also makes clear that the mitigation proposals put forth by the company are neither aggressive nor detailed enough to be considered adequate under the CLCPA. Finally, the comment describes at length the Project's disproportionate burden on disadvantaged communities, in violation of CLCPA Section 7(3).

It is worth emphasizing here that commenters need not demonstrate that the permit *will* be denied or conditioned for DEC to make a referral for an adjudicatory proceeding. The agency is obligated to make a referral so long as comments have raised issues that "*may* result" in the denial or modification of the permit, or if comments have simply raised "sufficient doubt about the applicant's ability to meet statutory or regulatory criteria applicable to the project, such that a

---

[292] 6 N.Y.C.R.R. § 621.8(b).

[293] *Id.*; *see also id.* § 624.4(c)(3).

[294] *Id.* § 621.8(d).

reasonable person would require further inquiry."[295] There is no question that commenters have surmounted this light burden.

[295] *Id*. § 624.4(c)(2).

Respectfully,

Rachel Spector
Senior Attorney
Mandy DeRoche
Deputy Managing Attorney
Meagan Burton
Senior Attorney
Michael Youhana
Associate Attorney
Earthjustice
48 Wall Street
New York, NY 10005
Tel. 212-845-7387
rspector@earthjustice.org
mderoche@earthjustice.org
mburton@earthjustice.org
myouhana@earthjustice.org

Hayley Gorenberg
Legal Director
Justin Wood
Director of Organizing and Strategic Research
New York Lawyers for the Public Interest
151 West 30th Street, 11th Fl
New York, NY 10001
hgorenber@nylpi.org
jwood@nylpi.org

Joshua Berman
Senior Attorney
Sierra Club Environmental Law Program
50 F St. NW, 8th Floor
Washington, DC 20001
Tel: (202) 650-6062
josh.berman@sierraclub.org

Annel Hernandez
Associate Director
NYC Environmental Justice Alliance
462 36th Street
Brooklyn, NY 11232
annel@nyc-eja.org

Dariella Rodriguez
Director of Community Development
THE POINT CDC
940 Garrison Avenue
Bronx, NY 10474
drodriguez@thepoint.org

Elizabeth Yeampierre
Executive Director
UPROSE
462 36th Street
Brooklyn, NY 11232
elizabeth@uprose.org

Seth Mullendore
Vice President, Project Director
Clean Energy Group
Tel. 802-223-2554 x213
seth@cleanegroup.org

Jose Miranda
Director of Programs
Chhaya CDC
37-43 77th St., 2d Floor
Jackson Heights, NY 11372
jose@chhayacdc.org

Appendix A

The Proposed New Astoria Combustion Turbine Generator and New York State's Clean Energy Future

Prepared for Sierra Club

September 8, 2021

AUTHORS

Rachel Wilson
Erin Camp, PhD

Synapse Energy Economics, Inc.

485 Massachusetts Avenue, Suite 3
Cambridge, Massachusetts 02139

617.661.3248 | www.synapse-energy.com

CONTENTS

EXECUTIVE SUMMARY

Astoria Gas Turbine Power LLC (Astoria) is proposing to build a new 437-megawatt gas-fired H-class simple cycle combustion turbine generator in Astoria, Queens County, New York that would come online in 2023. Astoria must receive approval from the New York State Department of Environmental Conservation to modify its Title V air permit, which requires a finding of compliance with the state's Climate Leadership and Community Protection Act. The compliance determination depends on whether the project is consistent with the Act and, if not, whether it is nevertheless justified, or its inconsistencies adequately mitigated.

Synapse Energy Economics was retained to evaluate several of the claims made by Astoria's parent company, NRG, in support of its application. NRG claims that the new Astoria combustion turbine is consistent with the New York Climate Leadership and Community Protection Act in that it results in both direct and indirect greenhouse gas emissions reductions. Direct emissions reductions are said to result from the displacement of less-efficient fossil generators. NRG's calculation of indirect emissions reductions is more complex, stemming from its conclusion that the new Astoria Project would avoid 3,000 megawatts of battery storage. NRG claims that avoiding the installation of battery storage results in cost savings that could be used to fund the installation of new offshore wind turbines that will displace existing fossil generation and indirectly reduce emissions. Synapse found that the methodology supporting these claims is flawed and does not support the magnitude of emissions reductions claimed to be associated with the project.

NRG makes several other claims about the benefits of the Astoria Project: (1) that the new combustion turbine is justified based on cost savings; (2) that it will facilitate renewables integration; (3) that it will address outstanding reliability shortfalls; and (4) that it can provide system restoration service. This report addresses the errors with each of these claims in the sections that follow.

1. THE NEW ASTORIA COMBUSTION TURBINE GENERATOR PROJECT

Astoria Gas Turbine Power LLC (Astoria) is proposing to build a new 437-megawatt (MW) gas-fired H-class simple cycle combustion turbine generator (CTG) in Astoria, Queens County, New York that would come online in 2023. There are currently 24 simple cycle combustion turbines located at the site that will be retired in 2023 due to regulations in New York limiting nitrogen oxide pollution from combustion turbines. The new Astoria CTG will use natural gas as the primary fuel with limited distillate oil firing for back-up. Two of the existing combustion turbines on the site will not be demolished but will remain operational to maintain black-start capability until they can be replaced by a battery energy storage system of approximately 24 megawatt electric (MWe); all other existing units will be permanently shut down once the new unit has come online.

Astoria must receive approval from the New York State Department of Environmental Conservation (NYSDEC) to modify its Title V air permit, which requires DEC to find that the Astoria CTG complies with the state's Climate Leadership Community Protection Act (CLCPA). The compliance determination depends on whether the project is consistent with the CLCPA and, if not, whether it is nevertheless justified, or its inconsistencies adequately mitigated.

2. THE NEW ASTORIA CTG IS NOT CONSISTENT WITH NEW YORK'S CLIMATE LEADERSHIP AND COMMUNITY PROTECTION ACT AND NRG'S JUSTIFICATIONS FOR THE PROJECT ARE MISPLACED

New York's CLCPA became law effective January 1, 2020. It requires reductions in statewide greenhouse gas (GHG) emissions[1] of 40 percent below 1990 levels by 2030 and 85 percent below 1990 levels by 2050. It also replaces New York's previous Clean Energy Standard, setting a requirement to obtain 70 percent of New York's electricity from renewable sources by 2030 and 100 percent from zero-emission sources by 2040.

[1] Statewide GHG emissions are defined as being the total annual emissions produced in the state, any emissions associated with the generation of electricity produced outside of the state but imported into the state, and emissions associated with the extraction and transmission of fossil fuels imported into the state. See: State of New York, Senate Bill S6599.

The CLCPA also includes several resource-specific individual capacity requirements for the procurement of renewables, demand-side resources, and battery storage that will help the state meet its energy targets.[2] These include the following:

- 6 GW of installed distributed solar PV by 2025;
- 185 trillion btu energy consumption reduction from energy efficiency by 2025 relative to the state's current forecast for that same year;
- 3 GW battery storage capacity installed by 2030; and
- 9 GW offshore wind capacity installed by 2035.

As part of its Draft Supplemental Environmental Impact Statement (DSEIS), NRG submitted analysis of the impact of the new Astoria CTG on the state's GHG emissions for the years 2023 through 2035. According to the authors, the results of this analysis show that the Astoria CTG is "…consistent with the CLCPA and provides significant GHG reduction, while minimizing costs and maximizing benefits to New York…."[3] The analysis claims that the Astoria CTG leads to emissions reductions in three ways. First, NRG claims a direct reduction in GHG emissions will result from the displacement of older, less efficient fossil generators in New York City, and also from the GHGs attributed to extraction and transportation of the fossil fuels used to power these generators.[4] Second, NRG asserts that the project provides quick-start and fast-ramping capacity in New York City, which avoids the installation of "very large amounts of marginal capacity from energy storage" and results in cost savings that accelerate additional renewable procurement like offshore wind, and thus lead to sizable indirect GHG reductions.[5] Third, NRG states that the new Astoria CTG technology would already be capable of being converted to use hydrogen as a fuel source once it is available in quantities large enough for commercial transportation. This report addresses the first two claims, while the claims around hydrogen are addressed elsewhere.

NRG hired the consulting firm Navigant/Guidehouse (referred to hereafter as Guidehouse) to evaluate the GHG emissions impact of the new Astoria CTG. The results of that evaluation were attached to the DSEIS submitted by NRG as Appendix E. Each of the components of the Guidehouse emissions analysis contains numerous flaws that, when corrected, would demonstrate that the Astoria CTG is not in fact consistent with the CLCPA or justified based on GHG benefits, and thus should not be approved. Each of the two claims made about the emissions reductions benefits of the Astoria CTG are examined in more detail below.

---

[2] New York State Senate Bill S6599, Article 75, 75-0103.

[3] Guidehouse, Inc. February 2021. *Supplement to GHG Impacts of Astoria Replacement Project*. Prepared for Astoria Gas Turbine Power LLC, page 1.

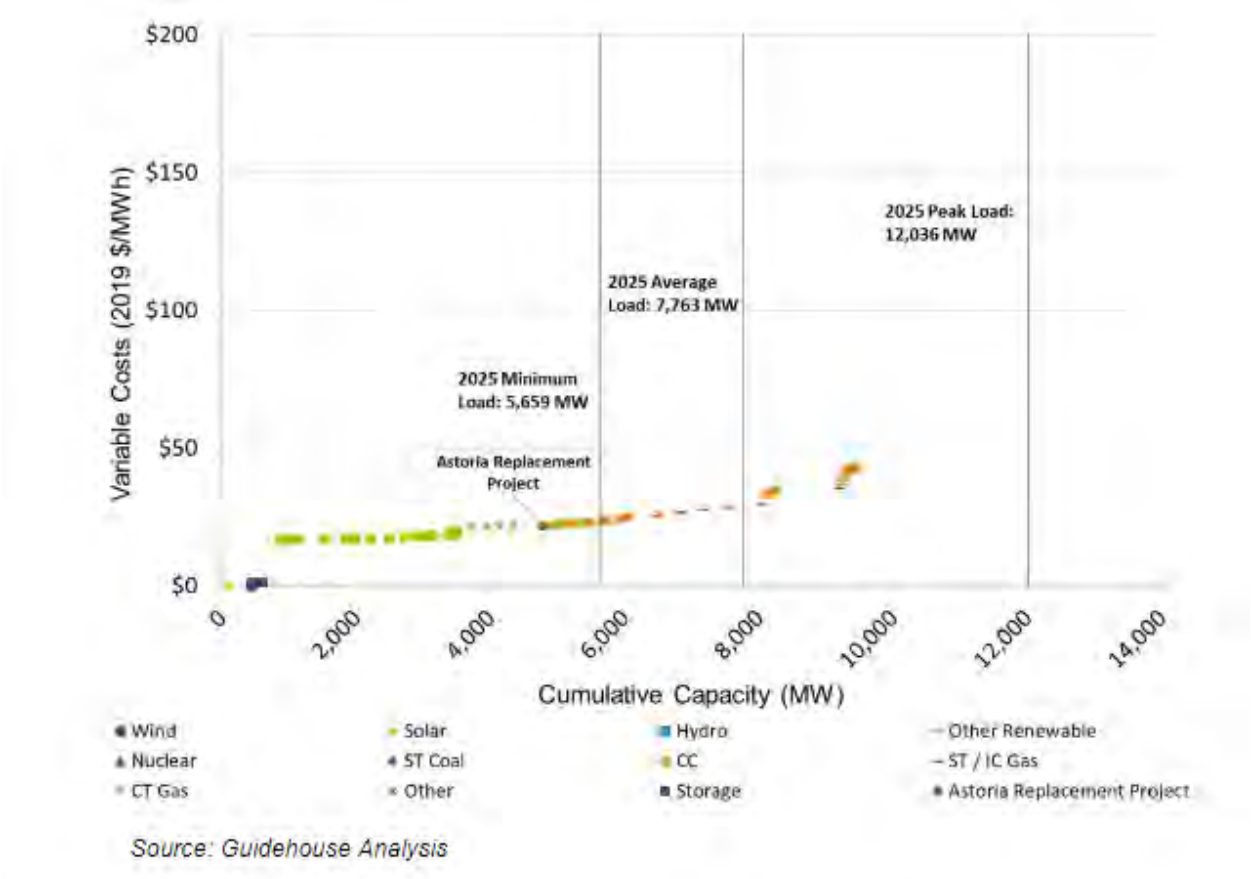
[4] *Ibid.*

[5] Ibid at 1.

2.1. Guidehouse's modeling approach for estimating direct emissions reductions

Guidehouse used two models in its estimate of direct emissions reductions created by the Astoria CTG. PROMOD IV, a widely used electric system dispatch (or production cost) model, was used to produce a forecast of hourly locational marginal prices for electricity within New York City. Guidehouse then used its proprietary Electric Value Model (EVM) to dispatch the Astoria CTG against this forecast of locational marginal prices, producing an hourly generation estimate for the Project over the analysis period. To estimate the direct emissions reductions associated with the Astoria CTG, Guidehouse took the hourly dispatch schedule produced by its EVM model and then attempted to determine which unit(s) would have come online in order to replace the Astoria CTG's forecasted generation. Guidehouse appears to have done this by looking at a supply stack, similar to the example shown in Figure 1, that orders the generators in New York City according to their variable cost of operation.

Figure 1. Illustrative New York City supply curve, 2025



Source: Guidehouse, Inc. February 2021. *Supplement to GHG Impacts of Astoria Replacement Project*. Prepared for Astoria Gas Turbine Power LLC., page 13.

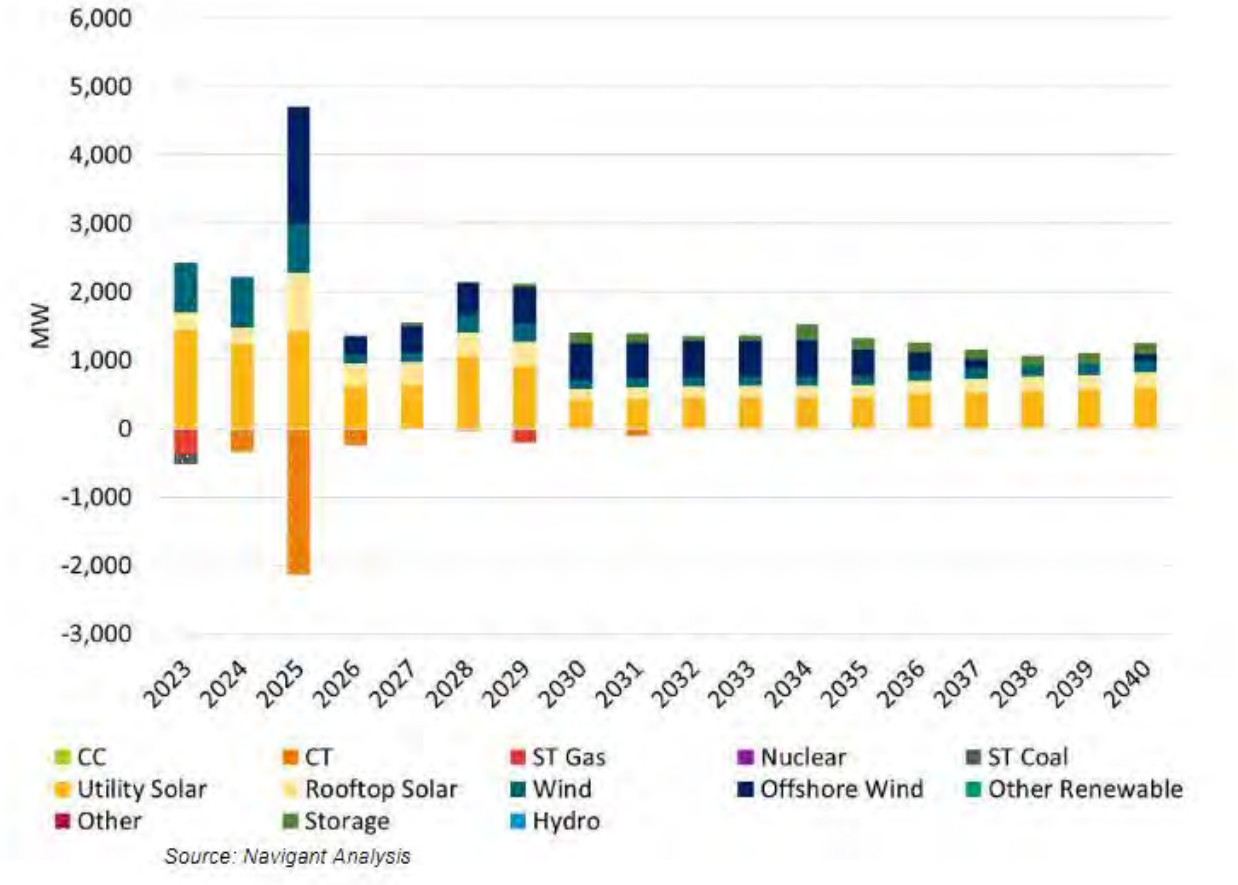
To arrive at the expected "direct emissions reductions" associated with the project, the GHG emissions from the proposed Astoria CTG were subtracted from the GHG emissions associated with the operation of the existing CT units whose generation the proposed Astoria CTG's generation is expected to replace.

The Guidehouse estimate of direct emissions reductions is dependent on several variables, two of which play a particularly important role in producing the emission numbers: (1) the assumed capacity additions over time; and (2) the simplified "supply stack" displacement methodology used in the analysis.

Guidehouse's forecasted capacity additions

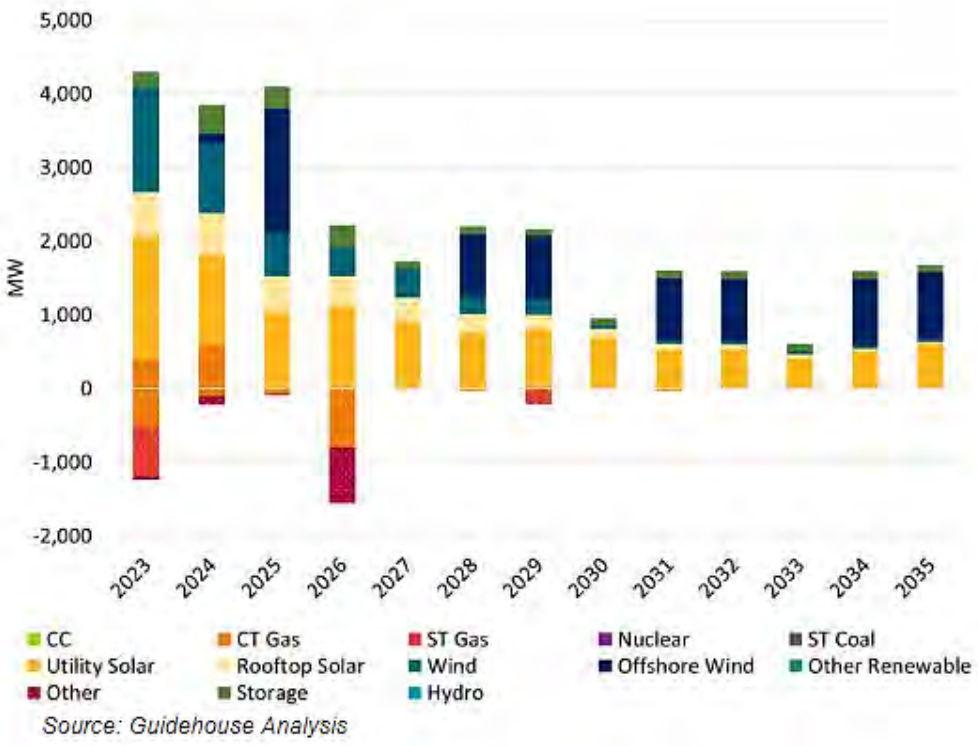
Guidehouse provided forecasts of resource capacity additions in New York in both its April 2020 report and its February 2021 supplemental report. Those forecasts are shown in Figure 2 and Figure 3, respectively.

Figure 2. Guidehouse forecast of NYISO capacity additions and retirements, April 2020



Source: Guidehouse, Inc. April 2020. *GHG Impacts of Astoria Replacement Project.* Prepared for Astoria Gas Turbine Power LLC, at page 12.

Figure 3. Guidehouse forecast of NYISO capacity additions and retirements, February 2021



Source: Guidehouse, Inc. February 2021. *Supplement to GHG Impacts of Astoria Replacement Project.* Prepared for Astoria Gas Turbine Power LLC, at page 7.

From April 2020 to February 2021, a period of less than a year, the forecasted capacity additions in 2023 and 2024 practically doubled, with increases to the volumes of utility-scale solar, rooftop solar, and onshore wind. Battery storage resources, which did not show up until 2030 in the April 2020 analysis, occur in all years in the February 2021 analysis. Guidehouse did not provide an explanation for these changes, however, they lead to a sizable drop in the amount of direct emissions reductions expected from the Astoria CTG in the Guidehouse analysis, particularly after 2025. A comparison of the direct emissions reductions estimates from the two reports is shown in Figure 4 on both an annual and cumulative basis.

Figure 4. Comparison of direct emissions reductions estimates in the Guidehouse April 2020 report (left) and February 2021 supplemental report (right)

Year	Emissions Reduction (000 Tons)	Cumulative Emissions Reduction (000 Tons)
2023	151	151
2024	154	305
2025	108	413
2026	84	497
2027	82	579
2028	86	665
2029	91	756
2030	75	830
2031	65	896
2032	95	991
2033	82	1,073
2034	78	1,151
2035	72	1,223

Source: Navigant Analysis

Year	Emissions Reduction (000 Tons)	Cumulative Emissions Reduction (000 Tons)
2023	72	72
2024	88	161
2025	57	218
2026	38	256
2027	40	296
2028	18	314
2029	27	341
2030	21	362
2031	15	377
2032	19	396
2033	7	403
2034	13	416
2035	5	421

Source: Guidehouse Analysis. Note: 2023 includes June – December 2023 only.

Despite the increase in projected capacity additions in the February 2021 supplement, both Guidehouse forecasts appear to have overlooked the potential for Tier 4 renewable resources from upstate New York and/or Canada to contribute to new capacity additions in New York City. In response to its request for proposal (RFP) for Tier 4 resources, the New York State Energy Research & Development Authority (NYSERDA) received 35 proposals from seven bidders for a total of more than 35 million MWh of renewable energy per year and nearly 7,500 MW of new renewable transmission capacity.[6] If even one or two of those proposals were selected, they would substantially change the assumed generation mix and resulting GHG emissions. The addition of these Tier 4 resources would decrease Guidehouse's projected direct emissions reductions from the new Astoria CTG. At a minimum, Guidehouse should have acknowledged this uncertainty and conducted sensitivity analyses around the potential impact of Tier 4 resource additions.

Guidehouse's "supply stack" methodology

Guidehouse's method of calculating direct emissions reductions, described above, simply stacks New York City generators in the order of their variable operating costs and assumes that the least-cost generators will always dispatch first. The Astoria CTG is thus assumed to displace the most-costly, least-efficient, and highest-emitting peaking units. This methodology does not consider that transmission

[6] NYSERDA. *Tier 4 – New York City Renewable Energy*. Available at: https://www.nyserda.ny.gov/All-Programs/Programs/Clean-Energy-Standard/Renewable-Generators-and-Developers/Tier-Four.

within New York City can be constrained, and thus the least-cost generators are not always able to displace the highest-emitting peaking units in every hour during which they operate. Modeling the transmission constraints within Zone J would likely lead to a lowering of the direct emissions reductions estimated by Guidehouse in its analysis. The Guidehouse report also does not specify which generators are assumed to be displaced, or where those generators are located. There are nine sub-zonal load pockets in Zone J, and thus not all generators can be expected to serve all loads. This lack of data makes it impossible to discern whether the higher cost generators that were assumed to be displaced would actually be displaced by generation from the Astoria CTG.

2.2. Guidehouse's modeling approach for estimating indirect emissions reductions

Guidehouse also estimated the indirect emissions reductions that it claims would be associated with the Astoria CTG. It argues that the project provides quick-start and fast-ramping capacity required to maintain reliability in New York City and thereby avoids the installation of "very large amounts of marginal capacity from energy storage."[7] According to Guidehouse, the savings associated with installation of the project, rather than battery storage resources, could be used to accelerate the development of an additional 543 MW of offshore wind. Guidehouse assumes that this additional offshore wind generates at a 50 percent capacity factor and displaces 2,400 GWh of fossil generation, resulting in an indirect GHG reductions benefit of approximately 1 million tons per year.[8] Notably, the Guidehouse estimate of indirect emissions reductions remains the same between the April 2020 report and the February 2021 supplement, even though the updated capacity forecast adds what appears to be more than 1,000 MW of battery storage resources between 2023 and 2026, as shown in Figure 3. Battery storage on the order of 1,000 MW between 2023 and 2026 would in general directly support integration of the pipeline of new renewables without the inclusion of a new gas turbine and would lower the initial emissions baseline, such that the indirect emissions reductions should be changed in the Guidehouse update.

The Guidehouse analysis is not a standard estimate of indirect emissions and makes several unorthodox and unjustified assumptions. As described above, it assumes that the alternative to the Astoria Project would be 3,000 MW of battery storage capacity and that avoiding this alternative investment would result in substantial cost savings. It then, without justification, assumes that those savings would be re-spent specifically on additional offshore wind capacity. Guidehouse then erroneously assumes that the generation from the offshore wind would exclusively displace fossil fueled generators, thereby avoiding up to approximately one million tons of GHGs each year. In sum, Guidehouse is claiming emissions reductions from effects that are many steps removed—well beyond the scope of a traditional indirect emissions analysis—and none of its assumptions have been justified with any supporting evidence,

[7] Guidehouse, Inc. April 2020. *GHG Impacts of Astoria Replacement Project*. Prepared for Astoria Gas Turbine Power LLC. Page 1.

[8] Guidehouse, Inc. February 2021. *Supplement to GHG Impacts of Astoria Replacement Project*. Prepared for Astoria Gas Turbine Power LLC. Page 13.

much less capacity optimization and/or dispatch modeling. It is thus highly probable that the estimates of indirect emissions reductions are overstated, and likely dramatically overstated.

The analysis does not appear to directly examine the costs and benefits of replacing the Astoria Project with new battery storage. Instead, it assumes that New York City (Zone J) replaces half of the current peaking resources (approximately 3,000 MW) with battery storage. Increasing penetrations of battery storage resources cause the firm capacity values of new resources to go down; thus, the firm capacity value of storage after the addition of these resources is calculated to be 30 percent. Guidehouse calculates the cost savings of the Astoria Project versus battery storage based on this 30 percent firm capacity value. This approach is flawed. Guidehouse should instead have looked at the costs and benefits of replacing the Astoria CTG with a battery storage alternative starting in 2023. Moreover, because Guidehouse looked at the amount of storage that would have been required to replace half of Zone J's current peaking resources rather than just the project capacity and calculated its capacity value for storage based on this significantly larger amount, Guidehouse understates the capacity value of a storage resource that would be an alternative to the Astoria Project and thus overestimates the costs.

Even accepting Guidehouse's flawed methodology, described above, the Guidehouse estimates do not account for the falling costs of battery storage resources or expected technological improvements. The overnight capital costs for battery storage in the Guidehouse analysis were shown to be approximately $354/kWh in 2020, falling to approximately $239/kWh in 2030 (2020$).[9] Forecasts of battery storage costs get lower every year, and the anticipated overnight capital cost for battery storage from the U.S. Energy Information Administration's (EIA) *2021 Annual Energy Outlook* is $745/kW in 2030, or approximately $186/kWh,[10] which is lower than the Guidehouse assumption. Even the EIA figure may be a conservative estimate. Data from Bloomberg New Energy Finance predicts that by 2023, the average global battery pack price will be $101/kWh, with its expectation being that prices will fall to $58/kWh by 2030.[11] Battery storage technologies also continue to evolve, with long-duration and "multi-day" storage options getting closer to commercial operation. One example is the iron-air-exchange battery from the Massachusetts-based startup Form Energy, which could deliver electricity for 100 hours at a price of less than $20/kWh.[12]

The Guidehouse calculations of the cost savings associated with the Astoria CTG also ignore the operating costs of new combustion turbines versus other replacement renewable and storage

[9] The Guidehouse values were taken from the Energy Information Administration's *Capital Cost and Performance Characteristic Estimates for Utility Scale Electric Power Generating Technologies*, published in February 2020. These values were in 2019 dollars, and we have inflated them to 2020 dollars using an inflation rate of 2 percent.

[10] US EIA. February 3, 2021. *Annual Energy Outlook 2021: Reference Case Projections Tables*. Table 55: Overnight Capital Costs for New Electricity Generating Plants, Diurnal Storage.

[11] Bloomberg New Energy Finance. December 16, 2020. *Battery Pack Prices Cited Below $100/kWh for the First Time in 2020, while Market Average Sits at $137/kWh.* Available at: https://about.bnef.com/blog/battery-pack-prices-cited-below-100-kwh-for-the-first-time-in-2020-while-market-average-sits-at-137-kwh/.

[12] Plautz, Jason. July 26, 2021. *Form Energy's $20/kWh, 100-hour iron-air battery could be a 'substantial breakthrough.'* Utility Dive. Available at: https://www.utilitydive.com/news/form-energys-20kwh-100-hour-iron-air-battery-could-be-a-substantial-br/603877/.

resources. The Astoria CTG would incur both fuel and emissions costs associated with its operations and is subject to fluctuations in those commodity price forecasts. The Guidehouse analysis is silent on the costs of carbon dioxide (CO_2) allowances the Astoria CTG would pay under the Regional Greenhouse Gas Initiative (RGGI). The clearing price from the most recent RGGI auction on September 8, 2021 was $9.30/ton. [13] The assumptions from the Brattle Group that inform the *2020 Grid in Transition Study* were that the price would reach $12.60/ton by 2030.[14] Averaging the RGGI auction prices from 2021 results in a price of $8.29/ton in 2021. If we assume a straight line increase from the average RGGI auction price for 2021 to the 2030 Brattle estimate, and carry that increase forward in time, we can estimate the annual cost of emissions under one specific trajectory of allowance prices. Those costs are shown in Table 1, below. Total emissions costs would be more than $2 million in 2023, and while costs decline over time, this estimate does not consider potential increases in RGGI prices that might cause these estimates to be even higher. Discounting the summation of the values leads to a total cost of $10.4 million (using a 6 percent discount rate) and $12.0 million (using a 3 percent discount rate).

Table 1. Estimated cost of new Astoria CTG emissions under forecasted RGGI prices ($nominal)

Year	RGGI Price ($/ton)	Astoria CTG CO_2e (metric tonnes)	Astoria CTG CO_2e (short tons)	Total Cost of Astoria CTG CO_2e
2021	$8.29			
2022	$8.77			
2023	$9.25	221,694	244,307	$2,259,295
2024	$9.73	203,131	223,850	$2,177,318
2025	$10.21	145,765	160,633	$1,639,349
2026	$10.68	95,454	105,190	$1,123,900
2027	$11.16	95,844	105,620	$1,179,072
2028	$11.64	46,666	51,426	$598,712
2029	$12.12	63,520	69,999	$848,466
2030	$12.60	48,840	53,822	$678,153
2031	$13.08	36,823	40,579	$530,773
2032	$13.56	46,215	50,929	$690,596
2033	$14.04	19,077	21,023	$295,161
2034	$14.52	35,747	39,393	$571,989
2035	$15.00	9,083	10,009	$150,142
2036	$15.48	27,027	29,784	$461,053
2037	$15.96	16,844	18,562	$296,251
2038	$16.44	20,470	22,558	$370,853
2039	$16.92	15,076	16,614	$281,105

[13] RGGI, Inc. *Allowance Prices and Volumes*. Available at: https://www.rggi.org/auctions/auction-results/prices-volumes.

[14] Brattle Group. March 30, 2020. *NYISO Grid in Transition Study: Detailed Assumptions and Modeling Description.* Presented to NYISO ICAP/MIWG/PRLWG Stakeholders, at slide 9.

Lastly, the Guidehouse analysis ignores the additional benefits associated with storage resources. Strategic siting of modular battery storage resources can defer or avoid more investments in transmission capacity. As renewable penetration increases, storage becomes increasingly valuable as a means of reducing curtailment from those resources and shifting the dispatch from renewable resources from lower priced hours to higher priced hours. Additionally, batteries provide a faster and more accurate operating reserve response to fluctuations in supply and demand than do gas-fired generators. Guidehouse did not model an alternative scenario to the Astoria CTG, however, and thus was unable to capture any of these benefits in its analysis.

It should be noted that NRG's analysis actually highlights what a poor GHG reduction strategy a new gas combustion turbine is relative to installation of new renewable capacity. The Astoria CTG is projected to have a direct emissions reductions benefit, in the NRG estimate, of 421,000 tons of CO_2 between 2023 and 2035.[15] Meanwhile, a 543 MW offshore wind facility would have a GHG reduction of up to approximately 1 million tons a year. Based on NRG's own numbers, building new fossil fuel facilities is not an effective GHG mitigation strategy.

3. NRG AND GUIDEHOUSE'S OTHER INDIVIDUAL CLAIMS ARE UNSUPPORTED

In instances where proposed projects are not consistent with the CLCPA, they might still be approved if they are sufficiently justified. NRG claims that the Astoria CTG is justified based on cost savings, through its facilitation of renewables integration and based on its ability to address a claimed reliability need. This section evaluates those claims and finds them all to be deficient.

3.1. NRG claims that the Project is justified based on cost savings

NRG also retained Navigant/Guidehouse (referred to again as Guidehouse) to prepare a report assessing the direct, indirect, and induced jobs, associated earnings, output, and economic value added that would result from the Astoria CTG. This report was submitted as part of the DSEIS as Appendix C. Guidehouse found that the project would support 1,022 local job-years during the construction phase and 73 additional local annual jobs related to spending on operations and maintenance (O&M) during the operations phase. The Value Added attributable to the construction phase is $156 million and $10.6 million annually in the operations phase. We identify several shortcomings with the Guidehouse report.

[15] AECOM. Revised June 2021. *Astoria Replacement Project Draft Supplemental Environmental Impact Statement*. Page ES-5.

First, the Guidehouse analysis does not appear to be an economic analysis of ***net*** impacts, as it exclusively refers to benefits, but never costs. This is therefore a partial analysis, looking only at the benefits of the Astoria CTG itself. A full analysis would also incorporate the cost components—things like displaced generation from the project, retired resources from the project, etc. Second, the analysis looks at the benefits of the Astoria CTG only but does not look at the benefits that might accrue from any alternative resource(s), which could be greater than those from the project. It is important to bear in mind that any large investment will create some degree of economic benefit; to claim those benefits justify an otherwise CLCPA-inconsistent project would require more analysis of the economic benefits of the alternatives.

Guidehouse also analyzed New York Zone J wholesale electricity and capacity prices with and without the Astoria CTG in order to determine energy and capacity cost savings for ratepayers. Similar to the above criticism, Guidehouse seems not to assume that any other new resources (i.e., transmission, storage, or renewables) were included in the "without the Astoria CTG" scenario in place of the Astoria project. This is problematic in that Guidehouse did not examine the effect of an alternative resource or set of resources, and thus did not analyze whether there is a portfolio of alternative resources that would lead to lower wholesale electricity prices and capacity prices than the Astoria CTG.

Lastly, Guidehouse did not provide any of the raw data used as primary inputs to the Jobs and Economic Development Impact (JEDI) model, nor did it provide any calculations or workpapers. As a result, it is impossible for the interested public to determine whether or not the data and methodology are, in fact, reasonable and can be relied upon to support a justification under the CLCPA.

3.2. NRG claims that the Project will facilitate renewable integration

NRG claims that the Astoria CTG is necessary to provide long-duration firm capacity that will facilitate the integration of renewable energy resources, with the ability to provide energy during sustained periods of low renewable output. However, other states with ambitious renewable targets are choosing to forgo investments in new gas, at least in the near term. As an example, California will require that renewable and zero-carbon energy resources supply 100 percent of electric retail sales to customers by 2045.[16] In a very recent procurement decision, the California Public Utilities Commission confirmed that the state will require 11,500 MW of additional net capacity in 2023–2025 to replace retiring nuclear and other thermal power plants, and stated that its expectation is that all of the resources procured pursuant to the order will be zero-emitting or otherwise qualify as renewables.[17] Fossil-fueled resources

[16] The 100 Percent Clean Energy Act of 2018, California Senate Bill 100.

[17] Before the Public Utilities Commission of the State of California. Order Instituting Rulemaking to Continue Electric Integrated Resource Planning and Related Procurement Processes. Rulemaking 20-05-003. Decision Requiring Procurement to Address Mid-Term Reliability. Decision 21-06-035. June 24, 2021.

are not authorized to count toward the 11,500 MW for the next procurement, but will be reevaluated at a later date.[18]

The best way to facilitate renewable integration is not to build new fossil generation but to deploy a number of different approaches that instead increase the flexibility of the grid on both the electricity supply and demand sides. Those approaches could include: (1) a reliance on difference types of renewables (solar, wind, hydro, geothermal, etc.) to decrease volatility in production associated with a single resource type, and balance variability of production; (2) energy storage to further balance fluctuations in renewable output; (3) transmission upgrades to facilitate the transfer of electricity, particularly within constrained areas; and (4) demand-side management to both lower demand and shift flexible loads. NRG's alternatives analysis examined certain of those approaches described above, but only one at a time, (e.g., a standalone battery storage replacement for the Astoria Project). A full consideration of alternatives would have examined a portfolio of these approaches in order to promote flexibility in the electric grid and better facilitate the integration of renewables.

According to the EIA, generation from gas made up almost 40 percent of New York's fuel mix in 2019, with 29 percent of generation coming from renewable sources.[19] As the penetration of renewables increases over time, there may be a future need for the kind of long-duration firm capacity that can indeed be helpful to integrate renewables if expectations around storage do not materialize. However, the new Astoria CTG has no CLCPA-compliant plan for operation post-2040, and so the plant would be retiring at the point in time when its capacity contribution would be most helpful for renewables integration.

3.3. NRG claims the Project will address outstanding reliability shortfalls

In NRG's application, the company claims that the project is needed to maintain local and bulk system reliability. NRG points to two reports by the New York Independent System Operator (NYISO)—*2020 Q3 Short Term Assessment of Reliability* and a long-term reliability needs assessment. These reports discuss reliability impacts of New York's regulation that would phase in nitrogen oxide (NO_X) emissions control requirements from 2023 to 2025, with the intention to replace peaking plants in favor of battery storage. The two reports summarize that there will likely be both local (non-Bulk Power Transmission Facilities, or non-BPTF) and system-wide (BPTF) reliability issues from 2023 to 2030 in the New York City Transmission Load Area due to the Peaker Rule. Since the release of those reports, however, Con Edison has received Public Service Commission approval for the construction of three new transmission projects, collectively called the "TRACE Projects," and has authorization from NYISO to perform an alternative operating procedure for summer 2023. Together, these solutions are intended to address local and bulk reliability needs.

[18] *Ibid.*

[19] U.S. Energy Information Administration. *New York State Energy Profile*. Accessed September 4, 2021. Available at: https://www.eia.gov/state/print.php?sid=NY.

In addition, NRG cites to a February 2021 NYISO presentation to claim that the TRACE Projects and alternative operating procedure will reduce, but not eliminate, Con Edison's local transient voltage response issues.[20] At that time, it was unclear to the NYISO what the magnitude of the voltage deficiencies would be and how the local reliability issues would interact with the BPTF reliability issues expected to arise in 2029. However, in March 2021, the NYISO provided an updated set of modeling results. In this presentation, NYISO concluded that a dynamic voltage response deficiency of 150 MVAr is first observed on the local system (non-BPTF) in 2025, increasing to 475 MVAr in 2030.[21] NYISO states that Con Edison will be addressing this non-BPTF violation with a Corrective Action Plan as required by North American Electric Reliability Corporation (NERC) Standard TPL-001-04, and that addressing the non-BPTF deficiencies prior to 2025 will also address the BPTF deficiency that would arise in 2029. In other words, if the local voltage issue is addressed prior to 2025, there will no longer be a bulk transmission reliability issue in 2029.

According to the NERC, dynamic voltage violations can be addressed with various dynamic reactive support solutions, including synchronous condensers, synchronous generators, static synchronous compensators (STATCOMs), static Var compensators (SVCs), or battery solutions.[22] Therefore, synchronous generators (like the Astoria Project) are not the only available solutions to address dynamic voltage violations. Con Edison will determine what the best solution is to meet the voltage needs of the system as part of its Corrective Action Plan.

NYISO stated in March 2021 that, once Con Edison addresses the anticipated voltage deficiency, there are no remaining reliability needs on the local or bulk system due to the Peaker Rule, therefore the NYISO will not solicit solutions in the 2020–2021 Reliability Planning Process. Given this latest information, the Astoria project is not necessary for either local or bulk reliability issues in New York City.

3.4. NRG claims that the Project can provide system restoration service

System restoration—or black-start—service is a reliability service called upon to help restore the power system in the event of a widespread outage. This is typically done by starting up very small generators, like a small onsite diesel generator, and then using those generators to start operation of slightly larger target generators, like a combustion turbine. This creates small islands of generation and load, which are then expanded until the grid is fully restored. Generators providing black-start need to be small and

[20] New York Independent System Operator. *2021-2021 Reliability Planning Process: Post-RNA Base Case Updates.* February 23, 2021. Available at: https://www.nyiso.com/documents/20142/19415353/07%202020-2021RPP_PostRNABaseCaseUpdates.pdf/b81547bc-0411-7958-de0c-7b74244904a5.

[21] New York Independent System Operator. *2021-2021 Reliability Planning Process: Post-RNA Base Case Updates – Dynamics.* March 26, 2021. Available at: https://www.nyiso.com/documents/20142/20255668/03%202020-2021RPP_PostRNABaseCaseUpdates_Dynamics.pdf/60e9535a-a5c2-2b43-7d24-97046c54575e.

[22] North American Electric Reliability Corporation (NERC). *Reliability Guideline: Reactive Power Planning.* December 2016. Available at: https://www.nerc.com/comm/PC_Reliability_Guidelines_DL/Reliability%20Guideline%20-%20Reactive%20Power%20Planning.pdf, at pages 3–8.

highly flexible to balance supply and demand within those pockets of generation and load, so large and inflexible coal, nuclear, and combined cycle generators are not typically used.

NRG states that the project has been designed with black-start capability to restore electric service to New York City following a total system outage. NRG explains that black-start service will be provided by two of the existing simple cycle units (fueled by natural gas) that will eventually be replaced by a 24 MW battery storage system. In other words, the new CT unit at Astoria will not be used for black-start service; the existing units will be used for this purpose.

NRG includes black-start service under the section of its Draft EIS titled "Project Need and Purpose" (Section 1.4.1). However, NRG did not make any statement that the project is *needed* for black-start capability in the New York City region. NRG should provide justification from the NYISO that the project is needed for black-start service in this region if that is the case. If the project is needed for black-start capability, NRG can provide that service with the existing units, eliminating the need for a new 437 MW combustion turbine at the site. However, we believe that is unlikely, given that 86 MW of peaker units in New York City will be reclassified as black-start-only units by 2023–2025. [23]

Alternative options for black-start service

If additional black-start capacity is needed in the New York City region, we recommend considering the use of non-emitting technologies to provide New York City with fast-acting black-start service that will align with the goals of the CLCPA. Wind, solar, and battery storage are digitally-controlled inverter-based resources, allowing them to respond to grid disturbances more quickly (by orders of magnitude) than mechanically controlled conventional generators, with a full response in a few seconds or less. This frequency response is fast enough that it can offset the need for inertial response from conventional generators, while also reducing the need for conventional generators' slower frequency response. Wind and solar resources are also highly flexible, able to fully dispatch up or down in seconds, compared to many minutes for conventional generators.

Batteries can provide black-start service if they are outfitted with grid-forming inverters that can set their own frequency and voltage signal. When outfitted in this way, batteries have a strong potential for use as black-start resources because of their small modular size and extremely fast response. Batteries can ramp from full charge to full discharge output in seconds or less in response to dispatch signals. In contrast, even quick-start natural gas generators typically take nearly 10 minutes to start and ramp up to full load. Therefore, it is much more likely that a battery will be used for black-start service to New York City than the proposed combustion turbine at the Astoria Project. Indeed, NRG itself proposes using battery storage to provide black-start capability at the site after it retires the final two existing

[23] Anderson, Jared. SPS Global. April 7, 2020. *Nearly 650 MW of New York City peaking capacity will retire to comply with tighter regulations.* Available at: https://www.spglobal.com/platts/en/market-insights/latest-news/natural-gas/040720-nearly-650-mw-of-new-york-city-peaking-capacity-will-retire-to-comply-with-tighter-regulations.

combustion turbines. There are currently 10 MW of battery storage technologies providing capacity on Long Island.[24]

The use of batteries as black-start resources is also aligned with the goals of the CLCPA. Batteries have the unique ability to absorb excess renewable output by charging, which gas and conventional generators cannot do. Because of their modularity and small footprint, batteries can be located near renewable generators to absorb excess output that would have been curtailed, and then release that output later when transmission capacity is available. In contrast, inflexible fossil generators tend to increase renewable curtailment, as these resources cannot change their level of output as quickly and often have high minimum output levels.

[24] New York Independent System Operator. *2021 Load and Capacity Data*. April 2021. Available at: https://www.nyiso.com/documents/20142/2226333/2021-Gold-Book-Final-Public.pdf/b08606d7-db88-c04b-b260-ab35c300ed64, at 89 tbl.III-2.

Appendix B

Applied Economics Clinic
Economic and Policy Analysis of Energy, Environment and Equity

Comments on Astoria Gas Turbine Power LLC's Proposed Gas-Fired Combustion Turbine

September 10, 2021

Bryndis Woods, PhD
Elizabeth A. Stanton, PhD

Introduction

Astoria Gas Turbine Power LLC's ("Astoria" or "the Company") proposes to build a 437 MW gas-fired simple cycle combustion turbine generator (CTG) (referred to as the "proposed Project" throughout these comments) at the Astoria Generating Facility—located in Astoria, New York. On behalf of Earthjustice for their engagement in the New York State Title V and Environmental Impact Statement processes before the New York Department of Environmental Conservation (NYSDEC), these comments assess the proposed Project's consistency with the electric sector goals set forth in New York's 2019 Climate Leadership and Community Protection Act (CLCPA).[1] These comments are informed by our review of Astoria's 2021 Draft Supplemental Environmental Impact Statement (DSEIS) and its appendices.[2] We specifically consider the Company's claims regarding the potential use of hydrogen fuel at the proposed plant.

Astoria Gas Turbine Power LLC incorrectly claims that the proposed Project is CLCPA-consistent

New York State's CLCPA requires 70 percent renewable electric generation by 2030 and zero emissions electricity by 2040, which means any remaining fossil fuel-powered generation can no longer operate beginning in 2040 (see Figure 1 below). These so-called "stranded assets" would lose all value by January 1, 2040 at the latest. By 2030, New York must reduce its share of oil, gas, and coal-fired generation from 63 percent in 2020 (gas-fired generation alone accounted for 37 percent of all generation in 2020) to 30 percent,[3] and increase its share of renewable generation from 26 percent in 2020 to 70 percent in 2030.[4] After 2040, a gas simple cycle CTG may no longer operate in New York State—this would include the proposed Project unless it has been converted to run entirely on a zero-emissions fuel. Hydrogen is not a

[1] New York State Climate Leadership and Community Protection Act, S.B. 6599, 242d Sess. (N.Y. 2019), https://www.nysenate.gov/legislation/bills/2019/s6599. ("CLCPA").
[2] AECOM, *Draft Supplemental Environmental Impact Statement: Astoria Replacement Project* (June 2021), https://www.nrg.com/assets/documents/legal/astoria/00_2021/astoria-draft-dseis-06-30-2021.pdf. ("DSEIS"); DSEIS Appendices A–D (June 2021), https://www.nrg.com/assets/documents/legal/astoria/00_2021/appendices-a-d-06-30-21.pdf; DSEIS Appendices E–M, https://www.nrg.com/assets/documents/legal/astoria/00_2021/appendices-e-m-06-30-21.pdf.
[3] U.S. Environmental Information Administration. 2020. Form EIA 923. Detailed data with previous form data: Electricity. US Energy Information Administration. Available at: https://www.eia.gov/electricity/data/eia923/.
[4] Ibid.

zero-emission fuel, as is discussed in detail in Section 2 below.

Figure 1. CLCPA Requirements

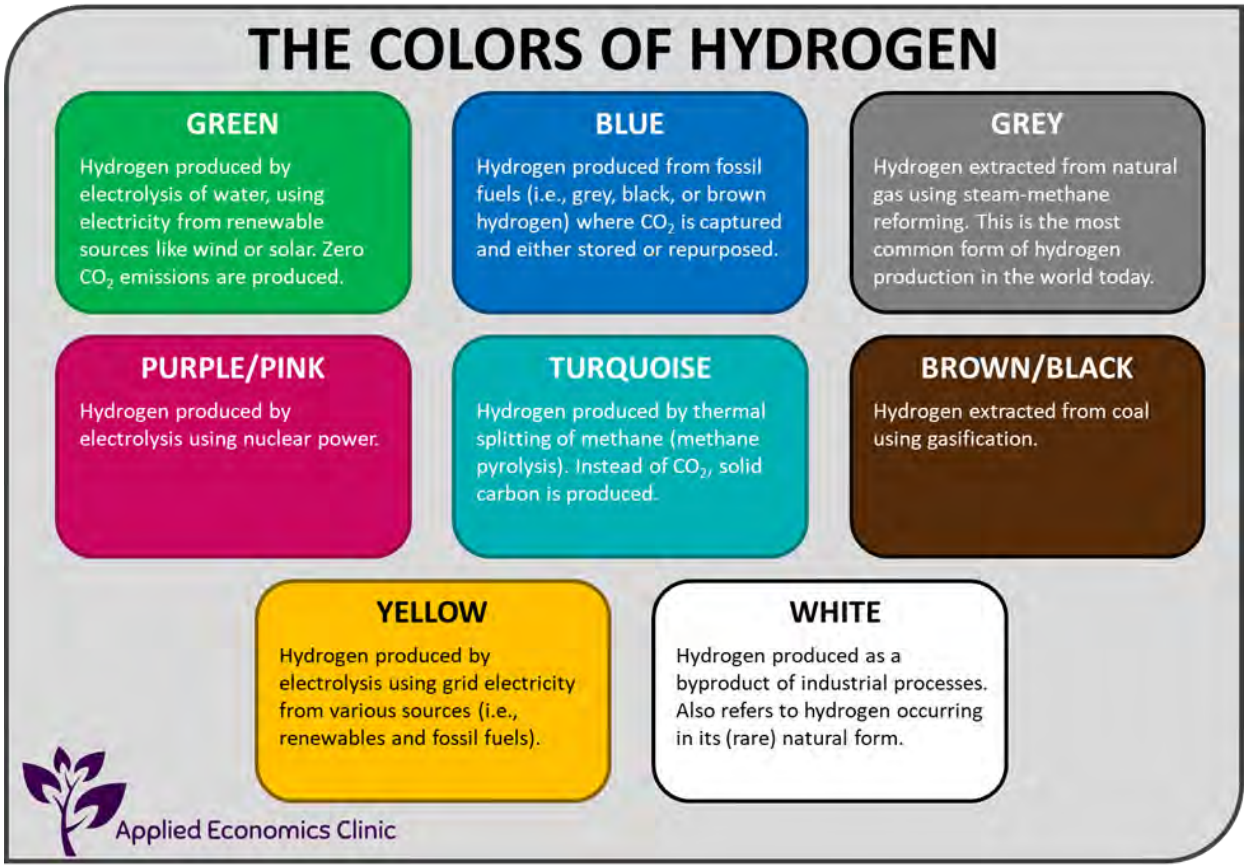
Category	Goal
Renewables	Achieve: ▪70% renewable electric generation by 2030 ▪100% zero-emissions electricity by 2040
Rooftop Solar	Install 6 GW by 2025
Offshore Wind	Install 9 GW by 2035
Battery	Install 3 GW by 2030
Energy Efficiency	Increase cumulative savings to reach 23% of 2030 total demand by 2030
Statewide Emissions	Reduce: ▪40% from 1990 levels by 2030 ▪85% from 1990 levels by 2050

Data source: CLCPA, see note 1.

In its 2021 DSEIS, Astoria asserts that the proposed gas-fired Project is consistent with CLCPA requirements **without** converting from gas to "green" hydrogen fuel (that is, hydrogen produced from 100 percent renewable energy sources and therefore with less emissions than other kinds of hydrogen, see Figure 2) or an—as yet unidentified—zero-emission fuel.[5] Hydrogen produced with anything less than 100 percent renewable energy does not qualify as green hydrogen. The Company concedes as much, stating in its DSEIS that "GHG emission reduction benefits from the use of hydrogen are only achieved if the fuel is produced using renewable energy (green hydrogen)."[6]

[5] DSEIS. Page 3-52.
[6] Ibid. Page 3-50.

Figure 2. The colors of hydrogen



Despite this disclaimer, Astoria repeatedly describes the proposed Project's ability to switch to a zero-emitting fuel in the context of 2030 and 2040 CLCPA goals, but omits any explanation of why a switch to zero-emitting fuel would be necessary if the proposed Project were already consistent with the CLCPA.[7][8] The Company also notes that if a zero-emission fuel is not available by the time the CLCPA ends all operation of gas-fired resources in 2040 (including the proposed Project), then the proposed Project will be retired.[9]

[7] DSEIS Appendix F.1: Air Emissions Supporting Information. Page 2.
[8] DSEIS Appendix D.5: Final Scoping Document. Page 2-1.
[9] Ibid. Page 2-1, Footnote 1.

Astoria does not have a coherent explanation of how the proposed Project is consistent with the CLCPA. Instead, the Company offers multiple, mutually exclusive explanations, none of which are adequately demonstrated. According to Astoria's DSEIS the proposed Project is simultaneously:

- "already consistent with the CLCPA",[10] despite the fact that gas-fired resources must decrease their share of New York's electric generation to be consistent with CLCPA goals;
- "well positioned to transition to renewable hydrogen fuel in place of natural gas or fuel oil to satisfy [the CLCPA]",[11] despite the wholly speculative nature of this conversion; and/or
- in the absence of a zero-emissions fuel—to "comply with the CLCPA…it will cease operating",[12] clearly demonstrating the proposed Project's inconsistency with CLCPA's 2040 electric sector goal.

Should the proposed Project be approved and built, the Company projects the power plant to come online in 2023[13] and is expected to have a lifetime of 30 years—operating economically through 2053.[14] The proposed Project is forecasted to emit 713,000 tons of carbon dioxide equivalent per year,[15] which means that—from 2023 through 2039—the proposed Project would emit over 8.5 million tons of carbon dioxide equivalent. In 2040, if zero-emission fuels are unavailable, infeasible, or prohibitively costly, the proposed Project will retire 13 years ahead of schedule.

To be clear, the Company claims that the proposed Project—which will produce up to 713,000 tons of greenhouse gas emissions every year it operates—is nevertheless CLCPA-consistent, even without converting to a speculative zero-emission source, because it could retire 13 years early.

Contrary to the Company's claims, the proposed Project interferes with the pre-2040 and 2040 goals of the CLCPA because it is fossil fuel-fired.

New fossil fuel resources like the proposed Project interfere with the CLCPA and must retire early unless they can be converted to as-yet-hypothetical zero-emissions fuels. By 2030, New York's electric sector must achieve 70 percent renewables and the state as a whole must achieve a 40 percent reduction in greenhouse gas emissions. The addition of new fossil-fuel infrastructure interferes with this statutory mandate and should be rejected on this basis.

DEC must also consider that a decision to grant a permit for Astoria's proposed Project may influence other gas generation owners to argue that their individual generators, like Astoria's, should be approved because, individually, gas generators have a small effect on the electric sector's total emissions. For this reason, if each application to build a new fossil-fueled power plant is considered only in isolation and not as part of a larger, integrated, legally-mandated renewable transition, New York State is at serious risk of overshooting

[10] DSEIS. Page 3-52.
[11] DSEIS Appendix D.5: Final Scoping Document, Page 2-1.
[12] Ibid. Page 2-1. Footnote 1.
[13] DSEIS. Page 3-13.
[14] Ibid. Page 3-109.
[15] Ibid. Table 3.17: Maximum Potential Combustion Turbine Air Emissions -Comparison of Current Configuration of the Project to Previously Approved Configuration of the Project.

its 2030 and 2040 emission limits.

Hydrogen is not zero emissions and does not meet CLCPA requirements

Astoria's claim that the proposed Project is "well positioned to transition to renewable hydrogen fuel"[16] is unpersuasive for three main reasons: first, because it is not technically feasible for the proposed Project to use more than 10 percent hydrogen fuel, which would only reduce emissions by 3 percent; second, because the Company admits that there is insufficient hydrogen fuel supply (of any type, see Figure 2 above) and research indicates that, even if the proposed Project can be modified at great cost to accommodate hydrogen, the existing gas pipeline system cannot ensure its safe transport; and third, because hydrogen fuel combustion causes both greenhouse gas and conventional air emissions, no matter the share of hydrogen in question and regardless of how the hydrogen is produced (in other words, regardless of hydrogen's source materials).

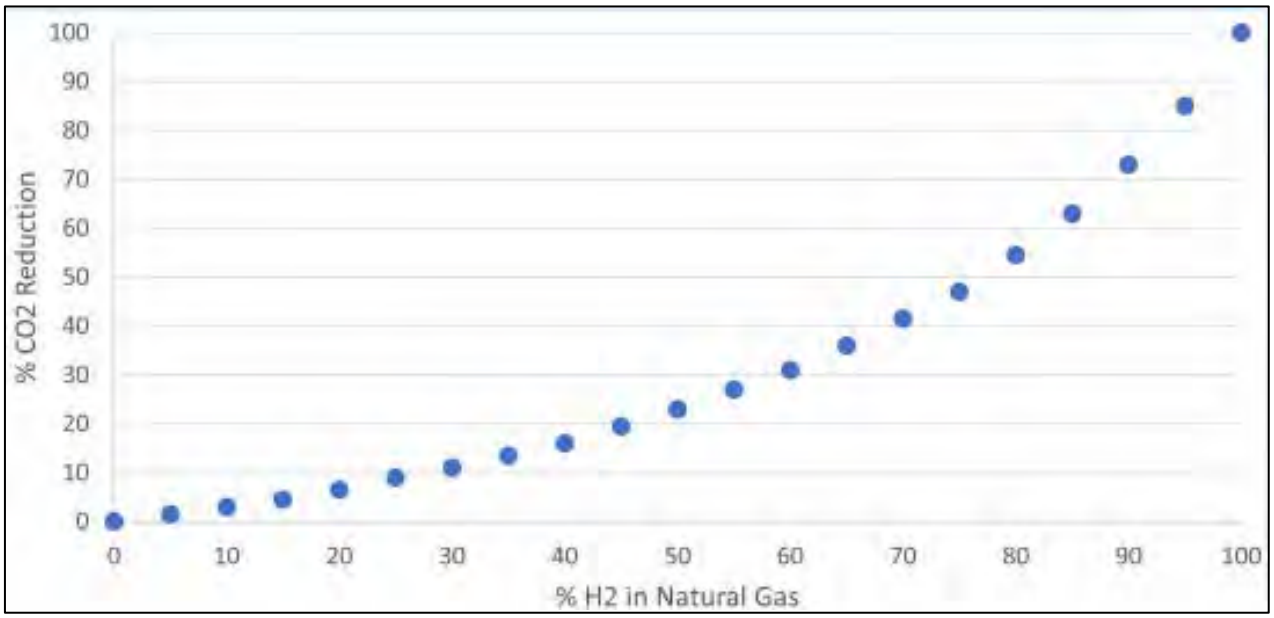
1. ***The proposed Project's transition to green hydrogen fuel would not result in meaningful greenhouse gas emission reductions***

As proposed, the proposed Project can only use up to 10 percent hydrogen fuel (of any type)—with modifications—a share that would only deliver emission reductions of 3 percent.

The emission reductions achieved from blending hydrogen (from any source material) with gas are non-linear; that is, 10 percent hydrogen in a fuel blend does not lead to a 10 percent emission reduction because the difference between gas and hydrogen's volumetric density leads to less hydrogen in the fuel blend on a heat input basis.[17] According to the Company, "with the addition of several balance of plant systems it is technically feasible for the Astoria Replacement Project to immediately use a blend of hydrogen fuel up to 10 percent."[18] Assuming that the proposed Project installs the "balance of plant systems" needed to blend 10 percent hydrogen into its fuel, that would only result in 3 percent emissions savings (see Figure 3).

[16] DSEIS Appendix D.5: Final Scoping Document. Page 2-1.
[17] GE Power. February 2019. "Power to Gas: Hydrogen for Power Generation." Available at: https://www.ge.com/content/dam/gepower/global/en_US/documents/fuel-flexibility/GEA33861%20Power%20to%20Gas%20-%20Hydrogen%20for%20Power%20Generation.pdf.
[18] DSEIS Appendix L: Information from General Electric Regarding Use of Green Hydrogen. Exec. Summary. Page 1.

Figure 3. Carbon dioxide emission reduction for hydrogen-gas fuel blends by volume



Source: Reproduced from Electric Power Research Institute. November 19, 2019. Technology Insights Brief: Hydrogen-Capable Gas Turbines for Deep Decarbonization. Figure 1. Available at: https://www.epri.com/research/products/000000003002017544.

A 2021 study conducted by General Electric on its gas combustion turbines confirms Astoria's technical issues with using a high share of hydrogen in its proposed Project. General Electric suggests that reaching a 50-50 blend of hydrogen and gas fuel would require even more extensive modifications to the proposed Project than those necessary to reach the "technically feasible" 10 percent blend, including different ventilation systems, enclosures, and controls to address hydrogen's flammability:[19]

> "Today, based on laboratory testing and analysis, GE's fielded and proven DLN 2.6e combustion system available for 7HA gas turbines has the capability to operate up to 50% hydrogen by volume in natural gas with minimal modifications to the turbine itself. Supporting systems, however, will need to be either installed or upgraded for the turbine to operate on hydrogen. One such example of an additional system that would need to be installed is a hydrogen blending system upstream of the gas turbines. Other examples of upgrades needed would be the fuel handling equipment, piping sizing and materials, and enclosure ventilation. Additionally, changes to the gas turbine control software, flame detectors, fire protection and area classification will be required at higher levels of H2."[20]

[19] GE. 2021. "Hydrogen as a Fuel for Gas Turbines: A Pathway to Lower CO2." Available at: 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. Pages 3-4.
[20] DSEIS Appendix L: Information from General Electric Regarding Use of Green Hydrogen. Technology Stages. Page 2.

According to the Company, the proposed Project is not equipped to blend any hydrogen and, even with modifications, could not currently blend more than 10 percent hydrogen into its gas fuel,[21] and, therefore, could only provide a 3 percent emission reduction.[22] That means the proposed Project cannot, at present, achieve meaningful emission reductions and would need extensive modifications to be able blend enough hydrogen to achieve even just 20 to 25 percent carbon dioxide emission reductions. (Figure 2 shows that a 50 percent hydrogen blend achieves less than 25 percent emission reductions.[23]) Beyond that, the use of 100 percent hydrogen in utility gas systems is purely hypothetical (currently, only one commercially available gas turbine can accommodate 100 percent hydrogen fuel[24]) and, even if Astoria were able to achieve it, would not be zero greenhouse gas emissions (for reasons given below).

2. *Conversion of the proposed Project to hydrogen is infeasible and, even if accomplished, may be unsafe*

Second, the Company admits that there is insufficient hydrogen fuel supply of any type to fuel even 10 percent of the proposed Project's needs and research indicates that—even if the proposed Project can be modified at great cost to accommodate 10 percent or more hydrogen into its fuel mix—the existing gas pipeline system cannot ensure its safe transport.

Current use of hydrogen fuel (from any source material) is infeasible for the proposed Project due to insufficient supply of hydrogen and lack of safe hydrogen transportation options. Astoria admits as much, stating that "[h]ydrogen…is not commercially available to serve the Project at this time," and is presently "a technically infeasible fuel choice for the Project's CTG."[25] To produce enough green hydrogen to power the proposed Project, using today's technology, over 1,700 MW of wind power would be required.[26] (As of 2020, New York State had approximately 1,990 MW of wind capacity installed.[27]) Demand for renewable

[21] DSEIS Appendix L: Information from General Electric Regarding Use of Green Hydrogen. Exec. Summary. Page 1.
[22] GE Power. February 2019. "Power to Gas: Hydrogen for Power Generation." Available at: https://www.ge.com/content/dam/gepower/global/en_US/documents/fuel-flexibility/GEA33861%20Power%20to%20Gas%20-%20Hydrogen%20for%20Power%20Generation.pdf.
[23] Electric Power Research Institute. November 19, 2019. Technology Insights Brief: Hydrogen-Capable Gas Turbines for Deep Decarbonization. Available at: https://www.epri.com/research/products/000000003002017544. Figure 1.
[24] GE. 2021. "Hydrogen as a Fuel for Gas Turbines." Available at: 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. Page 7.
[25] AECOM on behalf of Astoria Gas Turbine Power LLC. May 2021. Title V Air Permit Major Modification Turbine Replacement Project. Available at https://www.nrg.com/assets/documents/legal/astoria/00_2021/astoria-gas-turbine-llc-air-permit-application-revision-5-28-2021.pdf. Page 4-5.
[26] Calculated using GE's Hydrogen Cost Calculator tool. Available at: https://www.ge.com/gas-power/future-of-energy/hydrogen-fueled-gas-turbines. (select "Try our hydrogen calculator"; choose "7HA.03" from the "What kind of gas turbine do you have?" dropdown; choose "simple" under the "How is your plant configured?" dropdown; type "2710" in the "HRS" box under "What are the expected annual operating hours of your gas turbine?"; type "99" in the "%" box under "What's the volume percent of hydrogen you want to run through?"; type "4.60" in the "$" box under "What CO_2 tax rate do you pay today, if any?"; then click "See your hydrogen potential") (last visited Sept. 7, 2021). This result is based on estimate of 2,710 annual operating hours at 99% hydrogen on a 7HA.03 turbine configured as a simple cycle plant and a current CO_2 tax of $4.60 per ton (RGGI) and assumes a 50 percent capacity factor for wind.
[27] US EIA. June 3, 2021. Form EIA-860 detailed data with previous form data (EIA-860A/860B). 20202ER. Available at: https://www.eia.gov/electricity/data/eia860/.

energy supplies in New York will grow as the state moves towards meeting the requirements of the CLCPA and as electrification becomes more widespread. Producing green hydrogen would have the effect of further increasing demand for renewable energy sources. It is also important to note that according to the U.S. Department of Energy less than 1 percent of hydrogen fuel today is green.[28]

According to research published in *Oil, Gas & Energy Law* in 2021, significant infrastructure upgrades and/or new infrastructure would be needed to safely transport and store hydrogen for electricity production to overcome hydrogen's key safety risks: degrading pipeline integrity, the need for higher pipeline pressure, and the risk of leakage.[29] In its DSEIS for the proposed Project, Astoria confirms that, given the location of the proposed Project, green hydrogen fuel could not be produced on-site and would need to be compressed and transported via existing or not-yet-constructed gas pipelines or some other unspecified form of transport.[30] New York State's aging gas pipelines and other gas infrastructure result in tens of thousands of gas leaks each year. In 2020, there were 18,330 gas leaks reported, or about 370 gas leaks per 1,000 miles of pipeline, leaving a volume of gas equal to almost 20 percent of total gas demand lost or unaccounted for.[31] The cost of replacing leak-prone pipeline ultimately works its way into the fuel costs paid by electric generators, wholesale electric prices, and, ultimately, customer electric rates.

3. All hydrogen fuel—even green hydrogen—results in greenhouse gas and conventional air pollutant emissions

Third, so-called "green" hydrogen is not actually a zero-emission fuel source. Hydrogen fuel combustion entails greenhouse gas and conventional air emissions, no matter the share of hydrogen in question and regardless of how the hydrogen is produced.

Regardless of the share or type of hydrogen in question, hydrogen combustion emits nitrogen oxide (NO_x)—an indirect greenhouse gas and an air pollutant—and any leaked hydrogen is itself an indirect greenhouse gas. Furthermore, gas turbines burning hydrogen-gas blends (the only possibility for the proposed plant at present) produce higher NO_x emissions than hydrogen fuel alone.[32]

[28] U.S. Office of Energy Efficiency & Renewable Energy. August 30, 2021. "How Wind Energy Can Help Clean Hydrogen Contribute to a Zero-Carbon Future." Available at: https://www.energy.gov/eere/articles/how-wind-energy-can-help-clean-hydrogen-contribute-zero-carbon-future.
[29] Verdonck, P.K.A. and Kammoun, M. 2021. "Is Hydrogen a Viable Alternative to Lithium Under the Current Energy Storage Regulatory Framework?" *Oil, Gas & Energy Law Intelligence, 18(6)*. Available at: https://www.lexology.com/library/detail.aspx?g=e908442d-8b33-462c-ae23-9c1dcb917127.
[30] DSEIS. Page 3-50.
[31] US DOT PHMSA. 2020. "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 [Workbook]. Available at: https://www.phmsa.dot.gov/data-and-statistics/pipeline/gas-distribution-gas-gathering-gas-transmission-hazardous-liquids.
[32] European Turbine Network. January 2020. *Hydrogen Gas Turbines: The Path Towards A Zero-Carbon Gas Turbine.* Available at: https://etn.global/wp-content/uploads/2020/02/ETN-Hydrogen-Gas-Turbines-report.pdf. Page 9.

Two European studies from the City of Leeds and the *International Journal of Hydrogen Energy*[33] found that combusting green hydrogen produces NO_x emissions—an indirect greenhouse gas and a conventional air pollutant.[34] (NO_x acts as an "indirect greenhouse gas" when it reacts photochemically in the atmosphere to produce the greenhouse gas tropospheric ozone.)[35] A 2020 report from the European Turbine Network found that gas turbines burning hydrogen-gas blends result in higher NO_x emissions "if no additional measures are undertaken."[36] The 2021 General Electric study found that a 50/50 mixture of hydrogen and gas fuel increased concentrations of NO_x in gas exhaust by 35 percent.[37] Despite the significant concerns that green hydrogen combustion raises with regard to local air quality and greenhouse gas emissions, the Company does not present any plans for NO_x emissions controls at the proposed Project in its SDEIS or Title V permit application.

According to 2006 research from the Massachusetts Institute of Technology, hydrogen—regardless of whether it is green or not—is also itself an indirect greenhouse gas when leaked:

> "Because hydrogen reacts with tropospheric hydroxyl radicals, emissions of hydrogen to the atmosphere perturb the distributions of methane and ozone, the second and third most important greenhouse gases after carbon dioxide. Hydrogen is therefore an indirect greenhouse gas with a global warming potential GWP of 5.8 over a 100-year time horizon. A future hydrogen economy would therefore have greenhouse consequences and would not be free from climate perturbations."[38]

[33] 1) Cellek, M.S. and Pınarbaşı, A. 2018. "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) 1194–1207.* Available at: https://doi.org/10.1016/j.ijhydene.2017.05.107;
2) Sadler, D., et. Al. 2017. *H21 Leeds CityGate Project Report*. City of Leeds. Available at: https://www.h21.green/wp-content/uploads/2019/01/H21-Leeds-City-Gate-Report.pdf.

[34] 1) Milford, L., Mullendore, S. and Ramanan, A. December 14, 2020. "Hydrogen Hype in the Air." *Clean Energy Group*. Available at: https://www.cleanegroup.org/hydrogen-hype-in-the-air/. 2) Lewis, A.C. June 2021. "Optimising air quality co-benefits in a hydrogen economy: a case for hydrogen-specific standards for NOx emissions." *Environmental Science: Atmospheres*, 1, 201. Available at: https://pubs.rsc.org/en/content/articlepdf/2021/ea/d1ea00037c.

[35] Derwent, R., Simmonds, P., O'Doherty, S., Manning, A., Collins, W. and Stevenson, D. 2006. Global environmental impacts of the hydrogen economy. *Int. J. of Nuclear Hydrogen Production and Applications*. 1(1): 57-67. Available at: http://agage.mit.edu/publications/global-environmental-impacts-hydrogen-economy.

[36] European Turbine Network. January 2020. *"Hydrogen Gas Turbines: The Path Towards A Zero-Carbon Gas Turbine."* Available at: https://etn.global/wp-content/uploads/2020/02/ETN-Hydrogen-Gas-Turbines-report.pdf. Page 9.

[37] GE. 2021. "Hydrogen as a Fuel for Gas Turbines." Available at: 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. Page 5.

[38] Derwent, R., Simmonds, P., O'Doherty, S., Manning, A., Collins, W. and Stevenson, D. 2006. "Global Environmental Impacts of the Hydrogen Economy." *Int. J. of Nuclear Hydrogen Production and Applications*. 1(1): 57-67. Available at: http://agage.mit.edu/publications/global-environmental-impacts-hydrogen-economy.

In addition, a report released by the Columbia Climate School in 2021 found that hydrogen is difficult to transport due to its small molecular size (smallest of all molecules), making it prone to leakage.[39]

The prospect of running Astoria's proposed Project on a zero-emission fuel is wholly speculative. It is impossible for the plant to secure enough hydrogen of any type to blend the current technically feasible potential of 10 percent hydrogen fuel[40] or to use hydrogen as a dominant fuel (and no other possible fuels have been identified), and it is clear that gas turbines that can burn 100 percent hydrogen are a ways off: a January 2020 report by European Turbine Network Global—a non-profit membership organization—indicated that the "gas turbine industry strongly committed to develop gas turbines operating with 100% hydrogen till (sic) 2030."[41] Assuming that gas turbines are someday developed that can burn 100 percent hydrogen, the proposed Project would still emit NO_x—an indirect greenhouse gas and a conventional air pollutant—and associated infrastructure could leak hydrogen—an indirect greenhouse gas in its own right. As discussed above, even if the proposed Project were able to burn hydrogen fuel of any color, significant infrastructure upgrades would be needed to safely transport hydrogen fuel.[42] In the future, even if the proposed Project were able to be modified to run on 100 percent hydrogen and were able to safely supply 100 percent green hydrogen, green hydrogen is not a zero-emitting fuel. The use of hydrogen fuel—if it were practicable and available—interferes with statewide attainment of CLCPA greenhouse gas emission limits.

Hydrogen has negative environmental justice and public health implications

Hydrogen entails significant public health and safety risks that are different than those of gas, and—if the proposed Project is approved—the brunt of these risks will be borne by low-income communities and communities of color in the vicinity of the proposed Project. Astoria claims that, despite not relying on a transition to hydrogen for consistency with CLCPA targets for 2030 or 2040, the proposed Project is "well positioned to transition to renewable hydrogen fuel,"[43] but nevertheless neglects to assess environmental, public health, and safety risks related to hydrogen or its impacts on Environmental Justice communities.[44]

[39] Cho, R. January 7, 2021. "Why We Need Green Hydrogen." *Columbia Climate School*. Available at: https://news.climate.columbia.edu/2021/01/07/need-green-hydrogen/. ("Because hydrogen is so much less dense than gasoline, it is difficult to transport. It either needs to be cooled to -253˚C to liquefy it, or it needs to be compressed to 700 times atmospheric pressure so it can be delivered as a compressed gas").
[40] AECOM on behalf of Astoria Gas Turbine Power LLC. May 2021. Title V Air Permit Major Modification Turbine Replacement Project. Page 4-5.
[41] ETN Global. January 2020. "Hydrogen Gas Turbines." Available at: https://etn.global/wp-content/uploads/2020/01/ETN-Hydrogen-Gas-Turbines-report.pdf. Page 2.
[42] Verdonck, P.K.A. and Kammoun, M. 2021. "Is Hydrogen a Viable Alternative to Lithium Under the Current Energy Storage Regulatory Framework?" *Oil, Gas & Energy Law Intelligence,* 18(6). Available at: https://www.lexology.com/library/detail.aspx?g=e908442d-8b33-462c-ae23-9c1dcb917127.
[43] DSEIS Appendix D.5: Final Scoping Document. Page 2-1.
[44] DSEIS. Page ES-10.

1. *Safety and public health risks of hydrogen*

Hydrogen creates risks to safety because of its flammability and propensity for leakage. A 2021 study by General Electric found that hydrogen is even more flammable than methane gas, and—when it catches fire—hydrogen's flame speed is an order of magnitude faster than methane (meaning that hydrogen-caused fires would spread much faster than gas-caused fires).[45] Analysis released in 2021 by the U.S. Congressional Research Service found that because hydrogen molecules are the smallest of any gas, it is more likely than other gases to leak through existing pipelines, especially those with imperfections, [46] like the aging, leaky gas pipelines in New York. In addition, a May 2021 report by the consulting firm Arup found that hydrogen fuel used in United Kingdom homes would increase the risk of explosions and the risk of injury more than three-fold, as compared to gas.[47] The 2021 Congressional Research Service report established that when hydrogen leaks, it rises and disperses in the air more quickly than methane gas, meaning that a hydrogen gas cloud is larger than a comparable gas cloud and a hydrogen fire requires much less air to burn. [48] In addition, hydrogen can degrade materials commonly used for pipelines, like pipes, pipe welds, valves, and fittings.[49]

Second, hydrogen fuel results in emissions that are harmful to public health. In April 2021, researchers from Cornell University and Stanford University found that the greenhouse gas footprint of "blue" hydrogen (that is, hydrogen produced from fossil fuels and emissions are captured and either stored or repurposed) is "more than 20% greater than burning natural gas or coal for heat and some 60% greater than burning diesel oil for heat."[50] A 2020 study by the Clean Energy Group based on research with public health experts, found that combusting hydrogen of any kind (whether green hydrogen or not) produces NO_x emissions that—in addition to creating greenhouse gases in the atmosphere—are harmful to human health and produces up to six times the level of NO_x emissions produced by gas combustion.[51] According to 2011 research published in the *Annals of the New York Academy of Sciences*, NO_X emissions combine "with volatile organic compounds [to] form not only particulates but also ground-level ozone (photochemical smog), [which is]

[45] GE. 2021. "Hydrogen as a Fuel for Gas Turbines." Available at: 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. Page 4.
[46] U.S. Congressional Research Service. March 2, 2021. "Pipeline Transportation of Hydrogen: Regulation, Research, and Policy." Available at: https://crsreports.congress.gov/product/pdf/R/R46700. "Summary."
[47] Arup. May 1, 2021. "Work Package 7—Safety Assessment: Conclusions Report" (Incorporating Quantitative Risk Assessment). Available at: https://static1.squarespace.com/static/5b8eae345cfd799896a803f4/t/60e399b094b0d322fb0dadc4/1625528759977/conclusions+inc+QRA.pdf.
[48] U.S. Congressional Research Service. March 2, 2021. "Pipeline Transportation of Hydrogen: Regulation, Research, and Policy." Available at: https://crsreports.congress.gov/product/pdf/R/R46700. Page 2.
[49] Ibid. "Summary."
[50] Howarth, R.W. and Jacobsen, M.Z. April 2021. "How Green is Blue Hydrogen?" *Energy Science & Engineering*, 00, p.1-12. Available at: https://onlinelibrary.wiley.com/doi/10.1002/ese3.956.
[51] 1) Milford, L., Mullendore, S. and Ramanan, A. December 14, 2020. "Hydrogen Hype in the Air." *Clean Energy Group*. Available at: https://www.cleanegroup.org/hydrogen-hype-in-the-air/; 2) E4tech (UK) Ltd for the Department for Business Energy and Industrial Strategy (BEIS). October 2018. "H2 Emission Potential Literature Review: Final report." Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/798243/H2_Emission_Potential_Report_BEIS_E4tech.pdf.

corrosive to the lining of the lungs."[52] A 2010 report from the Clean Air Task Force demonstrated that particle-forming pollutants like NO_x take a substantial toll on the health of millions of Americans.[53] Comments submitted to the Department of Energy by Clean Energy Group in 2021 describe how particulate pollutants harm human health by passing through the lungs and causing significant damage to the respiratory system over time and by entering the bloodstream and leading to other serious, chronic health problems like cardiovascular and pulmonary disease[54]:

> "NOx does significant damage to the respiratory system over time. In areas affected by smog resulting from NOx emissions, symptoms including coughing, increased rates of asthma, and comorbidities with other respiratory illness develop. This impact is readily apparent in many frontline communities dealing with heavy NOx emissions emitted by nearby high-polluting peaker power plants and other sources. These communities have developed stark health disparities as a result of elevated NOx exposure."[55]

Hydrogen—green or not—entails significant public health and safety risks.

2. Environmental justice impacts of hydrogen

The public health risks presented by localized air emissions from hydrogen fuel combustion are an environmental justice issue. Low-income communities and communities of color near the proposed Project are more vulnerable to negative health impacts from localized air emissions, including particulate emissions like NO_x, because they have higher rates of asthma and other respiratory conditions (according to 2020 research from the American Lung Association);[56] higher rates of COVID-19 infections and hospitalizations;[57]

---

[52] Epstein et al. 2011. "Full Cost Accounting for the Life Cycle of Coal." *Ecological Economics Review, Annals of the New York Academy of Sciences*, issue 1219. Available at: http://www.coaltrainfacts.org/docs/epstein_full-cost-of-coal.pdf, Page 85.

[53] Clean Air Task Force. September 2010. "The Toll From Coal." Available at: https://www.catf.us/resource/the-toll-from-coal/. Page 4.

[54] Price, D., Birnbaum, R., Batiuk, R., McCullough, M., Smith, R. 1997. "Nitrogen Oxides Impacts On Public Health And The Environment." *U.S. Environmental Protection Agency*. Available at: https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=2000DM8Q.txt.

[55] Clean Energy Group. July 7, 2021. "Response of Clean Energy Group to DOE Hydrogen Program Request for Information #DE-FOA-0002529". Available at: https://www.cleanegroup.org/wp-content/uploads/CEG-Response-to-DOE-Hydrogen-RFI.pdf. Page 3.

[56] American Lung Association. July 6, 2020. "Current Asthma Demographics." *American Lung Association*. Available at: https://www.lung.org/research/trends-in-lung-disease/asthma-trends-brief/current-demographics#:~:text=Current%20Asthma%20Rates%20by%20Race,%25)%20to%20still%20have%20asthma. The cited source finds that "Blacks and American Indian/Alaska Natives have the highest current asthma rates compared to other races and ethnicities. In 2018, Blacks (10.9%) were 42 percent more likely than Whites (7.7%) to still have asthma."

[57] Carroll, N. October 23, 2020. The Backstory: Pollution. "Poor Health Care. Crowded Housing. High-Risk Jobs. Prejudice. Why People of Color Are Dying of COVID-19." *USA Today*. Available at: https://www.usatoday.com/story/opinion/2020/10/23/covid-racism-communities-color-have-higher-rates-covid-here-why/3727325001/. The cited report finds that "[p]eople of color make up the majority in 62% of counties with the highest COVID-19 death rates."

are more likely to have serious chronic medical conditions;[58] and are more likely to live nearby sites responsible for emitting localized air pollution like generators, refineries, and highways.[59]

Hydrogen fuel combustion at the proposed Project—regardless of its share or type—will increase greenhouse gas emissions and conventional air pollutants like NO_x, the harms of which will fall disproportionately on nearby low-income communities and communities of color. The proposed Project—regardless of whether it burns gas, hydrogen, or a blend of the two—will negatively impact public health and environmental equity.

With or without switching to hydrogen, the proposed Project is not consistent with the CLCPA

In April 2020, the New York State Energy Planning Board amended the 2015 State Energy Plan to incorporate the CLCPA § 7(2) requirement that all state agencies "consider whether [their] decisions are inconsistent with or will interfere with the attainment of the statewide greenhouse gas emissions limits established in [the CLCPA]."[60] Gas-fired resources—like Astoria's proposed Project—interfere with CLCPA renewable energy and emission reduction requirements.

NYSDEC's approval of the proposed Project would lock in polluting generation for decades to come and lower the share of total generation from renewable resources, meaning that renewable capacity will be needed to meet CLCPA-mandated renewable generation shares. The more fossil fuel capacity added in New York, the more challenging it will be for the State to wean itself off of its fossil fuel dependence and establish a reliable fossil-free electric grid by 2040.

In its consideration of Astoria's proposed Project, the New York Department of Environmental Conservation should be aware that—even in the unlikely event that Astoria were to commit to run the proposed Project entirely on green hydrogen by 2040—the proposed Project would still not be consistent with 70 percent renewable electric supply by 2030 or 100 percent zero-emission electric supply by 2040 as required by the CLCPA. New greenhouse gas emitting generation does not aid in the attainment of the statewide CLCPA greenhouse gas emissions limits; indeed, it interferes with the attainment of these limits. Actions, like the proposed Project threaten New York State's ability to achieve the ambitious goals of the CLCPA.

[58] Thorpe, K.E., Chin, K.K., Cruz, Y., Innocent, M.A., Singh, L. August 17, 2017. "The United States Can Reduce Socioeconomic Disparities By Focusing On Chronic Diseases." *Health Affairs*. Available at: https://www.healthaffairs.org/do/10.1377/hblog20170817.061561/full/.

[59] 1) Kravchenko, J. and Lyerly, H.K. 2018. "The Impact of Coal-Powered Electrical Plants and Coal Ash Impoundments on the Health of Residential Communities." *N C Med Journal*; 79(5): 289-300. Available at: https://pubmed.ncbi.nlm.nih.gov/30228133/; 2) Mikati, I., Benson, A.F., Luben, T.J., Sacks, J.D. and Richmond-Bryant, J. April 1, 2018. "Disparities in Distribution of Particulate Matter Emission Sources by Race and Poverty Status." *American Journal of Public Health*; 108(4): 480-485. Available at: https://ajph.aphapublications.org/doi/10.2105/AJPH.2017.304297.

[60] New York. April 8, 2020. "Amendment to the 2015 State Energy Plan." Available at: https://energyplan.ny.gov/-/media/nysenergyplan/meeting/2015-SEP-Amendment.pdf.

Appendix C

Introduction and Executive Summary

This report focuses on the environmental justice analysis and related analyses in the Draft Supplemental Environmental Impact Statement (DSEIS) prepared by Astoria Gas Turbines Power for the proposed "Astoria Replacement Project." It was prepared on behalf of Earthjustice for comments to the New York Department of Environmental Conservation (DEC) regarding the DSEIS and the Draft Title V permit for the proposed new gas-fired power plant.

To prepare the report, I reviewed the DSEIS sections on Environmental Justice, Air Impacts, and Disadvantaged Community Impacts, along with related Appendices. I reviewed the Applicant's selected study area for the environmental justice analysis in comparison to the study areas used for other similar recently proposed and/or constructed power plants. I also mapped a potential alternate study area at a conservative, slightly larger radius of 3 km from the proposed plant, as opposed to the study area in the DSEIS of 1 mile from the project site, and examined existing data on local air quality and health impacts within the 3 km radius.

The 1-mile radius study area used by the Applicant is considerably smaller than the study areas used in environmental reviews of similar recent power plant projects. Just outside the Applicant's limited study area is a far larger residential population that is predominantly comprised of DEC-designated Potential Environmental Justice Areas and CLCPA interim Disadvantaged Communities. These same communities that are excluded from review in the DSEIS also experience higher levels of ambient air pollution and worse existing health outcomes than New York City as a whole. The report finds that the 1-mile radius study area used in the DSEIS is unusually small and the limited scope excludes from review the likely impacts of this project on nearby communities of color that experience some of the highest environmental and health burdens in New York City.

Assumptions for Review of the Applicant's Environment Justice Study Area

Stemming from an earlier application in 2010, NRG Energy, operating as Astoria Gas Turbine Power LLC (Applicant) now proposes a reconfigured, gas-fired 437 Mw capacity generation unit (Project) to be sited at it current operation site within the larger Astoria industrial complex. To supplement a prior 2010 review, the lead agency New York State Department of Conservation (DEC) requires the Applicant to file a Supplemental Environmental Impact Statement (DSEIS). This independent review considers environmental justice issues in and near the proposed Project significantly updated from the Applicant's previous 2010 application, and detailed in the new DSEIS.[1]

Overview of Astoria Replacement Project Study Area for Environmental Justice Analysis

As seen in **Figure 1**, the Project (Latitude 40.781444, Longitude −73.906778), the larger Astoria Industrial Complex peninsula and the Applicant's 1-mile Study Area are shown as intersecting with the Bronx, New York and Queens counties, containing five unique Community Districts. **Table 1** details each of intersecting counties and their respective Community Districts:

County	Community District	Borough Community District Code
Bronx	Mott Haven and Melrose - Bronx CD 1	201
Bronx	Hunts Point and Longwood - Bronx CD 2	202
New York	East Harlem - Manhattan CD 11	111
Queens	Long Island City and Astoria - Queens CD 1	401
Queens	LaGuardia Airport Complex - Queens CD N/A	480

Table 1: three Counties, five Community Districts that intersect with a 1 mi radius

[1] AECOM, Draft Supplemental Environmental Impact Statement: Astoria Replacement Project (June 2021), https://www.nrg.com/assets/documents/legal/astoria/00 2021/astoria draft dseis 06 30 2021.pdf. ("DSEIS").

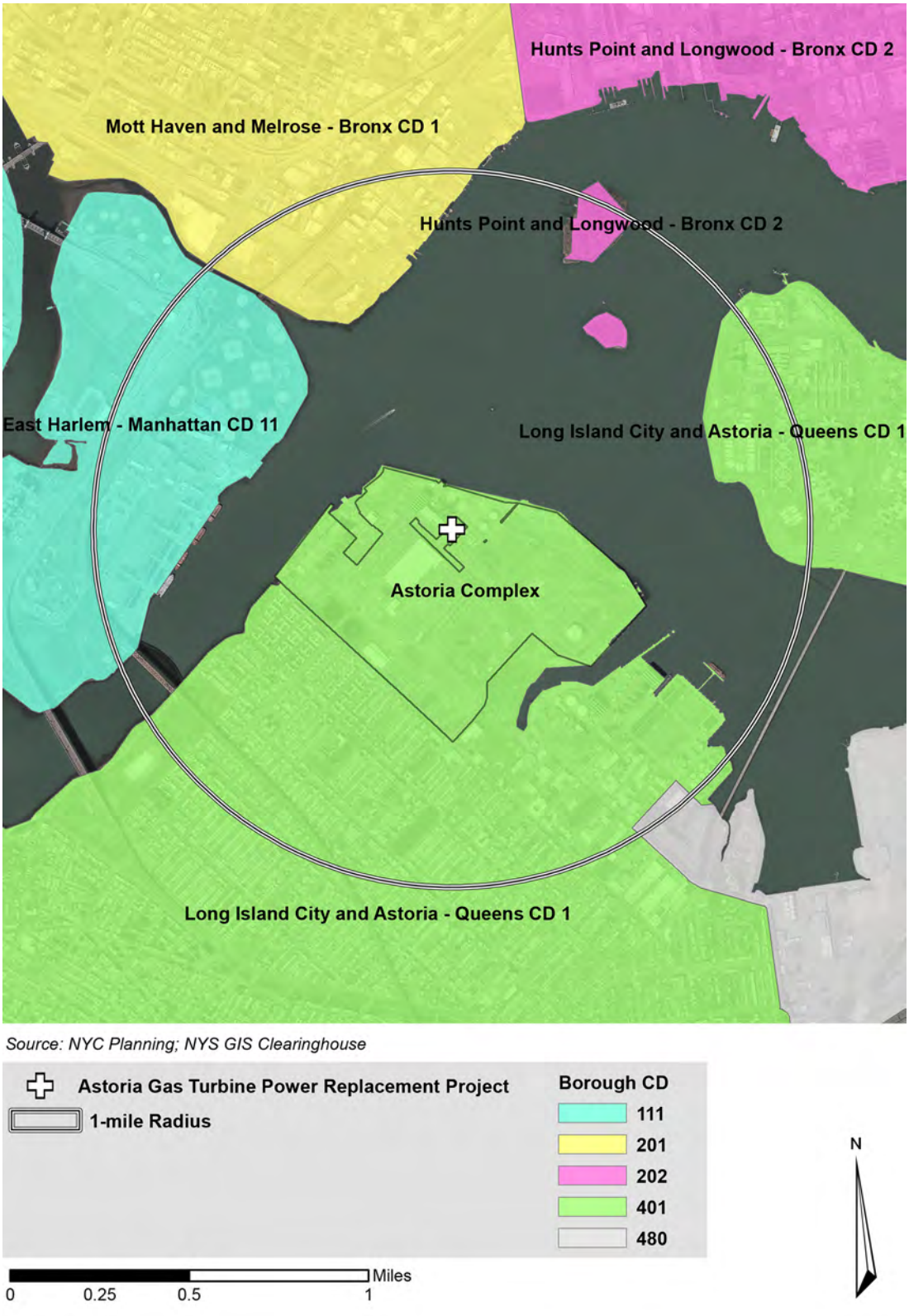


Figure 1: Astoria Replacement Project Orientation

As part of the DSEIS process guided by the earlier 2010 application, the Applicant states that the 1 mi Study Area is adopted from the earlier project (DEIS Section 3.3.5 - Determination of Potential Environmental Justice Areas):[2]

> *For the analysis conducted in support of the Project as approved in 2010, a one-mile radius centered on the existing Facility was selected for the EJ analysis.*

The Applicant further states that this analysis radius would then be restricted to the portion within the 1 mi Study Area that falls in Queens County:[3]

> *As agreed to by the NYSDEC and NYSDOH, the EJ analysis was limited to that portion of the one-mile radius located in Queens County.*

As part of the NYSDEC CP- 29 Environmental Justice and Permitting process[4], the definition of a project study area is largely left to the applicant. However, a short review of similar gas-fired generation projects show that the Project's 1 mi Study Area is comparatively limited.

First, the Luyster Creek Energy Project, nearly identical to the Astoria Project location itself, was originally proposed in 2011 as an Option A - a 387-Mw project; and Option B - a 430 Mw capacity project. As seen in **Appendix - Exhibit 1**, this project adopted a 2 mi study area based on DEC guidance. As noted in the DEIS:[5]

> *The NYSDEC has identified a PEJA within a 2-mile radius of the Site. Therefore, this DEIS evaluated the proposed LCEP based on the guidelines and recommendations provided in NYSDEC CP-29 for EJ.*

Second, the Island Park Energy Center, originally filed in 2014, maintains an open docket 13-F-0464 with the New York Department of Public Service (NYDPS). Located in Long Island, New York, this project proposal features the repowering of the E.F. Barrett Station with 330 - 650 Mw of new generation. This project is evaluated under Part 487.4 Defining the impact study area of the Article 10 process.[6]

As seen in **Appendix - Exhibit 2**, this project also adopted a 2 mi study area based on DEC guidance. As noted in it *Demographic and Economic Attributes* document: [7]

> *For the Barrett Station Repowering, National Grid proposes to use an ISA of 2 miles, due to the fact that the maximum and most signifcant air pollutant concentration are anticipated to be within 2 miles of the facility, and thus, extending the study area beyond the prescribed one-half mile.*

Third, the Danskammer Energy Project, currently in an active permitting process with NYDPS under docket 18-F-0325, is located north of New York City near Newburgh, New York. This project would feature a newly sited generation unit onto an existing facility location.

As seen in **Appendix - Exhibit 3**, this 525 Mw to 575 Mw combined-cycle facility has adopted a 5 mi study area. As noted in its Article 10, Exhibit 28:[8]

[2] DSEIS, *supra* note 1, at 3 67.

[3] *Id*.

[4] N.Y. State Dep't Env't Conservation, *DEC Policy: CP 29 Environmental Justice and Permitting* (Mar. 2003), https://www.dec.ny.gov/docs/permits ej operations pdf/cp29a.pdf.

[5] ESS Group, *Draft Environmental Impact Statement: Luyster Creek Energy Project 135* (June 2011), http://www.easterngeneration.com/luyster creek/documents/?dl page=3.

[6] N.Y. Comp. Codes R. & Regs. Tit. 6, § 487.7 (2020).

[7] Demographic and Economic Attributes at 5 6, Application of National Grid for a Certificate of Environmental Compatibility and Public Need Pursuant to Article 10 for the Repowering of its E.F. Barrett Power Station in the Town of Hempstead, Nassau County, Matter No. 13 02095/ 13 F 0464 (N.Y. Pub. Serv. Comm'n Mar. 19, 2014) (Docket No. 101), https://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=13 F 0464.

[8] Exhibit 28: Environmental Justice at 2, Application of Danskammer Energy, LLC for a Certificate of Environmental Compatibility and Public Need Pursuant to Article 10 for Approval to Repower its Danskammer Generating Station Site Located in the Town of Newburgh, Orange County, Matter No. 18 F 0325 (N.Y. Pub. Serv. Comm'n Dec. 11, 2019) (Docket No. 166), https://www.danskammerenergy.com/wp content/uploads/2019/12/Article 10 Application Exhibit 28.pdf.

> *For this Project, an ISA of 5 miles was used because the maximum and most significant air pollutant concentrations are located within 5 miles of the proposed Project. Thus, Danskammer determined to extend the ISA beyond the minimum prescribed 0.5-mile radius to a 5 mile radius.*

Each of the three projects discussed above are presented in summary **Table 2**:

Project Name	Approximate Nameplate Capacity	Study Area Radius
Luyster Creek Energy Project at the Astoria Generating Station	410 Mw	2 Miles
Island Park Energy Center	330 - 650 Mw	2 Miles
Danskammer Energy Project	536 Mw	5 Miles

Table 2: Study Area Radius Comparisons

Critique of Project Environmental Justice Study Area

The present Project 1 mi Study Area is highly restrictive by limiting any environmental justice consideration to a 1 mi radius within just one intersecting county - Queens county. In effect, this decreases any Potential Environmental Justice Areas (PEJAs) to just 1.64 sq mi - the equivalent of a 0.7 mi radius. Given that the Astoria Complex is highly industrialized containing no populations, a further constriction to just 1.24 sq mi - the equivalent of a 0.6 mi radius - remains for PEJA assessment in proximity to the Project. In **Figure 2** the Astoria Complex is included - effectively an 1.64 sq mi analysis area.

Not only is this 0.7 mi equivalent Study Area (0.6 mi with the Astoria Complex exempted) atypical for a project of this size, it fails to cover the maximum concentration for all pollutants as the SO2 maximum falls outside it. As stated by the Applicant:[9]

> *the current dispersion modeling analysis that shows the maximum modeled concentrations for all pollutants and averaging periods (with the exception of the 1-hour averaging period for SO2) are located within ZIP code 11105, the EJ Study Area has not changed and continues to be that portion of the area located in Queens County within one mile of the Facility.*

To remedy the shortcomings of the Applicant's 0.7 mi equivalent Study Area, a conservative 3 km (1.86 mi radius) Study Area has been adopted for comparative purposes. A 3 km Study Area is of a conservatively equivalent size to similar and recent projects, and it would encompass *all* not just *most* maximum air pollutant concentrations. The two radii are shown together on **Figure 3**.

[9] DSEIS, *supra* note 1, at 3 68.

Figure 2: Comparison of stated 3.14 sq mi Study Area (1 mi radius) to effective 1.64 sq mi Study Area

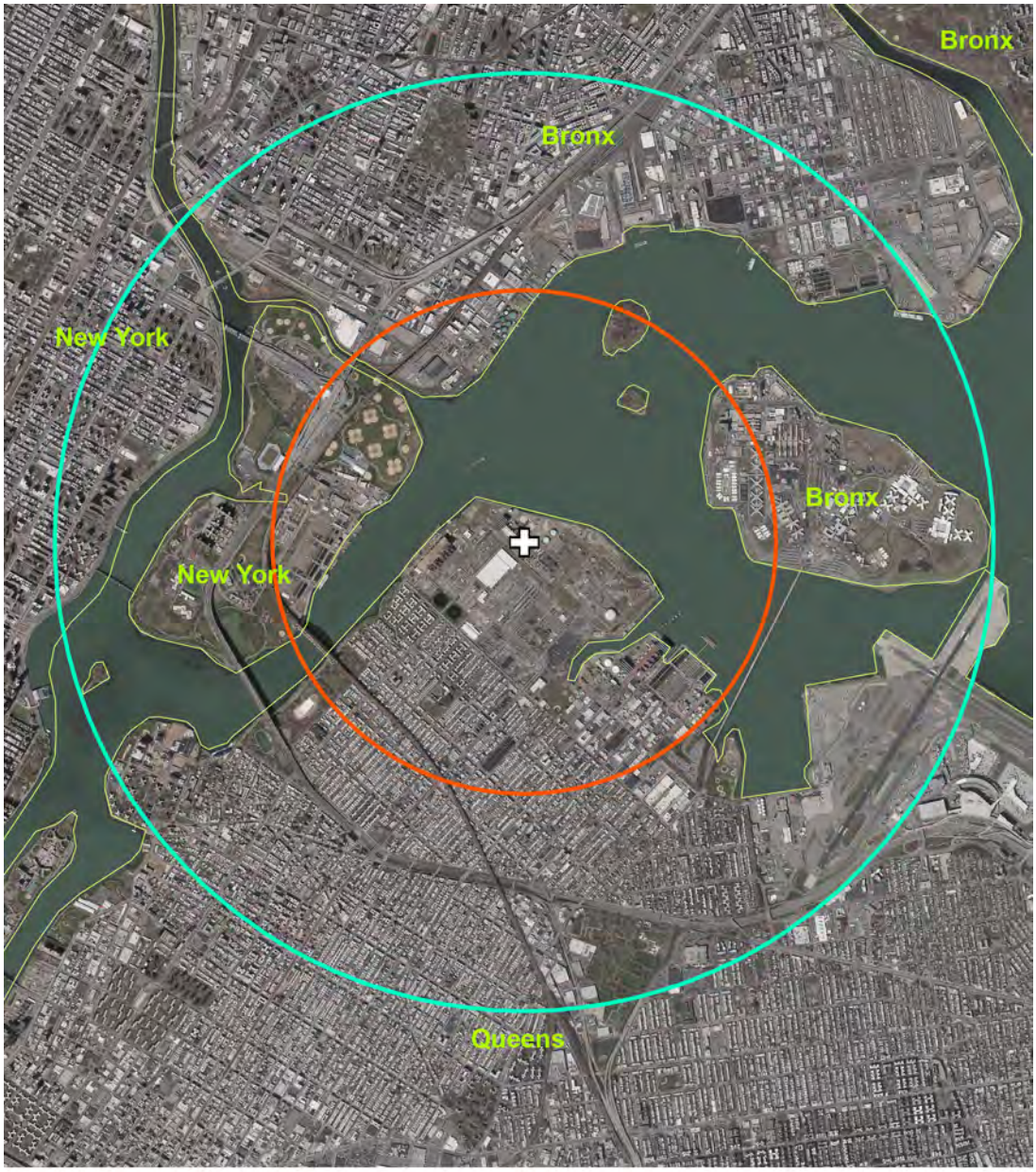


Figure 3: Comparison of Applicant 1 mi Study Area (1 mi radius) and a 3 km Study Area

Number and Location of PEJA within 1 mi Study Area and 3 km Study Area

As stated by the Applicant, the Study Area from the previous 2010 project application remains unchanged. As shown in the Applicant's *Figure 3.3-2 Potential Environmental Justice Areas Identified for the Project as Previously Approved*[10] and detailed in *Table 3.3-1 Updated Demographic Data for Potential Environmental Justice Area* [11], there is a slight change in position and number of PEJA located in close proximity to the Project at the fenceline of the Astoria Complex. The PEJAs ascertained by the Applicant for its DSEIS application are as follows:

- Tract 103 Block Group 4
- Tract 105 Block Group 1
- Tract 105 Block Group 2
- Tract 105 Block Group 3
- Tract 105 Block Group 4
- Tract 113 Block Group 2

These PEJA determinations are based on DEC threshold criteria for the 2010 U.S Census Decennial, and the 2018 U.S. Census American Community Survey 5-year estimate (2014–2018). At the Astoria Complex fenceline, the PEJAs remain largely unchanged from the latest DEC Office of Environmental Justice (NYSDEC OEJ) spatial dataset for PEJA geographies, issued May 5th, 2021.[12] For the purposes of this independent analysis - decidedly prior to any permitting decisions in the DSEIS process - this dataset is both the dataset of record, and the dataset to be utilized for current and future PEJA analysis. As seen in **Figure 4**, the PEJA determined by the DSEIS intersects generally with the PEJA in the current NYSDEC OEJ dataset *within the 1-mi Study Area* except where one PEJA is removed, and another is added.

A wholly different picture emerges when a comparison is made outwards from the 1 mi radius to the 3 km radius where the Applicant conducted no EJ screening analysis whatsoever outside Queens county - even within the technical 1 mi radius. Using the NYSDEC OEJ PEJA 2021 dataset, **Figure 5** shows the PEJA geographies at the analysis radii, while **Table 3** summarizes analysis populations across PEJA vs. Non-PEJA criteria.[13]

Comparative Radius	Total Population	PEJA Population	% PEJA Population	CBG Count Total	Non-PEJA CBG Count Total	PEJA CGB Count Total	% PEJA CBG Positive
1 mi (A)	22918	8865	38	22	15	7	32
3 km (B)	206334	135667	66	158	66	92	58
3 mi (C)	953456	702151	74	692	208	484	70
(B-A)	183416	126802	69	136	51	85	62
(C-(A + B))	747122	566484	76	534	142	392	73

Table 3: Populations and PEJA summary across comparative analysis radii

[10] DSEIS, *supra* note 1, at 3 70.
[11] DSEIS, *supra* note 1, at 3 73.
[12] *See* Process Description for NYSDEC OEJ PEJA spatial dataset: *OEJ PEJA*, NY GIS, http://gis.ny.gov/gisdata/metadata/nysdec.peja.xml (last visited Sept. 7, 2021).
[13] An additional 3 mile radius is added for comparison in Table 3 and Table 4; all selections are based on a 'centroid inside' for each analysis distance.

As shown in **Table 3** above, the percentage of PEJA populations and PEJA geographies within the 1 mi radius falls under 40 percent. However, in all other analysis radii, these percentages dramatically jump above 50 percent, upwards past 70 percent. By limiting its EJ Study Area, the Applicant has precluded consideration of the *preponderant* PEJA populations in communities just beyond the 1 mi Study Area into all other demonstrated radii.

Using the same analysis framework, **Table 4** shows minority and low income demographic variables per comparison area, resulting in a similar trend as **Table 3** where the 1 mi Study Area is *dissimilar* from all other radii featuring a preponderance of demographically vulnerable populations eligible for state PEJA status.

Comparative Radius	2010 Total Population (2010)	Minority Population (2010)	% Minority	Low Income Population (2018)	% Low Income
1 mi (A)	22918	10162	44	3768	16
3 km (B)	206334	145764	71	51501	26
3 mi (C)	953456	691735	73	214846	23
(B-A)	183416	135602	74	47733	26
(C-(A + B))	747122	545971	73	163345	21

Table 4: Demographic summary across comparative analysis radii

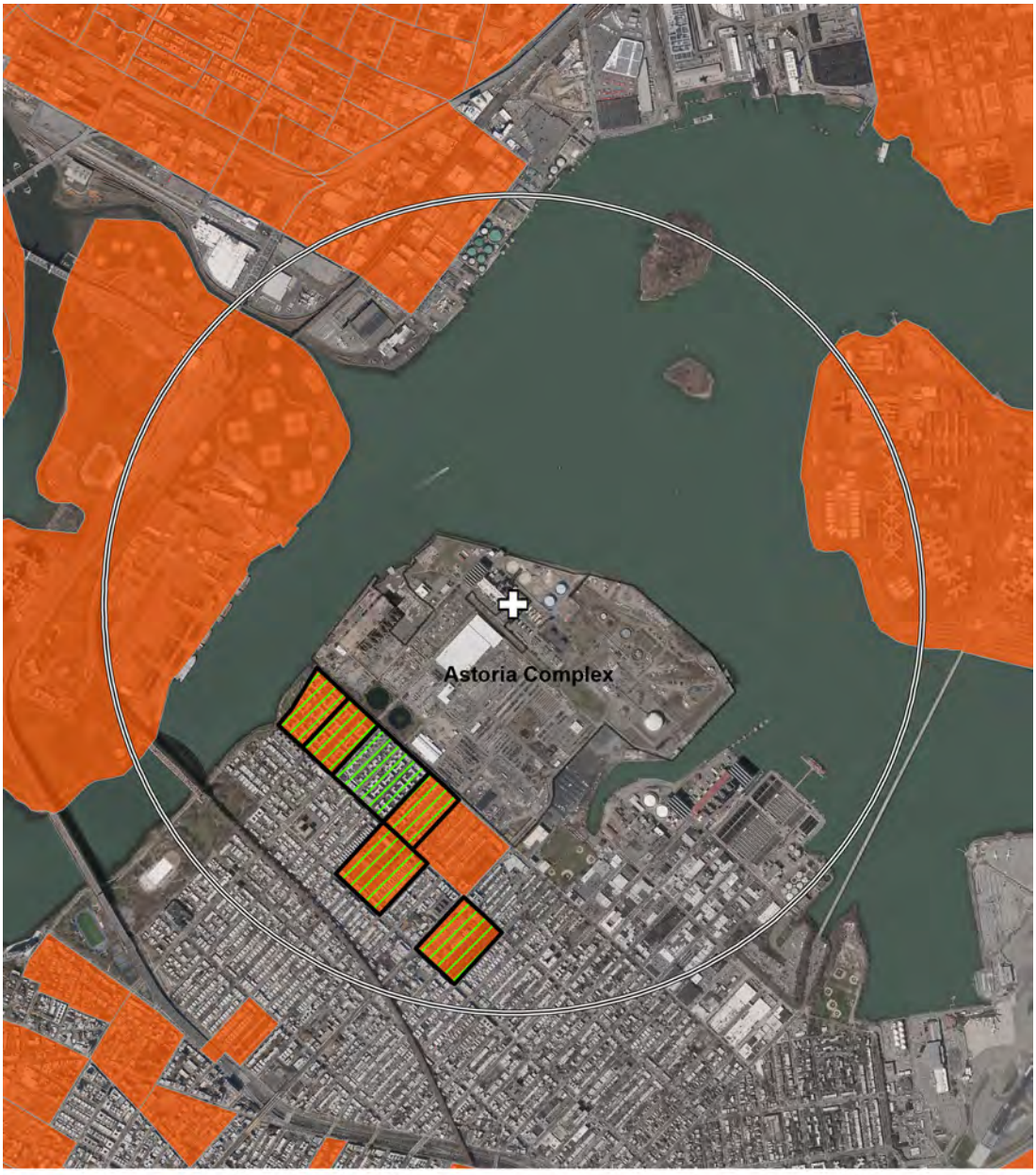


Figure 4: Applicant PEJA comparison to NYSDEC OEJ 2021 PEJA within the 1 mi Study Area

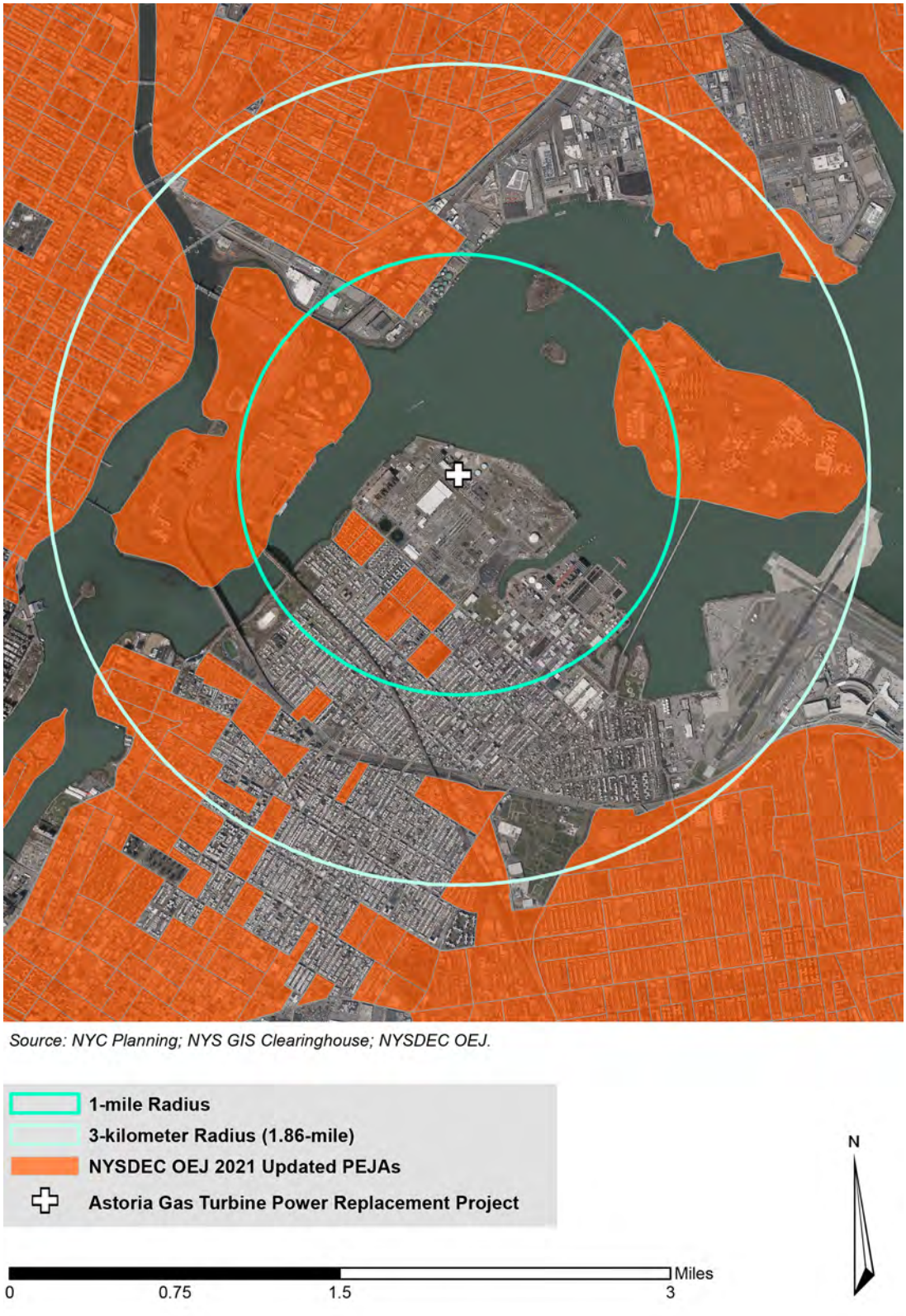


Figure 5: NYSDEC OEJ 2021 PEJA at 1 mi and 3 km radii

New York State's Climate Law *Disadvantaged Communities* mirrors the geographic trend of the Environmental Justice Areas

As part of New York State's Climate Law Climate Leadership and Community Protection Act (CLCPA) [14], geographies that meet certain demographic and economic criteria will be targeted and prioritized for clean energy programs and investments. Termed *CLCPA Disadvantaged Communities* [15], the interim definition sets out three criteria:

- 50% of The U.S. Department of Housing and Urban Development (HUD) Area Median Income
- Located within a NYSDEC OEJ PEJA geography
- Located within a New York State Opportunity Zone

As seen in **Figure 6**, the spatial pattern of CLCPA Disadvantaged Communities defined at the census block group geography is consistent with PEJA findings proximate to the Project where the 1 mi Study Area is significantly *dissimilar* from the surrounding area. **Table 5** summaries the CLCPA Disadvantaged Communities across the comparative analysis radii.

Comparative Radius	Total CBG Count	Disadvantaged Communities CBG Count	% Disadvantaged Communities
1 mi (A)	22	6	27
3 km (B)	158	84	53
3 mi (C)	692	372	54
(B-A)	136	78	57
(C-(A + B))	534	288	54

Table 5: CLCPA Disadvantaged Communities across comparative areas

[14] New York State Climate Leadership and Community Protection Act, S.B. 6599, 242d Sess. (N.Y. 2019), https://www.nysenate.gov/legislation/bills/2019/s6599. ("CLCPA").

[15] Disadvantaged Communities, NYSERDA, https://www.nyserda.ny.gov/ny/disadvantaged communities (last visited Sept. 7, 2021).

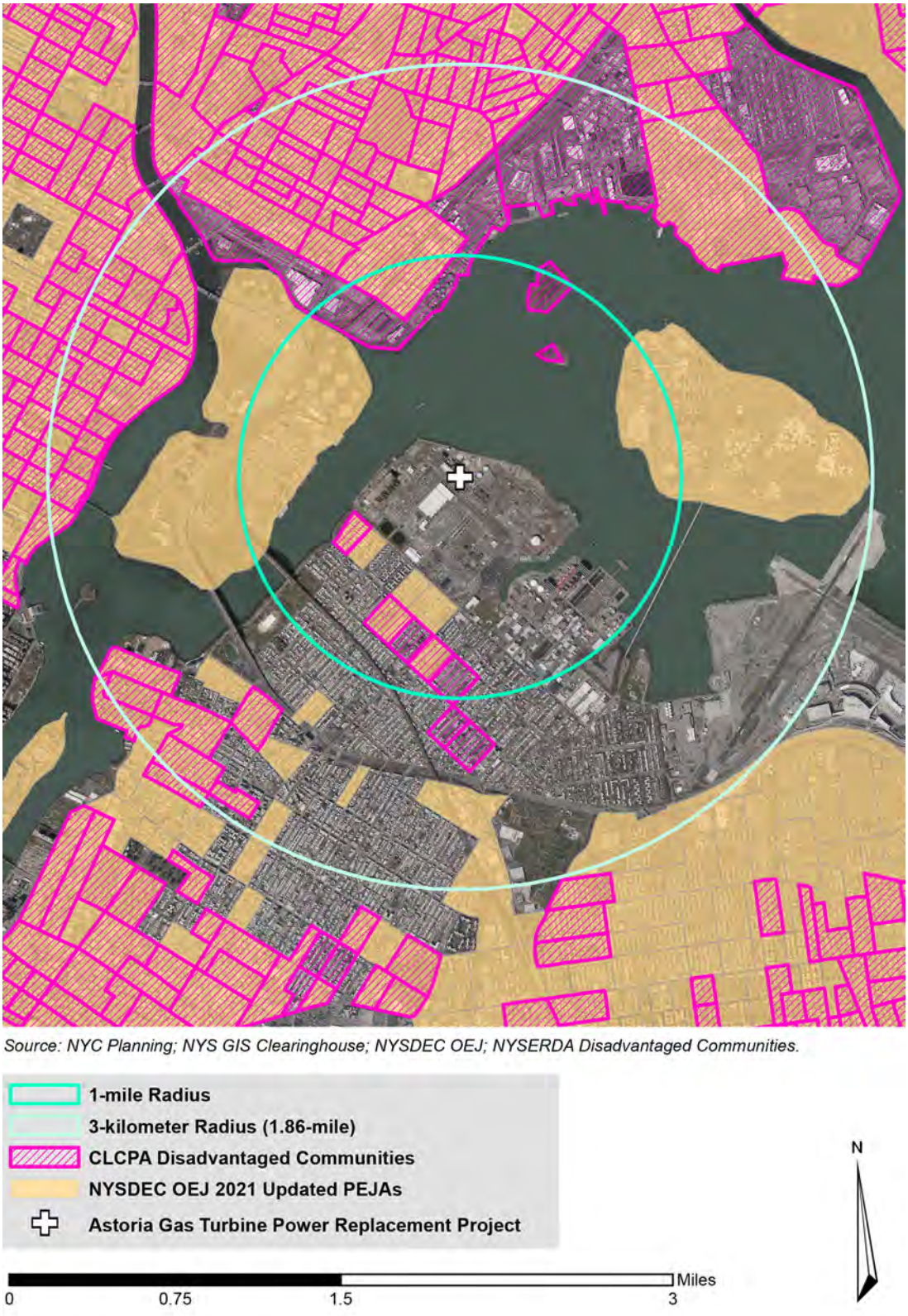


Figure 6: CLCPA Disadvantaged Communities at 1 mi and 3 km radii

An Assessment of existing air pollution burdens across the 1 mi and 3 km radii

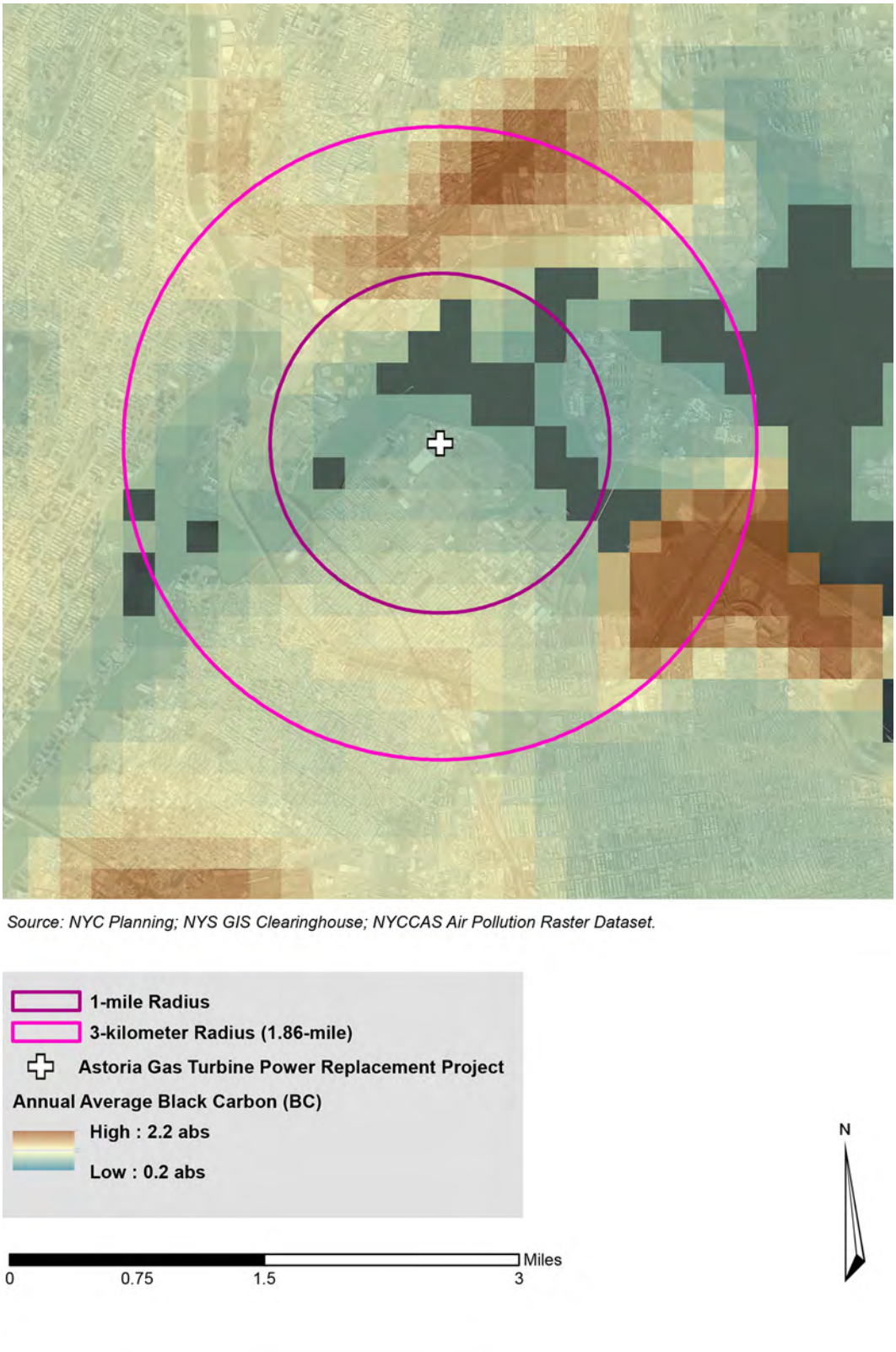
While the Applicant conducted a required AERMOD dispersion model for criteria pollutants[16] as a result of the Project in order to meet aggregated, regional NAAQS requirements, no assessment was conducted for existing, localized air pollution burden near the Project site. Even as New York City generally exhibits elevated air pollution values over New York State at large, localized hotspots for highly concentrated air pollution exist throughout the city. Local air quality is an important factor in the assessment of an existing environmental health burden[17]. To aid the assessment of localized air impacts, NYSDOH has developed the New York City Community Air Survey, a raster-based, spatial dataset over several criteria pollutants that impact human health.[18]

In the following assessment series, concentration maps - **Figures 7, 8, 9 and 10** - coupled with summary tables - **Tables 6, 7, 8 and 9** - for the 1 mi, 3 mi radii and New York City at large is shown for the following air pollutants:

- Particulate Matter sized 2.5 microns and smaller ("PM2.5")
- Nitrogen Dioxide ("NO2")
- Nitric Oxide
- Elemental Carbon (Black Carbon)

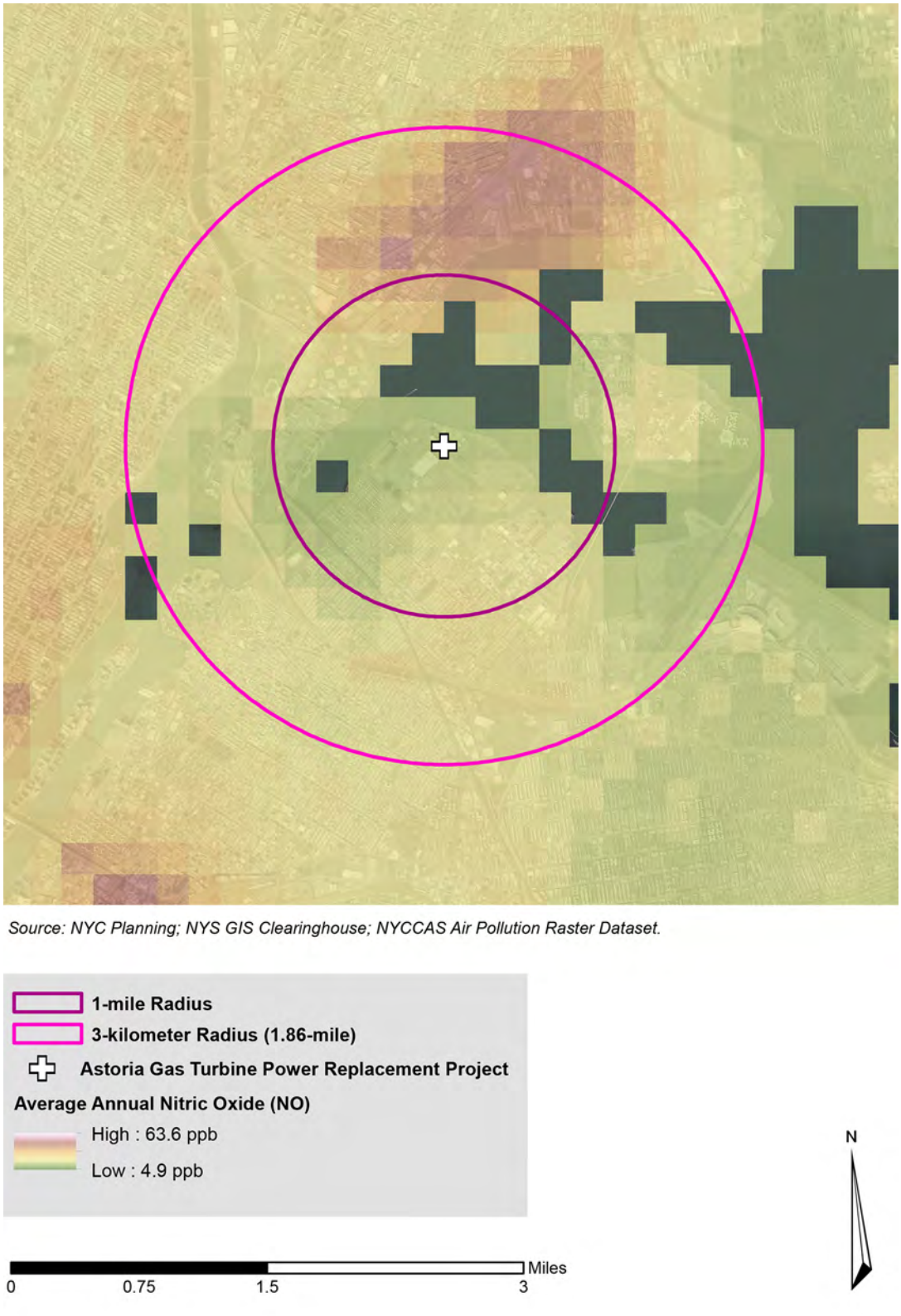
As assessed by its AERMOD modeling, the Project introduces new criteria pollutants in and across both the 1 mi and 3 km radii. While maximum concentrations - except for the short-term sulfur dioxide ("SO2") whose maximum concentration occurs in the Bronx - would generally intersect with the Astoria Complex itself, the modeling shows new air pollution induced outwards past the 1 mi radii throughout the 3 km radii. In effect, the Project would add new air pollution burdens atop concentrations seen in the following maps - the very loci of environmental justice communities in the Bronx, New York and Queens counties.

[16] *Outdoor Air Quality*, EPA, https://www.epa.gov/report environment/outdoor air quality (last updated May 30, 2019).
[17] *Id*.
[18] *NYCCAS Air Pollution Rasters*, NYC Open Data, https://data.cityofnewyork.us/Environment/NYCCAS Air Pollution Rasters/q68s 8qxv (last updated June 7, 2021).



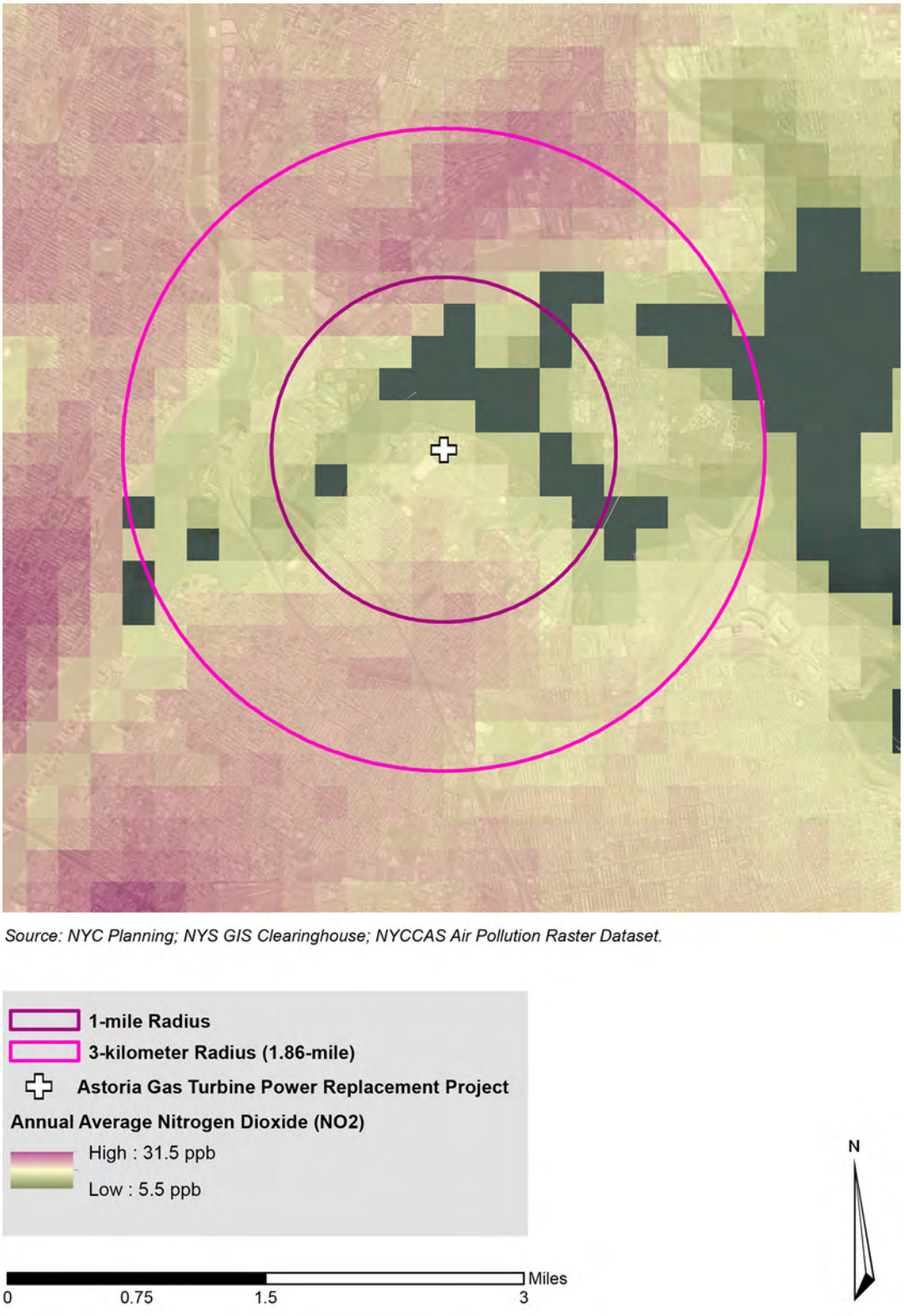
Source: NYC Planning; NYS GIS Clearinghouse; NYCCAS Air Pollution Raster Dataset.

Figure 7: Black Carbon 2018-19 Annual Average at 1 mi and 3 km Radii



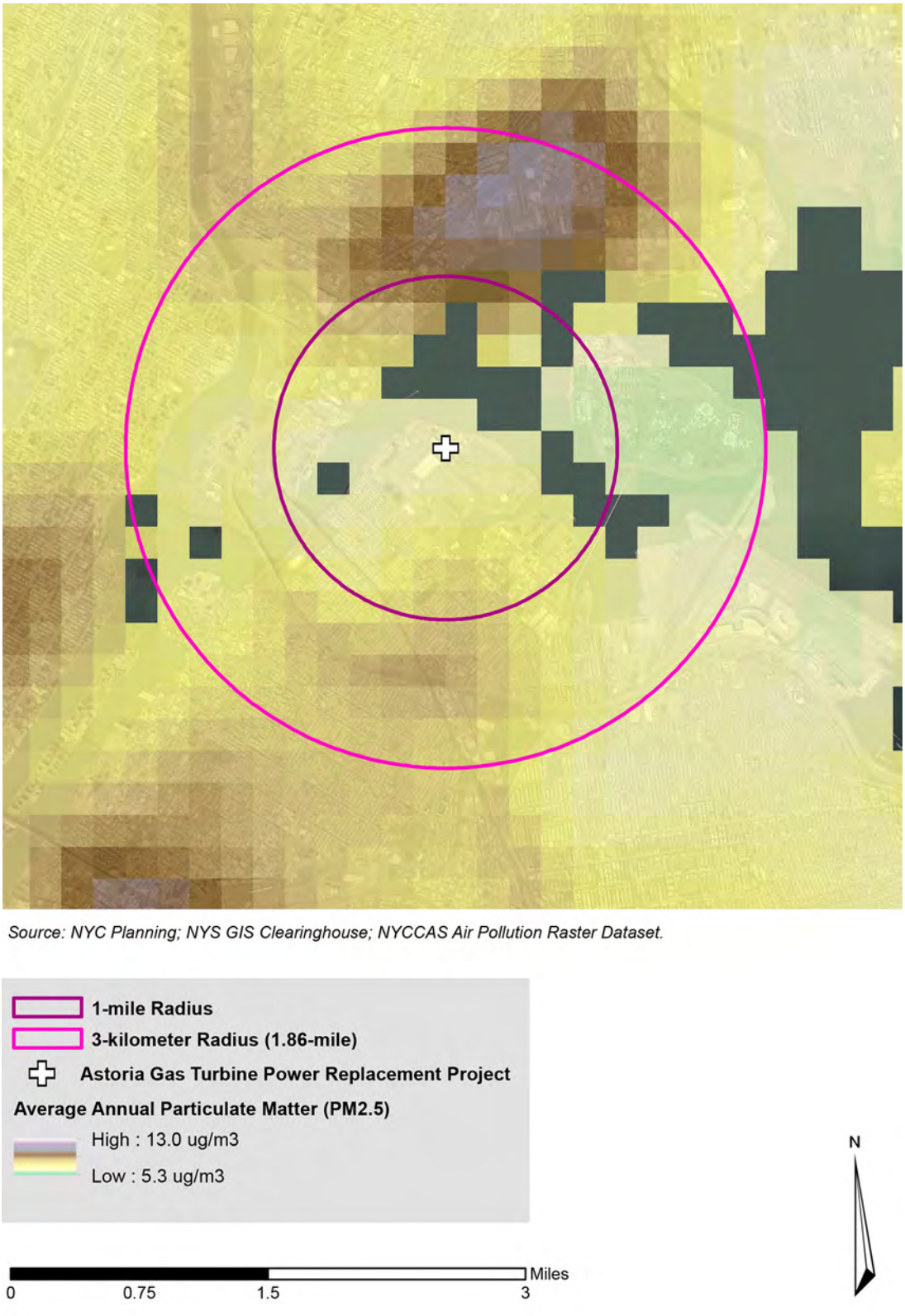
Source: NYC Planning; NYS GIS Clearinghouse; NYCCAS Air Pollution Raster Dataset.

Figure 8: Nitric Oxide 2018-19 Annual Average at 1 mi and 3 km Radii



Source: NYC Planning; NYS GIS Clearinghouse; NYCCAS Air Pollution Raster Dataset.

Figure 9: Nitrogen Dioxide 2018 - 2019 Annual Average at 1 mi and 3 km Radii



Source: NYC Planning; NYS GIS Clearinghouse; NYCCAS Air Pollution Raster Dataset.

Figure 10: Fine Particulate Matter 2018-2019 Annual Average at 1 mi and 3 km Radii

Black Carbon 2018-19 Annual Average - Comparison Geography	MIN	MAX	MEAN
1 mi Radius	0.54	1.07	0.69
3 km Radius	0.54	2.28	0.87
NYC Region	0.27	2.28	0.63

Table 6: Black Carbon (BC) summary

Nitric Oxide 2018-19 Annual Average - Comparison Geography	MIN	MAX	MEAN
1 mi Radius	8.96	19.29	11.29
3 km Radius	8.82	24.04	12.53
NYC Region	5.00	47.76	10.50

Table 7: Nitric Oxide (NO) summary

Nitrogen Dioxide 2018 - 2019 Annual Average - Comparison Geography	MIN	MAX	MEAN
1 mi Radius	13.43	20.36	16.64
3 km Radius	13.63	22.30	17.75
NYC Region	5.50	31.53	15.18

Table 8: Nitrogen Dioxide (NO2) summary

Fine Particulate Matter 2018-2019 Annual Average - Comparison Geography	MIN	MAX	MEAN
1 mi Radius	6.04	8.54	6.86
3 km Radius	6.01	9.28	7.22
NYC Region	5.36	13.07	6.54

Table 9: Fine Particulate Matter (PM2.5) summary

As shown in **Tables 6 through 9** above, the mean values in both the 1 mi and 3 km radii are consistently above respective mean values in the NYC region. When compared locally, the 3 km radius persistently shows the highest mean values. Consistent with the critique of the Applicant's PEJA assessment, by limiting the primary Study Area to a portion of a 1 mi radius, the existing elevated air pollution burden proximate to the Project is left unexamined, lending to the perception that elevated air pollution does not exist near impacted communities.

An Assessment of existing health burdens across the 1 mi and 3 km radii

As discussed by the Applicant in the DSEIS Section 3.3 Environmental Justice Analysis[19], the ZIP code 11105 was chosen as the Study Area for the Health Outcome Data Review (HOD) based on New York State Department of Health (NYSDOH) 2017 Updated Guidance.[20] As the NYSDOH HOD analysis is the only opportunity within the environmental justice evaluation to assess health data, the HOD study area limited to ZIP code 11105 does not include nor represent PEJA proximate communities within and intersecting with the 1 mi and 3 km radii. As seen in **Figure 11**, the primary HOD study area ZIP Code 11105 is *contiguous* with only Zip Codes southward of the Project, exclusively within Queens county.

Because of the Applicant's limitation of the HOD and contiguous Study Areas to just Queens county, PEJA communities at the 1 mi and 3 km radii in both the Bronx and Manhattan are excluded from the analysis scope. In order to screen for health burdens in these excluded PEJA communities, same and similar study variables are here examined through New York City Community Health Profiles for Borough Community Districts (CDs).[21]

As a result of this southward configuration, the predominance of PEJA communities intersecting with the 1 mi and 3 km radii west and northward of the Project remain unaddressed. In order to remedy this deficiency, a screening of comparative health burdens can be accessed for same and similar HOD study variables represented as New York City Community Health Profiles for Borough Community Districts (CDs):[22]

- Premature Mortality (death before age 65)
- Infant Mortality
- Premature Mortality (death before age 65)
- Life Expectancy
- Lung Cancer Premature deaths (death before age 65)
- Colorectal Cancer Premature deaths (death before age 65)

[19] DSEIS, *supra* note 1, at 3 65 3 106.

[20] N.Y. State Dep't of Health, *Updated Guidance for Health Data Review and Analysis Relating to NYSDEC Environmental Justice Requirements for CP 29 and 6 NYCRR 487*, https://www.health.ny.gov/environmental/investigations/environmental justice/docs/new guidance ej rev2017.pdf.

[21] *2018 Community Health Profiles Public Use Dataset*, nyc.gov, https://www1.nyc.gov/assets/doh/downloads/excel/episrv/2018chp pud.xlsx (last visited Sept. 7, 2021).

[22] *Id*.

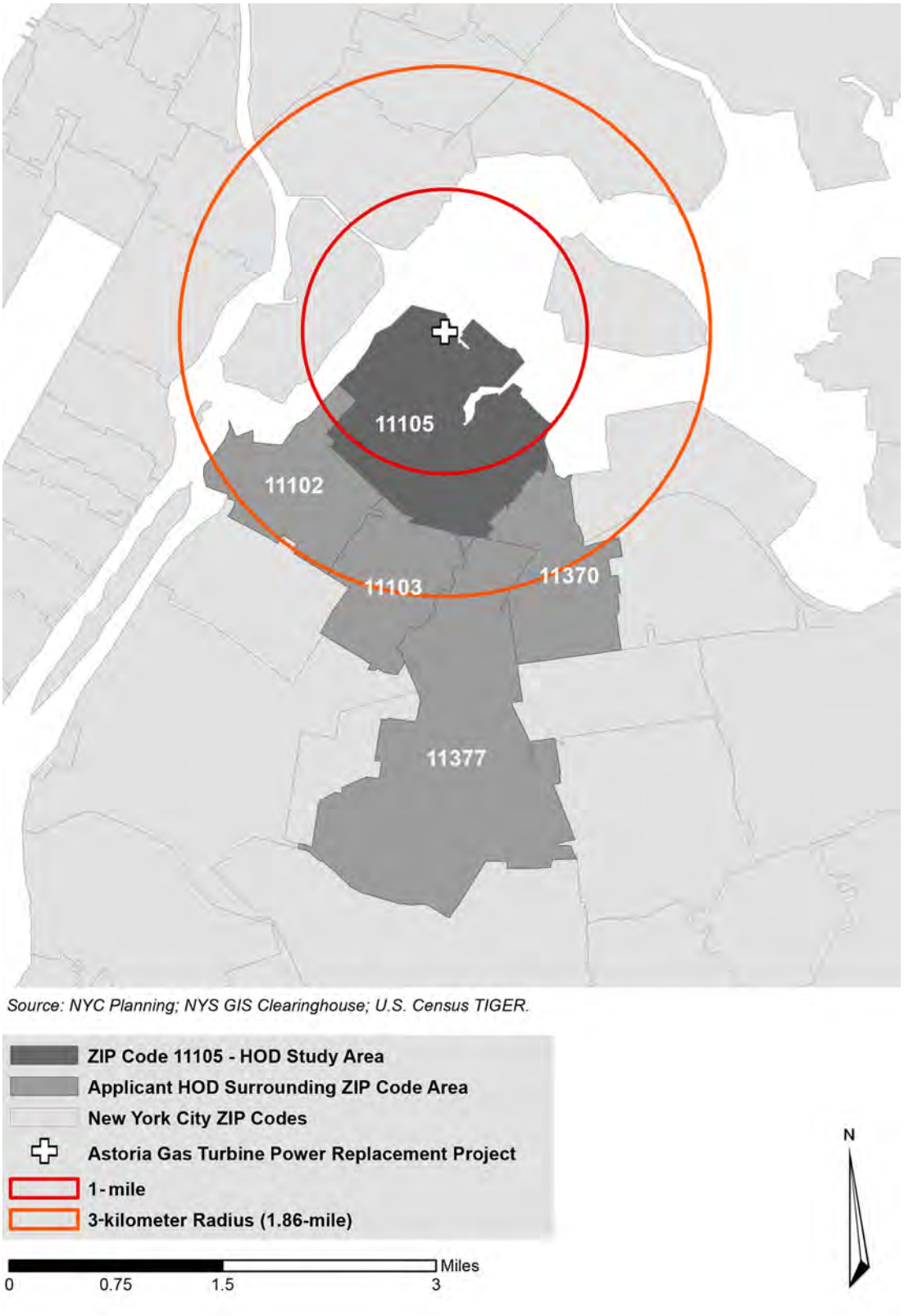


Figure 11: Applicant's Health Assessment Primary and Contiguous Study Area

As shown earlier in **Figure 1** and **Table 1**, the following New York City CDs intersect with the 1 mi Study Area:

-Mott Haven and Melrose - Bronx CD 201

-Hunts Point and Longwood - Bronx CD 202

-East Harlem - Manhattan CD 111

-Long Island City and Astoria - Queens CD 401

-LaGuardia Airport Complex - Queens CD N/A

For the community district screening, Long Island City and Astoria - Queens CD 1 intersects immediately with the Project. The LaGuardia Airport Complex district to the east does not contain health outcome data so it will be left out of the screening altogether. Each of the five health variables atop their respective districts are presented in **Figure 12**, and summarized in **Table 10**.

Health Variable Theme	Rate	NYC Comparison	401 - Queens	111 - Manhattan	201 - Bronx	202 - Bronx
Life Expectancy	Years	81.2	83.4	77.3	77.6	78.9
Child Asthma	Per 10K children 5 to 17	223	145	580	647	432
Premature Mortality	Per 100K people	169.5	133.4	288.9	302	261.6
Infant Mortality	Per 1K live births	4.4	4.3	5.9	5.1	4.2
Lung Cancer	Per 100K people	8.9	8.9	13.3	8.8	12.1
Colorectal Cancer	Per 100K people	4.5	3.4	6.1	6.7	4.9

Table 10: Community District Health Variable Summary

When seen in context of the 1 mi and 3 km radii, intersecting CDs exhibit a substantially different health profile than CD 401 alone. For every screening variable, except for one instance on the Infant Mortality variable and one instance on the Lung Cancer variable, all three neighboring districts score definitely worse than CD 401, carrying a higher health burden proximate to the Project. Due to the Applicant's limited study area, health outcomes in the zip code selected for its HOD analysis are not representative of the existing health burden of all proximate communities likely to be impacted by this project. The absence of any consideration of existing health burdens within the Project's immediate vicinity outwards to a conservative 3 km radius, containing a population total nearing 200,000 persons, the majority of whom are eligible for environmental justice consideration, is a significant shortcoming of the analysis scope of the Applicant's DSEIS.

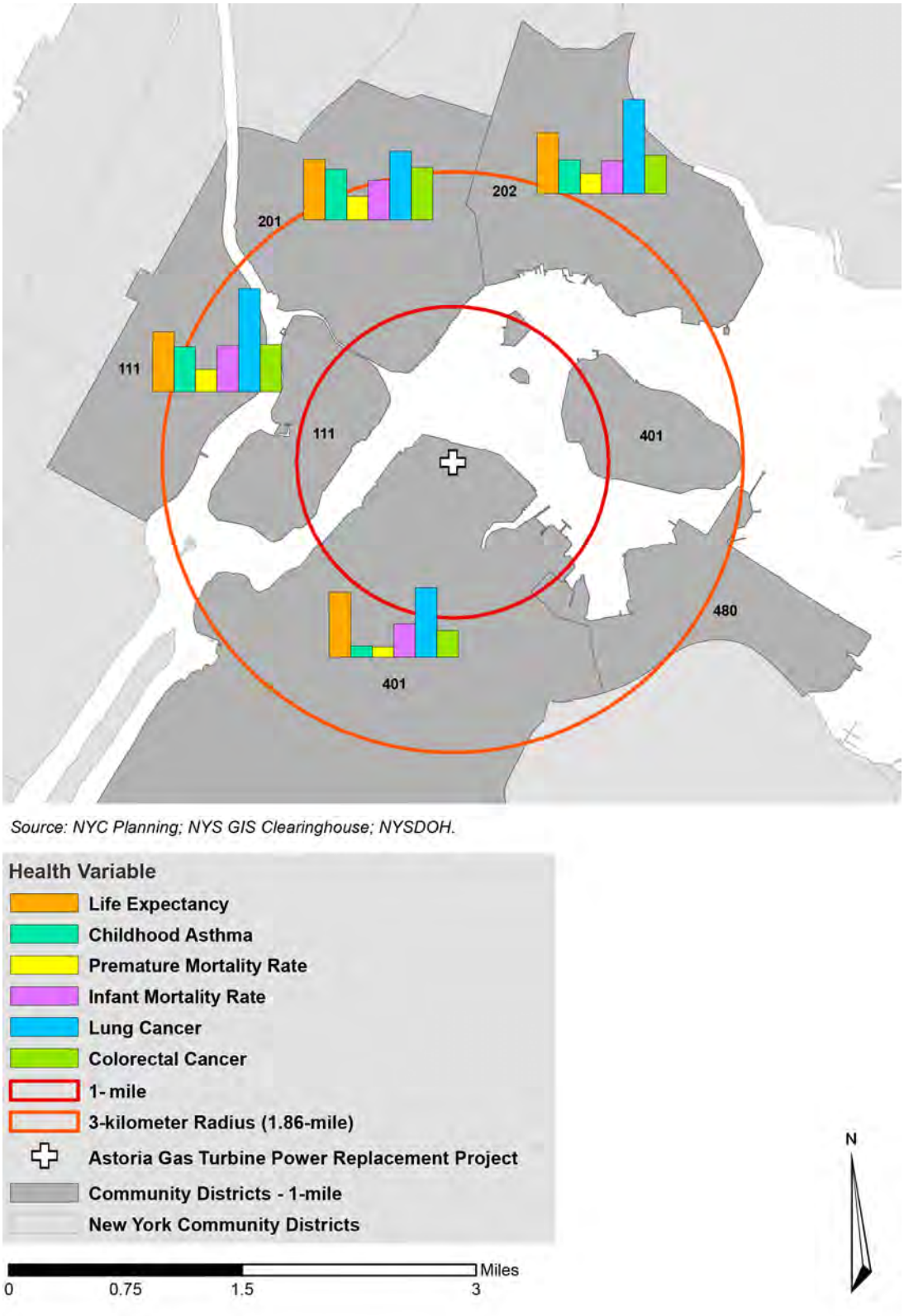


Figure 12: Community District Health Comparison at 1 mi and 3 km radii

The Applicant's DSEIS Environmental Justice Evaluation is Incomplete and Misleading

In the DSEIS subsection *3.3.6 Existing Environmental Burden to the Community*, the Applicant is decidedly candid:[23]

> *. . . the primary environmental burdens to the community (including both PEJA and non-PEJA) continue to result from air emissions from point, mobile, and non-point sources throughout the densely populated and heavily industrial portions of Queens, the Bronx, Brooklyn, and Manhattan, as well as these large power plants and long-range transport (particularly important with respect to ozone as discussed in Section 3.1.2.2).*

Indeed, the Applicant is describing the toxic legacy that is the Astoria Complex dating back to the early 1900's; a legacy that the surrounding communities must endure daily. However, the Applicant insidiously argues that since these environmental burdens are pervasive, there is no disproportionate impact as these environmental burdens are distributed *equally*:[24]

> *However, emissions from these facilities do not disproportionately impact the air quality in the PEJA compared to the non-PEJA.*

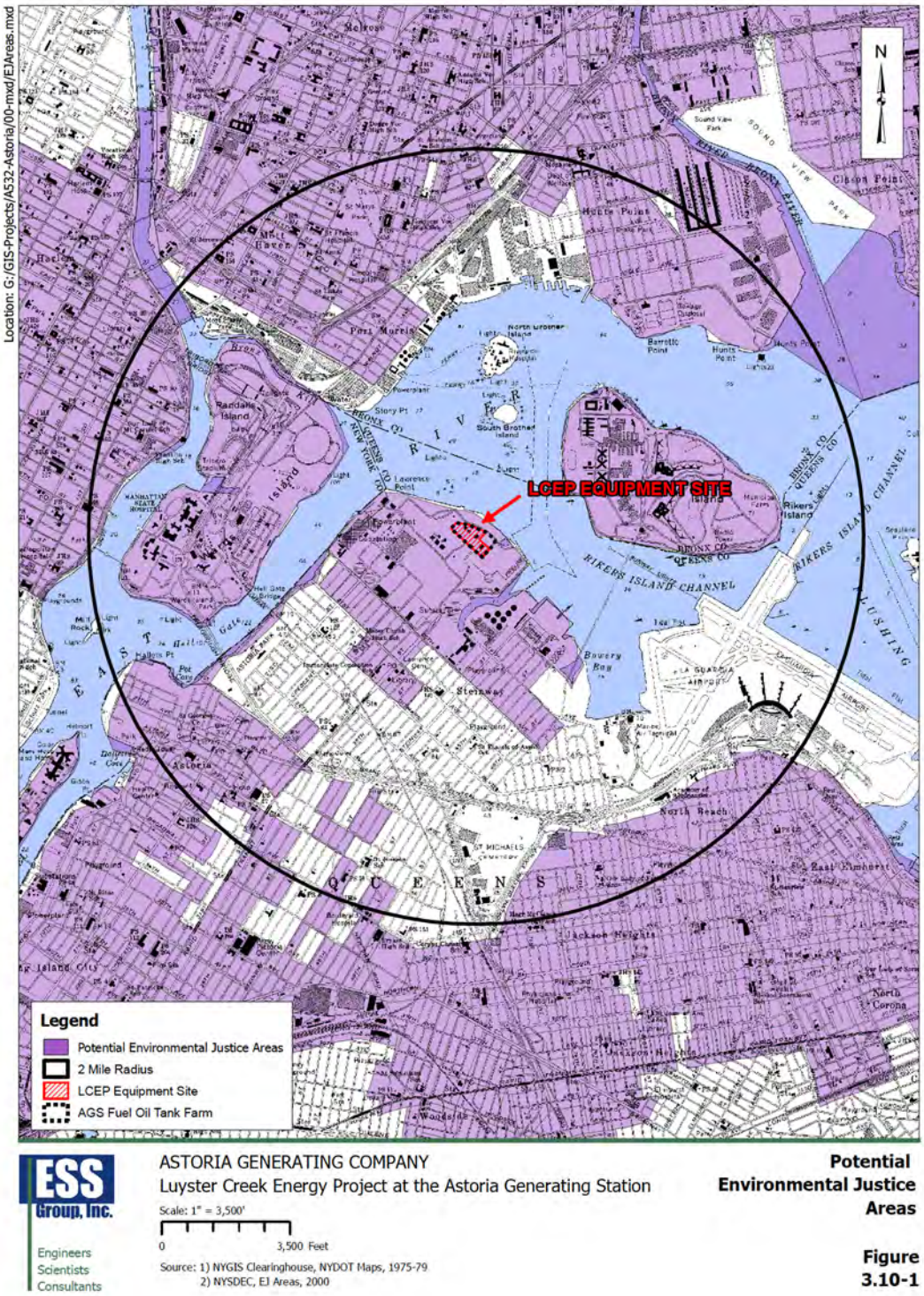
The Applicant's intent to normalize both the existing environmental burden and its own newly induced emissions is made all the easier by its consistent constriction of the geographic scope of its analysis. Every advantage has been taken to disregard communities that exist proximate to the project outwards to the 3 km radius - communities that would have been evaluated by any of the projects surveyed at the beginning of this report. By simply extending the geographic scope to a very conservative, reasonable 3 km distance, this study demonstrates - in stark detail - the overwhelming *dissimilarity* of the Applicant's constricted study area to the predominance of PEJA communities that would have been considered in a meaningful environmental justice evaluation.

First and foremost, these proximate communities are indeed eligible for environmental justice consideration. Further burdened by worse air quality and health outcomes - as demonstrated in this study - they are the definition of *vulnerable communities*. These are the very communities that should be given every opportunity for *meaningful involvement*, yet receive not a word of consideration in the Applicant's examination.

By avoiding any and all consideration of the predominate PEJA communities outwards to a 3 km radius, the Applicant's environmental justice analysis is misleading, encouraging the public to assume the number and extent of PEJA communities is limited to just those adjacent to the Astoria Complex fenceline. It fails to discuss in a meaningful way the newly induced Project emission concentrations that clearly extend beyond the narrowly defined Project Study Area. By effectually reducing the 1 mi Study Area downwards to the equivalent of a 0.6 mi Study Area, the Applicant excludes from consideration the Project's impacts on the proximate communities that are the most likely to suffer cumulative harms due to existing elevated air pollution and poor health determinants. The Applicant's artificially limited analysis fails to meet the standard of a comprehensive estimation of the Project on the preponderance of environmental justice communities that deserve protective attention, remediation and repair instead of yet more emissions that would persist over the lifespan of the Project.

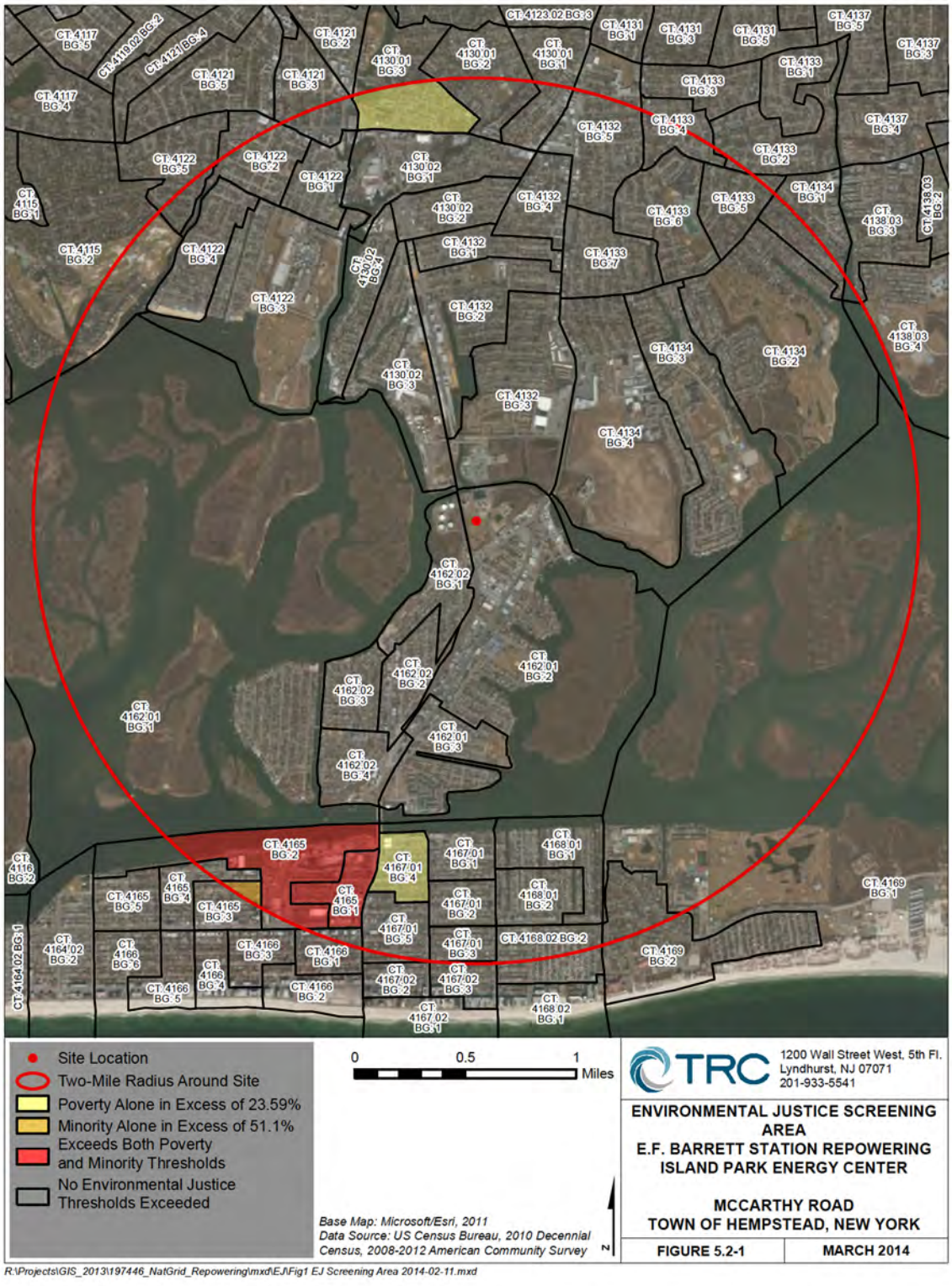
[23] DSEIS, *supra* note 1, at 3 75.
[24] *Id*.

Appendix - Exhibit 1



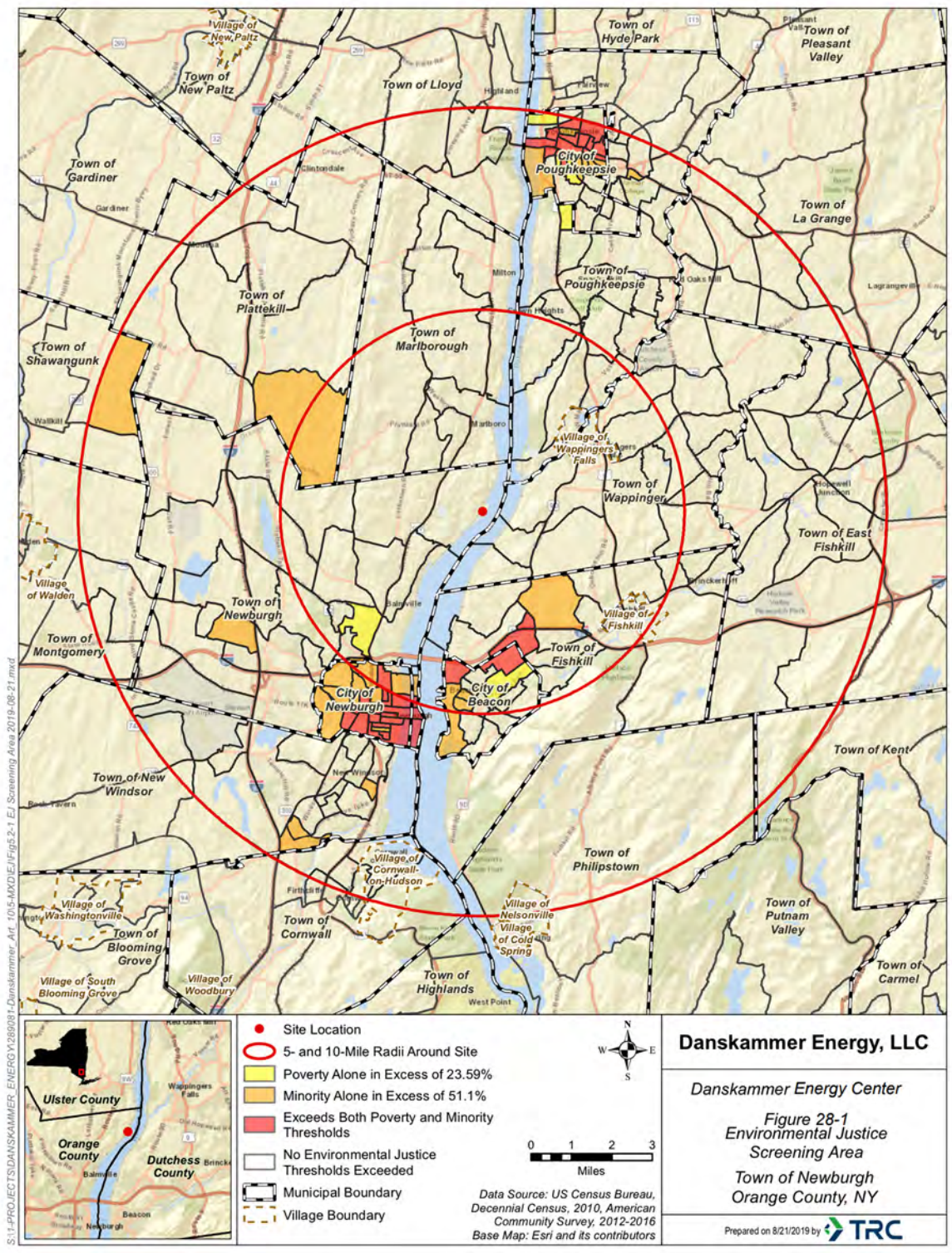
Appendix - Exhibit 1: Luyster Creek Energy Project at the Astoria Generating Station 2 mi Study Radius

Appendix - Exhibit 2



Appendix - Exhibit 2: Island Park Energy Center 2 mi Study Radius

Appendix - Exhibit 3

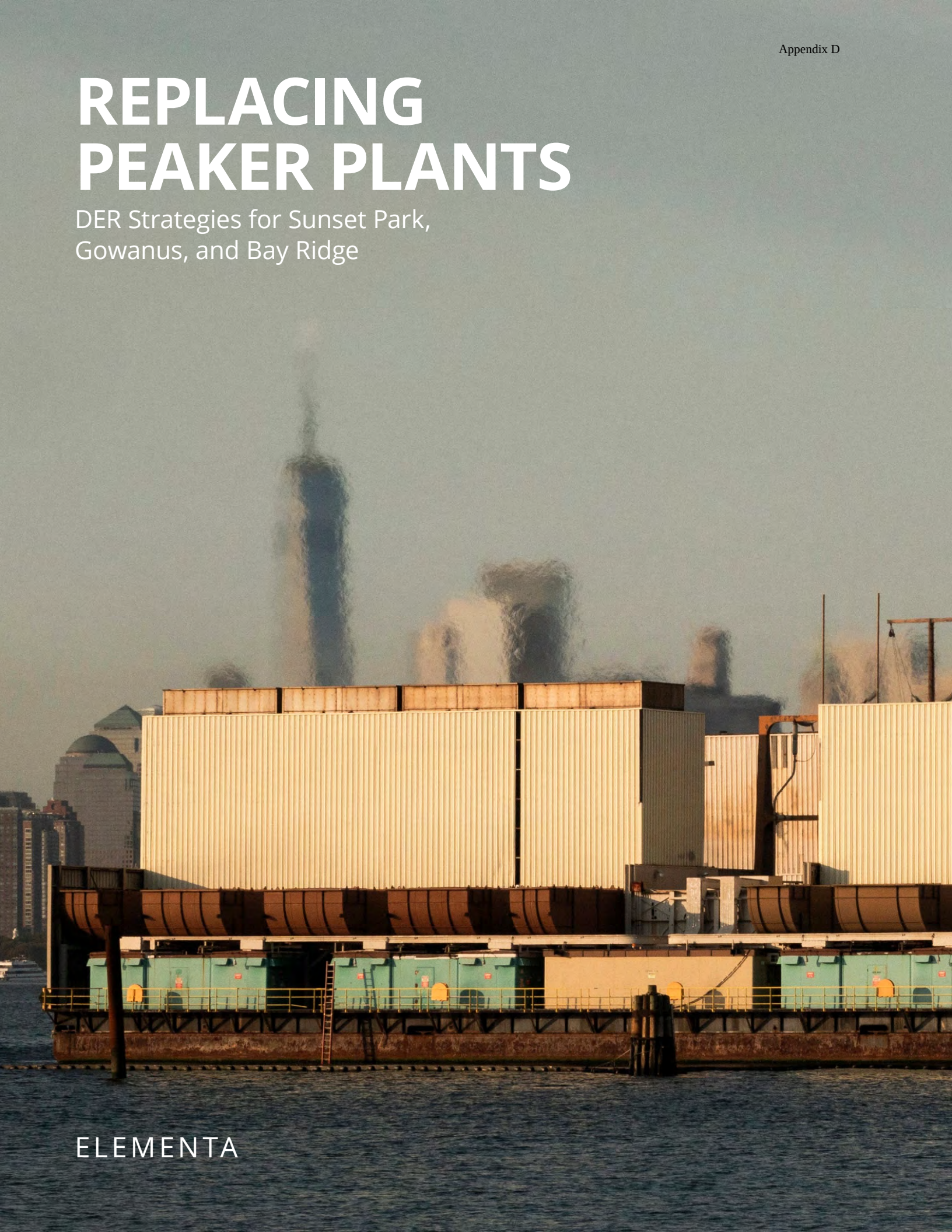


Appendix - Exhibit 3: Danskammer Energy Project 5 mi Study Radius

Appendix D

REPLACING PEAKER PLANTS

DER Strategies for Sunset Park, Gowanus, and Bay Ridge



ELEMENTA

Disclaimer

This report was prepared for NYSERDA in collaboration with UPROSE and NYC-EJA. The information contained herein may contain confidential or legally privileged information. It has been prepared for the sole benefit of our client and can only be relied upon only for its intended use. Elementa Engineering does not confer or purport to confer on any third party, any benefit or any right to rely upon or use any part of this report.

CONTENTS

EXECUTIVE SUMMARY

In New York City, highly-polluting power generating facilities known as “peaker plants” are used to produce electricity when demand exceeds normal levels – primarily during the summer months when residents and businesses turn up their air conditioning during heat waves. Overwhelmingly, peaker plants run on fossil fuels, operate without modern pollution control equipment, and are located in or adjacent to communities of color and low-income communities. By some estimates, peaker plants in New York City emit twice as much carbon dioxide and 20 times as much nitrogen dioxide as regular power plants, contributing to chronic respiratory illnesses among the city’s most vulnerable populations.[1]

New York City peaker plants, some of which are more than 60 years old, were originally intended to be used only for peak demand, but now run more frequently to meet the city’s growing energy needs. Fortunately, there are cleaner alternatives in the form of distributed energy resources (DERs), such as renewable energy generation and battery storage, which can be deployed alongside building energy efficiency improvements and demand response measures to reduce air pollution in environmental justice communities. This study explores how these strategies can reduce runtime at the privately-owned Gowanus and Narrows peaker facilities, which are currently seeking a re-powering. These two facilities are part of the Bay Ridge load pocket - an area encompassing Bay Ridge, Gowanus, and Sunset Park, which is the focus of this study.

There are three primary objectives of this work: i) to establish the theoretical potential of each strategy to reduce peak demand, ii) to assess the overall impact of peak demand reduction on peaker plant operation, and iii) to identify areas for further analysis and research. Based on our analysis, combining distributed energy and load reduction strategies could result in a 38% reduction in peak electricity demand, theoretically corresponding to a 35-40% reduction in runtime at the Gowanus and Narrows generating facilities. Further analysis is needed to confirm these estimates and evaluate how DER strategies relate to broader initiatives to reduce greenhouse gas emissions and promote environmental justice in NYC.

PROJECT APPROACH

Overview

To evaluate the impact of each strategy, we started by building an urban-scale energy model, calibrated to existing conditions in the study area. Having a calibrated baseline model is an important foundation for analyzing future scenarios as it allows us to simulate energy use in the study area under different conditions. The baseline model is also an important tool for understanding how energy is used in the study area and what drives peak electricity demand. The baseline model is based on building typologies, which represent groups of similar buildings in the study area that exhibit similar patterns of energy use. For each typology, we created planning-level energy models and scaled the results by the relative size of each typology in the study area. The resulting urban-scale model represents the aggregated loads of the building-scale typology energy models.

Typology Identification

To identify the most appropriate typologies for this study area, we used three main datasets: i) 2018 Local Law (LL) 84 benchmarking data, ii) 2016 LL87 audit data, and iii) 2020 MapPLUTO tax assessor's data. The Local Law 84 benchmarking data contains information about annual energy use for buildings that are greater than 50,000 square feet.[2] The LL87 dataset represents a more limited set of buildings but includes more detailed information about energy use and building characteristics.[3] And finally, the MapPLUTO data combines land use and geographic information for each tax lot in the city with the Department of Finance's Digital Tax Map, and includes a number of important building level data points including building size, vintage, defining architectural features, renovation history, etc. Unlike the LL84 and LL87 data, the MapPLUTO dataset theoretically covers every building in the study area.

From these three datasets, we identified eight typologies in the study area: small office (<10,000 gsf), medium office, retail/restaurant, outpatient healthcare, industrial/warehouse, single-family, multifamily, and institutional. Institutional buildings include schools and cultural or religious centers such as churches, synagogues, and mosques. Of these eight, the most predominant typology in the Bay Ridge load pocket is multifamily residential, which

FIGURE 1

Spatial Overlay of Typologies

This map shows each building according to it's corresponding typology. The Sunset Park focus area is highlighted. The classifications are based on MapPLUTO data at the tax parcel level, which means that multiple buildings that occupy the same tax lot inherit the classification that is given to the lot as a whole.

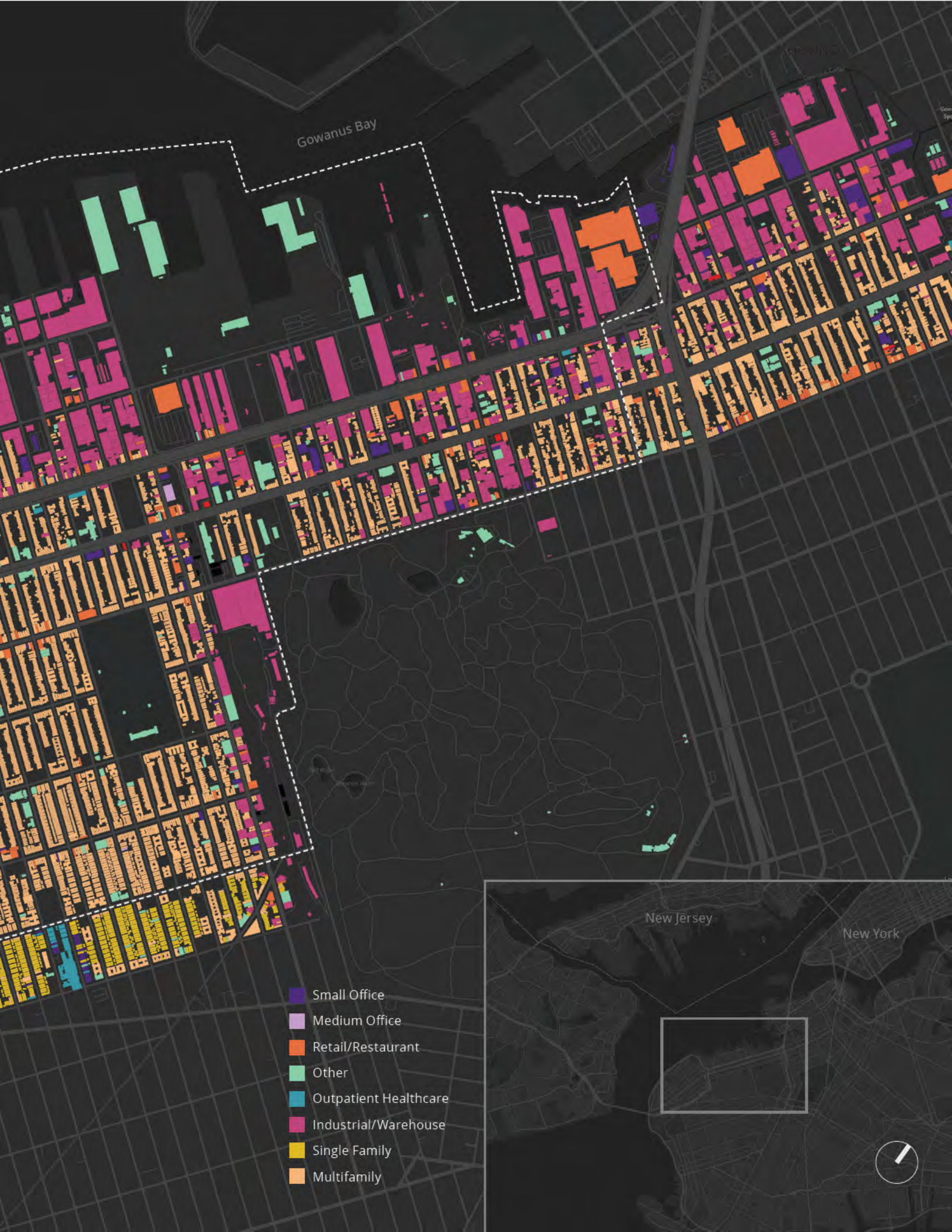
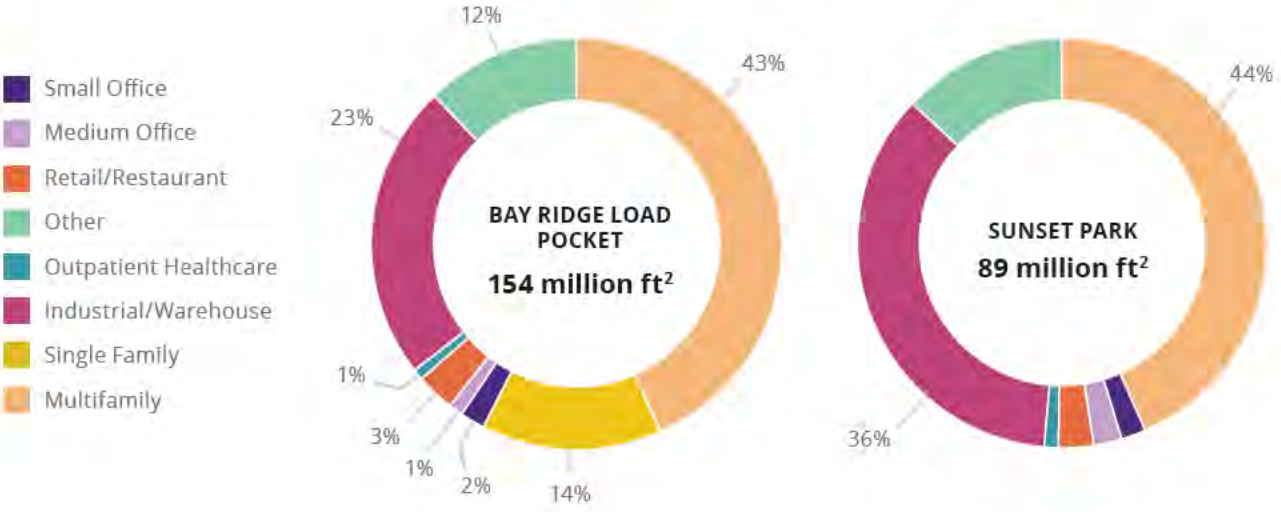

Gowanus Bay
Small Office
Medium Office
Retail/Restaurant
Other
Outpatient Healthcare
Industrial/Warehouse
Single Family
Multifamily
New Jersey
New York

FIGURE 2

Breakdown of Floor Area By Typology

The Bay Ridge load pocket includes roughly 154 million ft² of floor area. Sunset Park has roughly 89 million ft², with the majority of buildings classified as multifamily or industrial/warehouse.



accounts for roughly 43% of the total building area, followed by industrial/warehouse, which accounts for 23% of the total area. The majority of the industrial/warehouse buildings are in Sunset Park, which includes NYC's largest Significant Maritime Industrial Area (SMIA). Figure 2 shows a breakdown of the entire Bay Ridge load pocket by typology, alongside the specific breakdown for Sunset Park.

Baseline Model Development

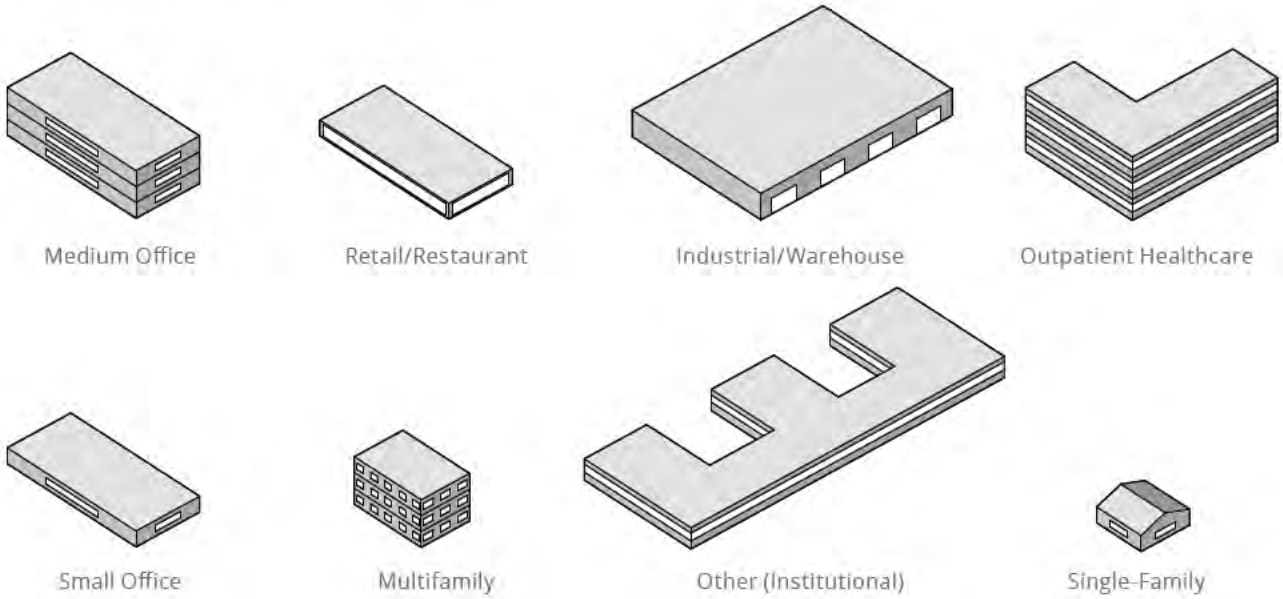
For each building typology, we created a baseline calibrated energy model, based loosely on prototype models from the Pacific Northwest National Laboratory (PNNL) that we used as the starting point for our input assumptions. The PNNL models helped us establish the general bounds for input parameters such as LPD and EPD loads and schedules, ventilation loads, cooling and heating setpoints, system types, and construction properties, which we further refined so that the energy use intensity aligned with measured data from the LL84 benchmarking dataset.

Calibrating the aggregated urban-scale energy model was an iterative process that involved making small changes to the typology energy models and comparing the aggregated results to Utility Energy Registry (UER) data[4] and hourly electricity use estimates from Con Edison.[5] The goal of this process was to ensure the aggregated energy use in the urban-scale model matched measured, real-world data. To quantify how closely the modeled data matched measured values, we used the ASHRAE Guideline 14 definition of "Goodness-of-Fit" (GOF). GOF is a weighted combination of normalized mean bias error (NMBE), which quantifies the percentage error between measured and modeled values summed over the year, and the coefficient of variation of root

FIGURE 3

Graphic Representation of Typology Models

The geometry of the energy models is based on PNNL prototype models. The goal of the typology modeling process is to create a simple planning level model to aggregate in the urban-scale model.



mean square error (CV_{RMSE}) which characterizes the variability of difference on a month by month basis. It is expressed as a single statistical index that represents an overall rating of simulation results. In accordance with ASHRAE Guideline 14 recommendations, a 3:1 weight is assigned for NMBE compared to CV_{RMSE}.[6] For the aggregated urban energy model, the NMBE was less than 4, and the CVRMSE was below 7, for a combined GOF of approximately 4. We consider any GOF value below 15 to represent a well-calibrated model.

Based on our analysis, the average annual electrical energy use intensity (EEUI) of buildings in the study area is between 34 and 318 KWh/m^2-yr (11-100 kbtu/ft^2-yr). Single family dwellings generally have the lowest EEUI, while outpatient healthcare facilities, with outsize cooling and equipment loads, have the highest. On an annual basis, industrial/warehouse facilities account for 36% of electricity use throughout the year, followed by multifamily residential (27%) and 'other' (primarily education and institutional buildings, which account for 16%). Equipment and process loads constitute the largest drivers of energy use, primarily in industrial and warehousing facilities.

In terms of monthly energy use, Figure 4 shows the comparison of the aggregated modeled data to measured electricity use from the 2018 UER data, broken down according to UER classifications: residential buildings, small commercial buildings, and other buildings (primarily large commercial, institutional, and industrial facilities). At the time of this analysis, the 2018 data was the most recent available for a complete calendar year.
In terms of hourly electricity use, Figure 5 shows

FIGURE 4

Monthly Electricity Use

Monthly electricity use shown for the three classifications of buildings in the Utility Energy Registry data: Residential, Small Commercial, and Other. The modeled data is shown as a solid line, while the measured data is shown as a dotted line.

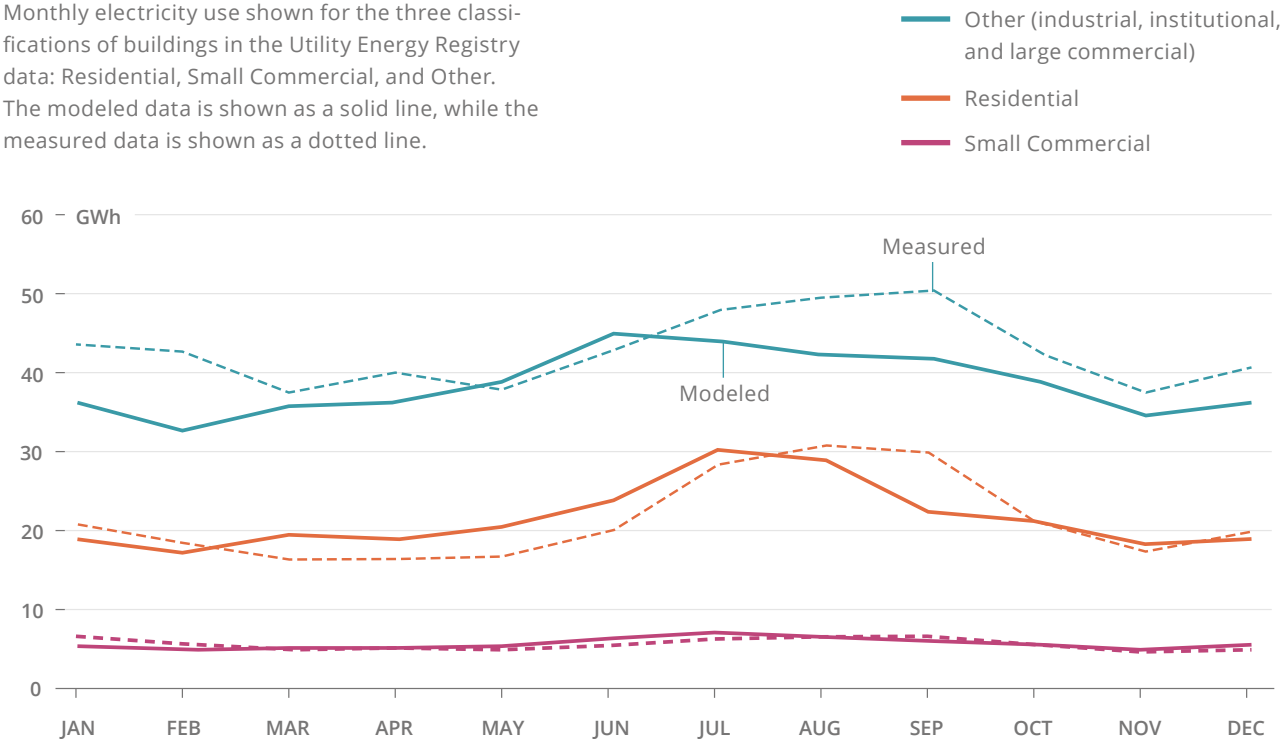
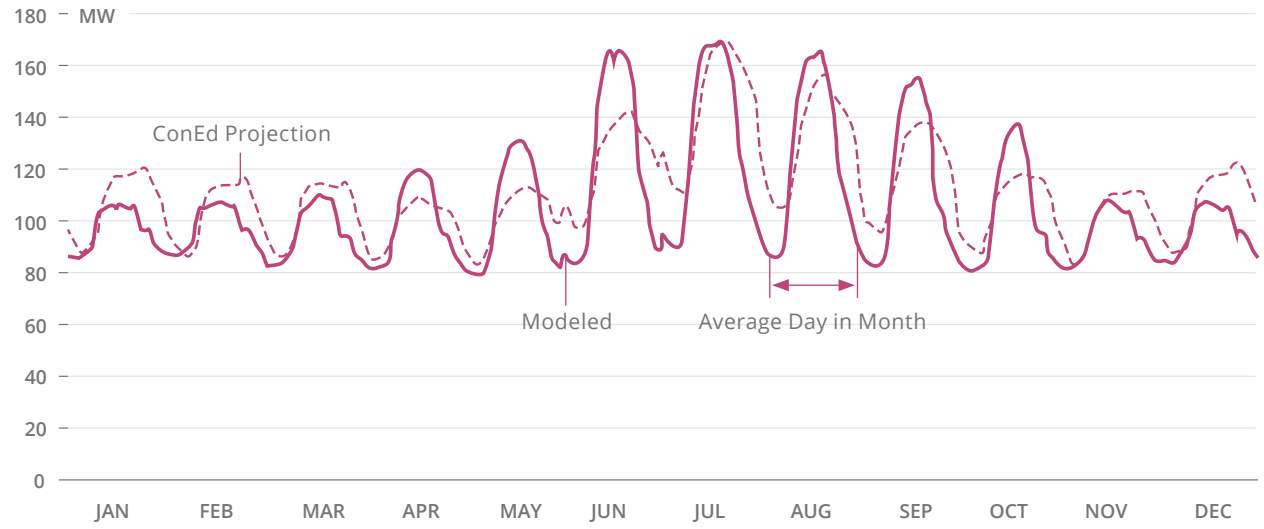


FIGURE 5

Average Day Hourly Electricity Use

This graph shows the average hourly demand profile for the study area for each month of the year. The modeled data is shown as a solid line, while the measured data is shown as a dotted line.



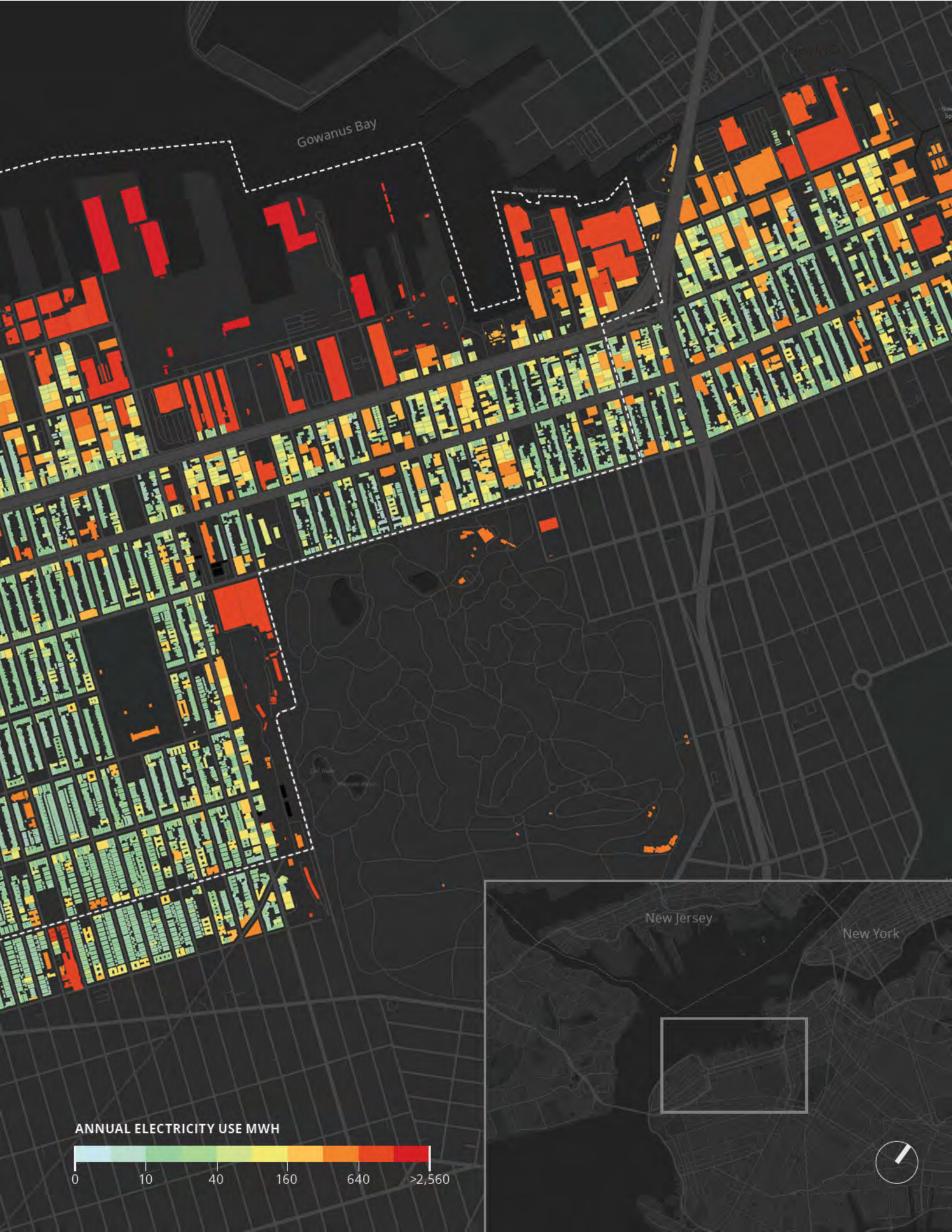
the comparison of the aggregated modeled data to hourly electricity use projections from ConEd. The ConEd projections represent the anticipated demand for 2021, based on historical trends. However, the annual amount of electricity use is roughly equal to the 2018 UER totals. The graph shows the average hourly demand profile for each month of the year. The average summertime peak demand, for building energy use, is around 170MW, although it can reach 232MW on the hottest days of the year. There is also a consistent baseload between 80-100MW.

There will inevitably be small discrepancies between the modeled and measured data, on an hourly basis, due to the limited capacity of the typology models to fully capture load diversity, and the use of a typical meteorological year (TMY) weather file for simulating energy use. Nevertheless, the urban-scale energy model is a useful surrogate for understanding hourly demand and estimating the impact of various DER strategies on peak demand reduction.

FIGURE 6

Spatial Overlay of Annual Electricity Use

This map shows the annual electricity use estimate for each building in the study area. Since these estimates are based on building typologies, there is a high margin of error at the building level. However when the typology models are aggregated into the urban-scale energy model, the margin of error and level of confidence in the results improves.


Gowanus Bay
New Jersey
New York
ANNUAL ELECTRICITY USE MWH
0
10
40
160
640
>2,560

PEAKER PLANT OPERATION

Overview

The study area includes three peaker plants. Two of the plants - the Gowanus and Narrows generating facilities - are privately owned. The other plant, the Joseph Seymour 23rd St/3rd Ave Power Plant, is owned by the New York Power Authority (NYPA). The Gowanus Station is an oil and gas-powered plant, built in 1971, with a nameplate capacity of approximately 640MW. The Narrows Facility also runs on oil and natural gas and was built in 1972 with a nameplate capacity of 352MW. The Joseph Seymour facility is a 94MW natural gas facility built in 2001. In 2018, according to the EPA Air Markets Program Data, these three facilities had a combined runtime of roughly 2,400 hours.[7]

Figures 7 shows the number of operating hours and the average load, at each hour of the day. In the study area, the average load is highest between 5pm and 7pm, typically when workers return home, switch on lights, and turn up the air conditioning. The average combined load of these three peaker plants during this time is roughly 350MW. Notably, this is significantly greater than the average peak demand projected by ConEd for the Bay Ridge load pocket (~170MW). In terms of peak output, Figure 8 shows the peak combined load for each day between July and September. Note that the peak (>600MW) is more than double the total peak demand for building energy use in the study area (232MW), indicating that the energy being generated by these two facilities is being consumed outside the study area, though more research may be needed to determine how energy is distributed in Brooklyn.[8]

It is also noteworthy that for approximately 35% of the total runtime hours, the Gowanus and Narrows facilities were operating at less than 10% of their nameplate capacity, which could indicate the use of standby mode or idling. This is not only a public health concern, but a financial concern as well, since the owners of these two facilities are paid billions of taxpayer dollars even when the facilities are not fully utilized.[9]

Correlation With OA Temperature

As peaker plants tend to operate to meet summertime peak loads, there is a strong correlation between peaker plant operation and outside air temperature. When tempera-

FIGURE 7

Peaker Plant Average Load

The graph below shows the average load during operating hours, combined with the frequency of operation at different times of the day (secondary axis), for the Gowanus and Narrows facilities.

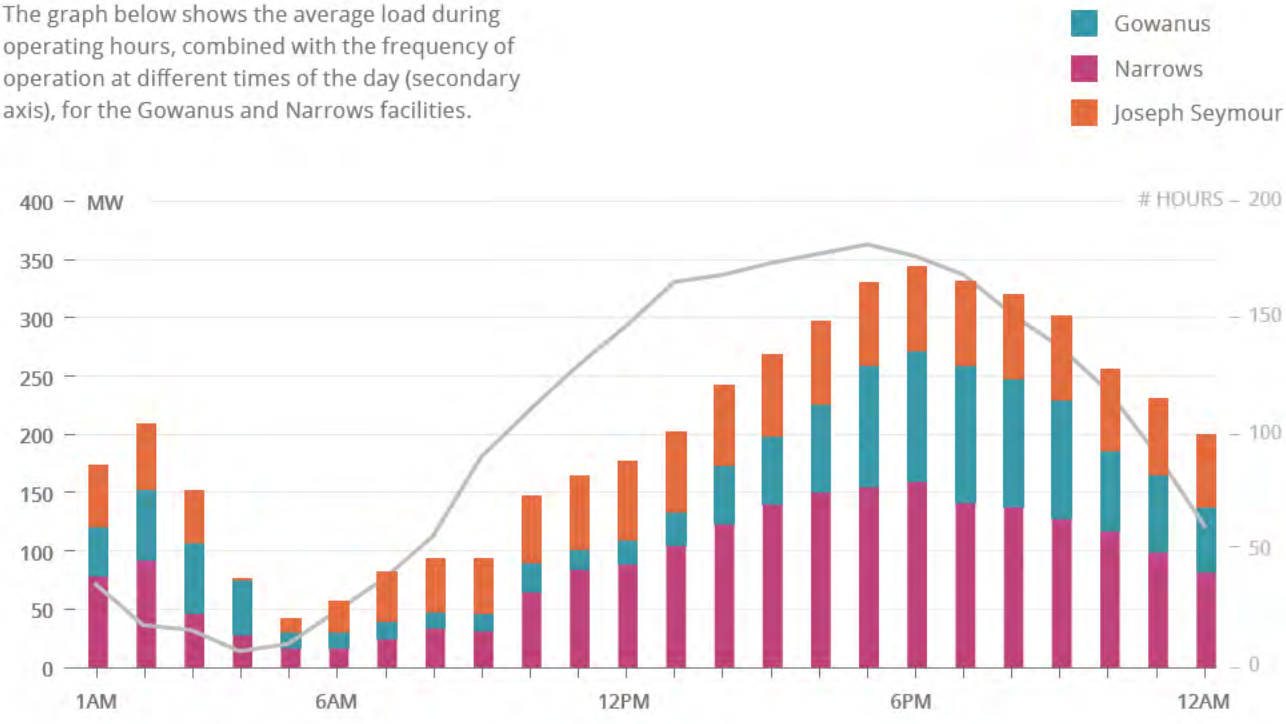


FIGURE 8

Peak Load July-September

The graph below shows the peak load for each day in 2018 between July and September. Note how the overall magnitude of peak load (>600MW) is more than double the building peak demand (232MW).

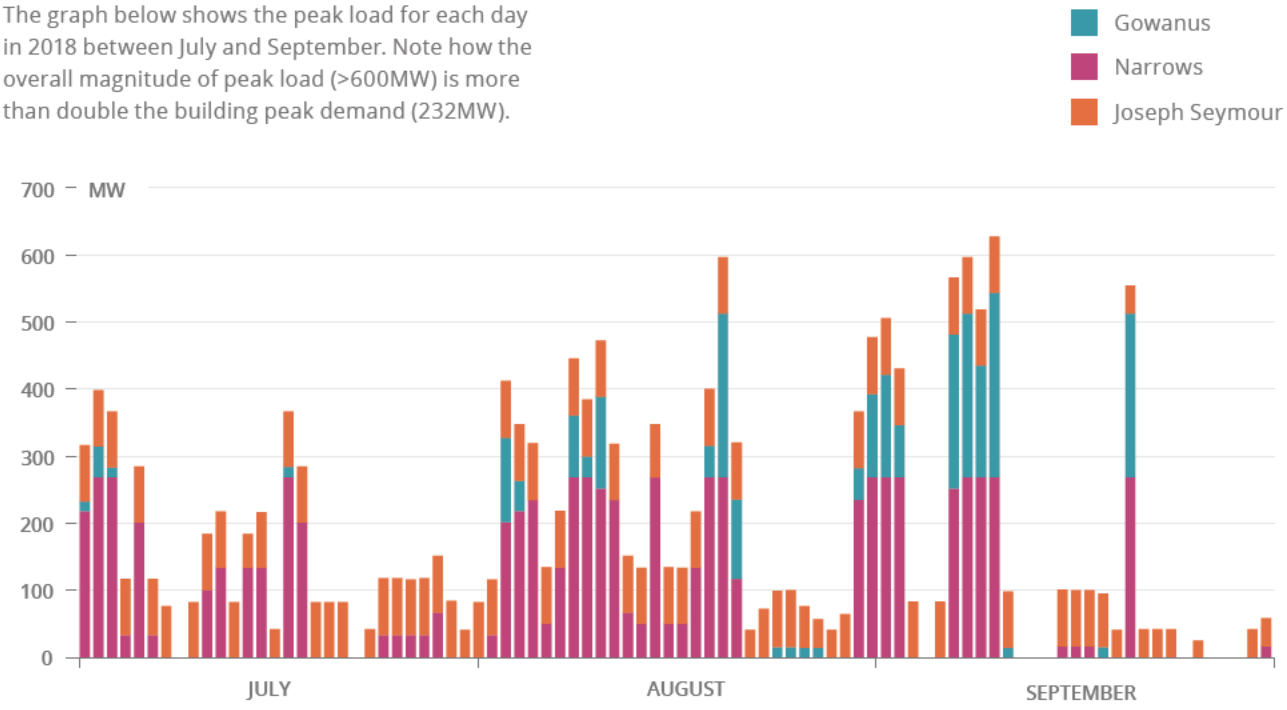
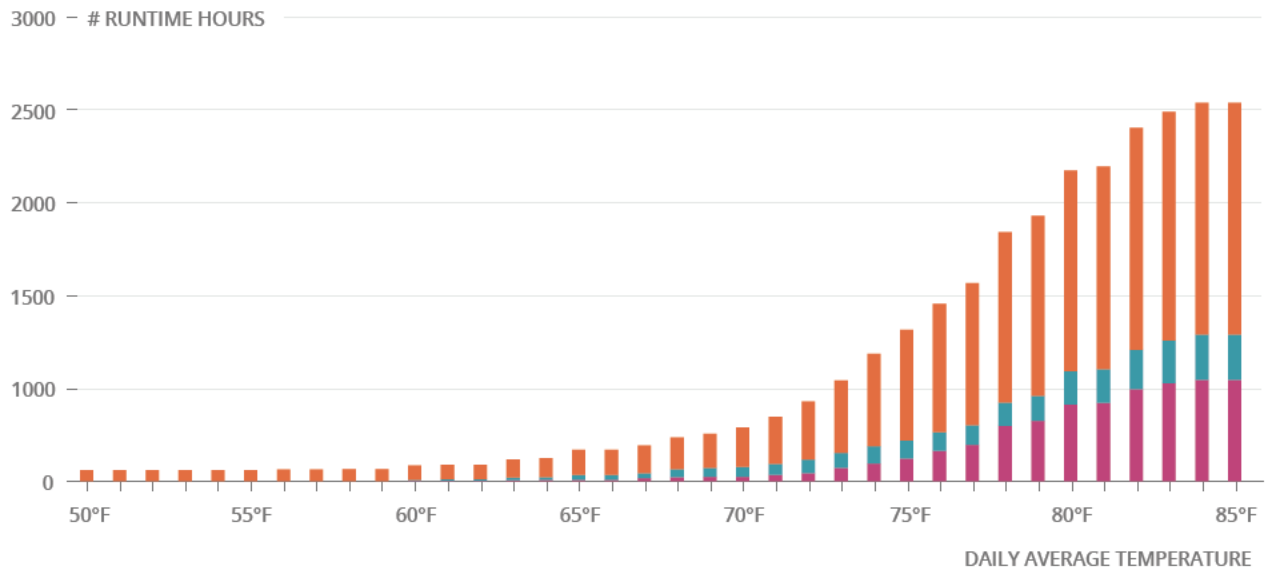


FIGURE 9

Cumulative Hours vs Daily Average Temperature

The number of runtime hours increases along with increasing daily average temperatures, starting around 60°F, due primarily to increased cooling loads during the summer months.



tures increase, residents and businesses turn up their air conditioning, which drives peak demand. Based on our analysis of the 2018 EPA Air Markets Program Data, the Gowanus and Narrows generating facilities begin operating when average daily temperatures exceed 60°F, with increasing temperatures corresponding to increasing loads. The Joseph Seymour facility is operated more frequently, and at lower average outside air temperatures, but there is still a strong correlation between outside air temperature and overall runtime. Figure 9 shows the number of operating hours compared to the average daily outside air temperature.

The relationship between outside air temperature and peaker plant runtime is especially important to consider in the context of climate change. Increasing temperatures and more severe heat waves will continue to drive peak demand in the future unless we implement strategies to either reduce loads (e.g. energy efficiency and demand response) or shift loads to off-peak hours (e.g. demand response and energy storage). These load shedding and load shifting strategies will be equally as important as renewable energy generation when it comes to creating a cleaner and more resilient energy infrastructure.

DER & EFFICIENCY STRATEGIES

Overview

For this analysis we used the calibrated baseline urban energy model to evaluate various DER strategies to determine what impact, if any, these strategies would have on peaker plant operation in the study area. The goal of this analysis was to identify the strategies that are most effective in terms of replacing the peaker plants in Sunset Park. After identifying these strategies, the community can develop a targeted implementation plan that will promote the most just and equitable transition toward cleaner energy solutions.

We modeled the following set of strategies individually, and as packaged scenarios: PV generation, battery storage, demand response, and energy efficiency. This is far from an exhaustive list of strategies, but it illustrates the range of potential high-level solutions – from generation to efficiency – that will ultimately be necessary to completely eliminate peaker plants in the study area, and throughout New York City. All of these strategies have been successfully implemented in other areas of the country, and in some cases in other areas of New York City, albeit on a smaller scale. Each of the referenced technologies, from photovoltaic panels to lithium-ion batteries, are mature and have well-established funding mechanisms.

PV Generation

Solar PV is one of the most cost-effective ways to build generating capacity within the study area. Solar PVs can be installed over parking lots, vacant land, and or even integrated into streets and sidewalks. However, given the uncertainty about rezoning and redevelopment plans in the area, we assumed that the most viable location for solar photovoltaics is existing building rooftops. There are many different development models for distributed rooftop PV – from owner-operated systems to community solar projects. Power generated by PVs would help offset some of the demand that occurs during the day, particularly from 10AM-2PM, reducing the need for peaker plants. In addition, solar power would reduce carbon emissions and, if configured correctly, reduce the need for additional transmission and distribution infrastructure in the study area. In New York City, premium PV panels (>20% efficiency) generate about 20 KWh/ft^{2}yr when operating under normal conditions.

We assessed three scenarios for PV generation: low, medium, and high. The low scenario assumes 1.5 million ft^2 of roof area (3% of total roof area in the study area) and achieves a 4% reduction of both peak and annual demand. The medium scenario assumes 4 million ft^2 of roof area (8% of total roof area) and achieves a 12% reduction of peak demand and 11% reduction of total demand. The high scenario assumes 6.1 million ft^2 of roof area (12% of total roof area) and achieves a 16% reduction of both peak and total demand. The total installed capacity for the low, medium, and high scenarios is 26MW, 71MW, and 106MW respectively. For size comparison purposes, there is currently about 200MW of installed solar capacity across all 5 boroughs of New York City. A typical multifamily row house in Sunset Park and Gowanus could theoretically accommodate a 5KW system, assuming there are no obstructions on the roof and decent solar exposure. In contrast, one of the large industrial buildings along Sunset Park's industrial waterfront could accommodate a 500KW-1MW system. For context, New York State has a target of 6,000MW installed photovoltaic capacity by 2025.

TABLE 1

Summary of PV Impact

	LOW	MID	HIGH
Roof Area (%)	3%	8%	12%
Installed Capacity (MW)	26MW	71MW	106MW
Generation (GWh/yr)[12]	37GWh	99GWh	148GWh
Peak Reduction (MW)	9MW	27MW	36MW
Peak Reduction (%)	4%	12%	16%

Battery Storage

Battery storage is another cost-effective mechanism for reducing peak demand. Battery storage systems will also improve infrastructural resiliency by providing backup power in the event of outages and would reduce the need for additional transmission and distribution capacity upgrades, the cost of which would likely be transferred to utility ratepayers. Like PV systems, there are a variety of deployment strategies when it comes to battery storage, particularly with respect to battery dispatch and control logic. For this analysis, we assumed optimal charging and discharging sequences to maximize peak demand reductions. In realty, a distributed battery storage system would operate according to localized needs and constraints, but this approach helps establish the theoretical potential of battery storage in the study area. Furthermore, we assumed a 1:4 power-energy ratio (1MW to 4MWh), which would provide resiliency benefits compared to smaller capacity battery systems.

We employed a similar low, medium and high scenario analysis for battery storage. The evaluated battery sizes, 30MW, 80MW and 120MW, result in a 8%, 17% and 24% peak reduction, respectively. After 80MW the impact of battery storage on peak demand in the study area diminishes, as both peak and off-peak demand approaches the daily average. For size comparison purposes, the Tesla Powerwall – a lithium-ion battery designed for residential applications – has a capacity of 14KWh, with a peak power rating of 7KW. The Tesla Megapack, designed for utility-scale storage applications, has a 3MWh capacity, with a peak power rating of 1.5MW. Theoretically, it would be possible to achieve the 80MW scenario with 22,500-23,000 Powerwalls, or 100-110 Tesla Megapacks. For context the New York State target for installed storage capacity is 1,500MW.

TABLE 2

Summary of Battery Storage Impact

	LOW	MID	HIGH
Battery Capacity	30MW / 120MWh	80MW / 320MWh	120MW / 460MWh
Peak Reduction (MW)	18MW	40MW	56MW
Peak Reduction (%)	8%	17%	24%

Demand Response

Demand response is yet another cost-effective way to reduce peak demand. Demand response represents a short-term reduction in system demand, "typically four hours or less in duration, that [is] provided by individual customers (or aggregated groups of customers) curtailing their electricity consumption or deploying emergency generation on request."[10]

Our analysis focuses on load curtailment rather than generation, which can be achieved by shutting off non-critical systems or, as is common in the residential market, adjusting temperature setpoints to reduce peak cooling demand. Con Edison has an existing demand response program, but our assumption is that it is underutilized and could be expanded to achieve at least a 12% reduction in peak demand. This is based on reports by Summit Blue Consulting and the Electric Power Research Institute (EPRI), which outline the projected savings from high participation in demand response programs.[11]

According to their analysis, offices represent the greatest opportunities for load reductions in New York City, followed by the single-family and multifamily residential sector. In our study area (Sunset Park, Gowanus, and Bay Ridge), all of the office and industrial/warehouse buildings should be enrolled in a demand response program. However, as the COVID-19 pandemic has shifted energy use from offices to residential buildings, the multifamily sector represents an equally strong opportunity for significant demand response savings. While theoretically harder to administrate, and to contractually guarantee specific load reductions, residential demand response programs will be an essential tool to curtail peak demand for the foreseeable future.

TABLE 3

Summary of Demand Response Impact

	HIGH PARTICIPATION
Peak Reduction (MW)	27MW
Peak Reduction (%)	12%

Energy Efficiency

Building energy efficiency will be essential for achieving deep reductions in peak demand and for eliminating the use of peaker plants in New York city. Similar to distributed generation, storage, and demand response, energy efficiency retrofits will improve resiliency (by keeping temperatures at comfortable levels during power outages), and will reduce the need for costly transmission and distribution capacity upgrades. To model the impact of energy efficiency, at a high-level, we assumed that all buildings in the study area could achieve a level of performance commensurate with the latest energy codes. This is roughly equivalent to the ASHRAE 90.1 2016 standard. In addition, we assumed that the average lighting power density of buildings in the study area could reduce by 20%.

This level of energy efficiency, which could be achieved through envelope and system upgrades, would reduce peak demand by 11%. It is important to note that energy-efficiency carries other benefits as well, such as improved occupant comfort, reduced utility bills, and greater resiliency. Energy efficiency will also be necessary to avoid increases in wintertime peak demand as buildings switch from combustion-based heating systems to electric heat pumps. Fuel switching is perhaps the most important strategy for decarbonizing the building sector, and energy efficiency is necessary to make it work.

Packaged Scenarios

TABLE 4

Summary of Energy Efficiency Impact

	UPGRADES TO ASHRAE 90.1 2016
Peak Reduction (MW)	26MW
Peak Reduction (%)	11%

The best approach to reducing peak demand and eliminating peaker plants in the study area is to combine strategies for maximum impact. Combining strategies also provides more flexibility in terms of financing and development strategies, to optimize outcomes for equity and environmental justice. We combined the strategies discussed above into three packaged scenarios:

1. Load Reduction: This package includes energy efficiency and demand response strategies.

2. Generation and Storage: This package focuses on distributed solar generation and battery storage, with 8% roof coverage for PV's (71MW installed capacity) and 80MW / 320MWh of battery storage.

3. Combined: This package combines load reduction strategies with 8% rooftop coverage of PVs (71MW installed capacity) and 30MW / 120MWh of battery storage.

The impact of each package is outlined in Table 5 and in Figure 10. The combined package, which includes both load reduction and generation and storage strategies, achieves a 38% reduction in peak demand – roughly 88MW off the estimated peak of 232MW. This package also achieves a 20% reduction in overall electricity use, totaling more than 186GWh. Notably, incorporating energy efficiency retrofits and demand response strategies reduces the need for extra battery storage capacity, which is why the Combined scenario only includes 30MW / 120MWh of battery storage. Incorporating more battery storage would help further reduce peak demand, but it comes with diminishing returns.

FIGURE 10

Average Day Hourly Electricity Use

Average hourly demand profile for each month of the year for each packed scenario. Note how the combination of solar and battery storage creates a more even demand profile throughout the day, with minimal seasonal variation.

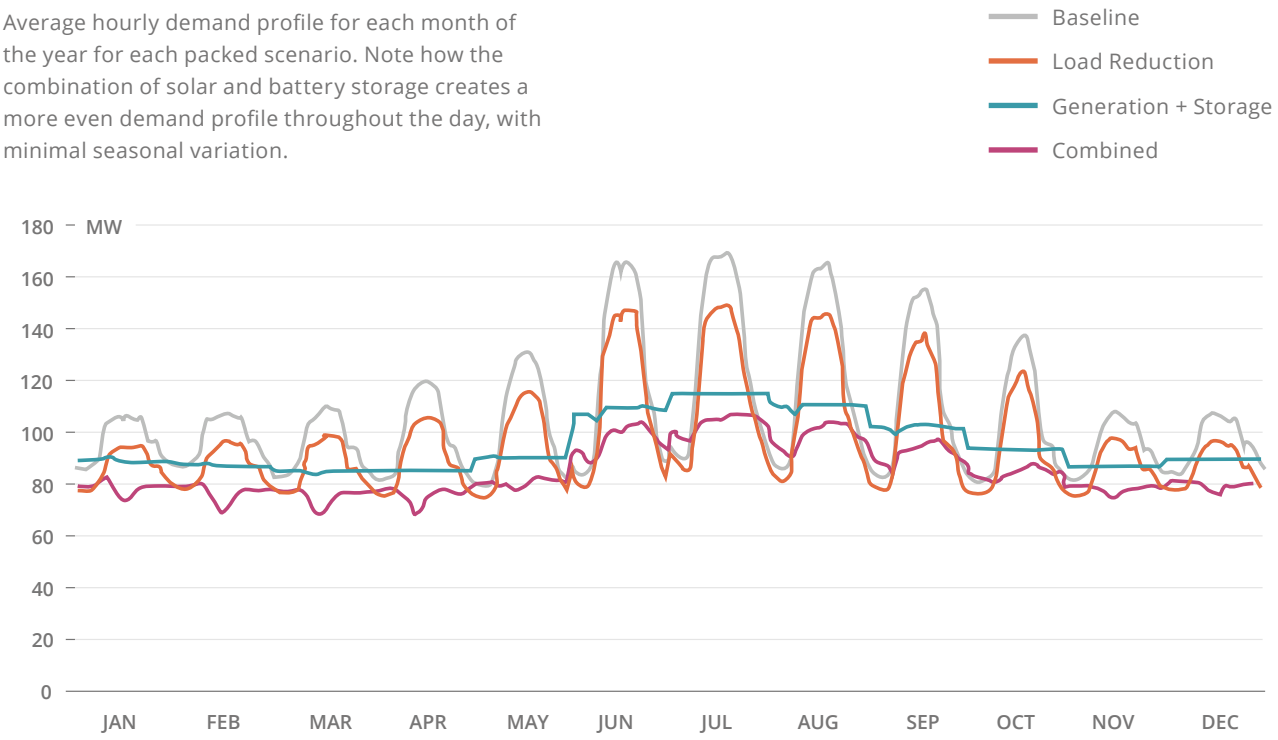


TABLE 5

Summary of Packaged Scenarios

PACKAGE DESCRIPTION	PEAK REDUCTION (%)	PEAK REDUCTION (MW)	TOTAL OFFSET (GWH)
Energy Efficiency (Retrofits + Demand Response)	20%	47MW	87GWh
Generation + Storage (71MW PV + 80MW/320MWh Battery)	32%	74MW	98GWh
Combined (Retrofits + Demand Response + 71MW PV + 30MW/120MWh Battery)	38%	88MW	186GWh

KEY FINDINGS & NEXT STEPS

Peak Demand Reduction

There are significant opportunities in the study area to reduce peak demand and peaker plant runtime. Based on our analysis, the theoretical potential for DER strategies, combined with energy efficiency and demand response, is approximately a 38% reduction in peak demand in the study area. This is based on aggressive, but realistic assumptions about PV deployment (71MW of total installed capacity), battery storage (30MW / 120MWh of battery capacity), energy efficiency, and demand response. Increasing the amount of PV and batteries, or further reducing energy use through energy efficiency upgrades and other load reduction strategies would result in higher savings, but those savings would come with diminishing returns, at least in terms of reductions to peak demand.

Reduced Peaker Plant Runtime

While it's difficult to estimate the impact this will have on peaker plant operation in the study area, it is likely these strategies would result in a 20% reduction in combined runtime at the Gowanus, Narrows, and Joseph Seymour facilities – from ~2,400 hours to ~1,940 hours. However, this is only a preliminary estimate, since it's unclear how the plants will be operated with reduced load, especially with respect to idling time and standby operation. Based on our analysis these two plants are serving loads outside our study area, which means that DER and load reduction strategies would need to be more widespread to fully eliminate these two plants. For a sense of scale, in 2018 the Gowanus, Narrows, and Joseph Seymour facilities had a peak combined output of over 600MW, while the peak demand in our study area, based on data from Con Edison, was just over 230MW. Replacing the entire generating capacity of these three facilities, using DER and load reduction strategies solely within the bounds of the study area, would be extremely challenging. However, by expanding the geographic extents of DER strategies, we can make a significant dent in peaker plant operation.

Environmental Justice

Reducing peaker plant runtime will lead to significant health benefits for environmental justice communities like Sunset Park that bear the brunt of polluting infrastructure like peaker

plants. The COVID-19 pandemic has hit environmental justice communities the hardest due to long term exposure to air pollution and historic health disparities. This study is an opportunity to support and work with frontline community leadership to replace polluting fossil fuel infrastructure, create well-paid clean energy jobs, and operationalize a Just Transition. This study also creates a replicable framework and innovative partnership model to help realize community-led clean energy projects.

Next Steps

This analysis is intended as a high-level assessment of DER, efficiency, and demand response strategies that provides a foundation for further exploration. While we have established the theoretical potential for these types of strategies, there is room for more detailed analysis related to siting and location of DER strategies, financing and procurement strategies, and even the impact of future decarbonization initiatives such as building electrification. The following is a list of questions for further research:

- What is the optimal strategy for siting renewable energy and battery storage systems?
- What is the optimal strategy for financing and operating distributed energy resources?
- What is the impact of building electrification (fuel switching) on peak electricity demand?
- What are the typical life cycle costs of energy efficiency upgrades with integrated PV and storage in multifamily buildings?
- How can we optimize battery control sequences to reduce peak demand?
- How can we design DER systems to promote resiliency and improve grid reliability?

The answers to many of these questions will depend on the availability of more granular data. This analysis was in some ways constrained by the lack of detailed information about hourly energy demand and peaker plant operation. Hourly load data for each of the typologies, based on a large sample size of buildings, would lead to a more robust bottom-up analysis of energy demand.

This could help shed light on opportunities for integrating DER strategies and implementing targeted energy efficiency upgrades. Similarly, having more detailed information about peaker plant operation, such as how the energy gets distributed and why these plants spend so much time idling, could help further identify opportunities for taking these plants offline and promoting environmental justice throughout New York City.

NOTES

1 New York Public Services Commission. This has also been reported on by Vice News in a September 25, 2020 article by Geoff Dembicki. “A Hedge Fund with Ties to Trump is Polluting One of Brooklyn’s Poorest Communities”

https://www.vice.com/en/article/qj4yjb/sunset-park-brooklyn-pollution-narrows-peaker-trump

2 LL84 requires owners of large buildings to annually measure their energy use and water consumption and publicly disclose this information. Currently the law applies to commercial and multifamily properties that are greater than 50,000 GSF.

https://www1.nyc.gov/html/gbee/downloads/pdf/nycbenchmarkinglaw.pdf

3 LL87 data is not publicly available, but is well documented in the One City 80x50 Technical Working Group Report from 2016. That report summarizes the main findings of the audit data.

https://www1.nyc.gov/assets/sustainability/downloads/pdf/publications/TWGreport_04212016.pdf

4 NYSERDA is in the process of launching an online portal for utility generated energy consumption data. They have made preliminary Utility Energy Registry data available for Con Edison from 2016-2019. We used the 2018 data throughout this report.

https://www.nyserda.ny.gov/all-programs/programs/clean-energy-communities/community-energy-use-data

5 This information was provided to NYSERDA by Con Edison for the Bay Ridge load pocket. The projection refers to 2021 load estimates.

6 According to ASHRAE, the Guideline 14 procedures include, “the determination of energy, demand, and water savings from individual facilities or meters, applies to all forms of energy (including electricity, gas, oil, district heating/cooling, renewables, and water), and encompasses all types of facilities (commercial, industrial, and residential).”

https://energywatch-inc.com/ashrae-guideline-14/

7 The EPA Air Markets Program Data tool provides operating profiles for specific facilities. We pulled both 2018 and 2019 data though only 2018 data is referenced in this report. The ORISPL code for the Gowanus Generating Facility is 2494 and the code for Narrows is 2499.

8 There may also be other loads within the study area that are not accounted for in this analysis. For example, the MTA operating data was excluded from our analysis, though based on a preliminary dataset received from the MTA, that load represents only a small fraction (<2%) of the total electricity use in the study area.

9 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. A Report by the Peak Coalition. May, 2020.

10 Summit Blue Consulting. Con Edison Callable Load Study, 2008.
https://uploads-ssl.webflow.com/5a08c-6434056cc00011fd6f8/5a27177a5f89cb0001ea0c03_Schare%20Welch%20Edison%20Callable%20Load%20Study_Final%20Report_5-15-08.pdf

11 I. Rohmund, G. Wikler, A. Faruqui, O. Siddiqui, R. Tempchin. Assessment for Achievable Potential for Energy Efficiency and Demand Response in the U.S. (2010-2030).
https://www.aceee.org/files/proceedings/2008/data/papers/5_297.pdf

12 Annual generation estimates represent AC output after accounting for system and inverter losses.

ELEMENTA ENGINEERING
54 West 40th Street
New York, NY 10018