COMMENTS OF INDEPENDENT POWER PRODUCERS OF NEW YORK, INC. ON PROPOSED INSTALLED CAPACITY DEMAND CURVES

Independent Power Producers of New York, Inc. ("IPPNY")[1] hereby submits the following comments on the New York Independent System Operator, Inc. ("NYISO") Staff's August 17, 2016 initial draft *Proposed NYISO Installed Capacity Demand Curves For Capability Year 2017/2018 and Annual Update Methodology and Inputs For Capability Years 2018/2019, 2019/2020, and 2020/2021* (the "Draft Report"). In its Draft Report, NYISO Staff expressly concurs with the vast majority of recommendations of the NYISO's independent consultants, the Analysis Group, Inc. ("AG") and Lummus Consultants International, Inc. ("Lummus") (the "Consultants") in their final report for the ICAP Demand Curves, including the Consultants' determination that the proxy unit for the New York City ("NYC"), Long Island ("LI") and Lower Hudson Valley ("LHV") Zones should continue to be an F Class Frame unit with dual fuel capability equipped with selective catalytic reduction ("SCR") emission controls, the Consultants' proposed financial parameters are necessary to adequately account for the various risk factors faced by developers and the zero crossing points and slopes for each Demand Curve should be retained.

Staff has, however, erroneously departed from the Consultants' recommendations in one important respect. Staff recommends a gas-only peaking plant configuration with SCR emission controls for the Rest of State ("ROS") proxy unit. In addition, NYISO Staff has left two considerations unresolved. Specifically, Staff stated in its Draft Report that it "is continuing to assess the Consultants' fixed property tax assumption of 0.75% for Load Zones C, F, G and K, as

[1] IPPNY is a not-for-profit trade association representing nearly 100 companies involved in the development and operation of electric generation facilities and the marketing and sale of electric power in New York.

well as the level of excess adjustment factor values (LOE-AF) determined by the Consultants using the 2016 CARIS Phase 2 database."[2]

I. Staff Has Correctly Determined That the Proxy Peaking Unit for All Zones Should Be Equipped with SCR Technology.

IPPNY strongly supports Staff's initial recommendation that the Siemens SGT6-5000F5 (F Class Frame) with SCR emission control technology represents the highest variable cost, lowest fixed cost peaking plant that is economically viable and practically constructible across all locations. For the reasons discussed in the Draft Report, the Consultants' final report and in the attached position paper of two leading permitting and air quality experts from the environmental consulting firm, Ecology and Environment, Inc. ("E&E"), a developer would be very unlikely to construct an F Class Frame unit that was not equipped with SCR technology in any Load Zone in New York due to siting, permitting and future market risks.

Addressing environmental requirements in its Draft Report, NYISO Staff establishes from the outset that the environmental regulatory framework has changed significantly since the 2013 reset process.[3] Following a comprehensive review of, and taking into consideration, all permit requirements, NYISO Staff concludes that emissions controls on the F Class Frame proxy peaking unit in all locations must include SCR technology, finding, that "due to the NOx emissions rates for all other technologies, SCR is required in order to comply with NSPS requirements for NOx."[4]

Some market participants claim that a proxy peaking plant without SCR in Zones C, F and G (Dutchess) could be permitted and constructed if the plant has an operating hour limit

[2] *See* Draft Report at 3.

[3] *See* Draft Report at 9.

[4] *See* Draft Report at 16.

below the major source threshold pursuant to the U.S. Environmental Protection Agency's New Source Review (NSR) regulations. Contrary to this claim, E&E demonstrates that "other factors in the air permit process drive the need to include an SCR for successful air permitting." E&E explains that a proposed project without emissions control technology, such as SCR, would not meet the Article X requirement to minimize adverse environmental impacts. As the Article 10 siting process provides for a mandatory public involvement process funded by the developer, this raises the risk substantially that the Siting Board will condition the Article 10 application on the installation of SCR, or deny the application outright, especially in light of the fact that the Siting Board is authorized to impose conditions more stringent than federal or state regulatory requirements.

There is also a risk that a developer that does not install SCR technology at the time the plant is permitted will face costs to retrofit its facility at a later time that are significantly higher than the cost would have been to install it initially. In short, the decision to construct a facility anywhere in New York State without SCR technology introduces development risks and the potential for significant additional future SCR retrofitting cost (relative to the cost of an SCR included in the original plant design). These additional risks would need to be included either in the form of a significantly shorter payback period or increased required return if the proxy peaking plant is not assumed to have SCR. Once the additional risks are appropriately represented, it is likely that the annualized cost of the uncontrolled unit would be no lower than the costs of a unit with SCR.

With the State's recent adoption of a Clean Energy Standard mandating that 50% of the energy consumed in the State by 2030 be generated by zero emission resources, it is hard to fathom that the State would permit a fossil-fueled facility without emissions control technology

when the State's citizens are required to spend billions of dollars for the clean energy services provided by zero-emission resources to meet the mandates of the CES program.[5]

An operating hour limit is also unlikely to avoid the need for SCR because a plant without SCR may have difficulty meeting the 1-hour nitrogen dioxide (NO2) National Ambient Air Quality Standard ("NAAQS"). E&E states:

> Demonstrating compliance of conventional peaking units without SCR through modeling is difficult because of the statistical form and concentration value of the 1-hour NO2 NAAQS. Modeling of NOX emissions from relatively simple, minor emission sources often show noncompliance with the standard. Locating emission sources close to property boundaries or fence lines and short exhaust stack heights can also contribute to a modeled NO2 NAAQS noncompliance. Using SCR to reduce the NOX emission rate may be necessary to model compliance with the 1-hour NO2 NAAQS.[6]

E&E has determined that, since 1990, every peaking unit permitted in New York, New Jersey and Connecticut, with the exception of one project permitted in New Jersey in 2001, includes SCR technology.[7] E&E explains that the sole New Jersey project without SCR, which was developed by Consolidated Edison, includes a limit on its operation of 1,050 hours per year.[8] The USEPA disagreed with the New Jersey Department of Environmental Protection's issuance of the permit with a LAER emission limit of 9 ppm because it did not agree with New Jersey that the frequent start and shutdown events and the hot exhaust gas temperature made the application

[5] It bears note that, throughout the CES Proceeding, the Staff of the Department of Public Service ("DPS Staff") and the New York Public Service Commission ("NYPSC") itself established that the loss of significant existing zero-emission resources would be replaced by fossil-fueled facilities. Case 15-E-0302, *Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard*, Order Adopting a Clean Energy Standard (Aug. 1, 2016), at 19. In light of this information, it strains credulity that the NYPSC in its capacity on the Siting Board would be willing to certificate new fossil-fueled facilities that did not control their emissions with SCR technology.

[6] E&E Position Paper at 5.

[7] *Id.* at 6–7.

[8] *Id.* at 8.

of SCR infeasible.[9] Real-world experience thus supports continuing to recommend that the proxy peaking plants be equipped with SCR technology in all regions in the State.

As NYISO Staff correctly finds in its Draft Report, the environmental regulatory framework is a significant factor in determining capital costs that must be accurately captured to ensure the proposed proxy unit is economically viable as mandated by the NYISO's Services Tariff. Given the significant changes to this framework since the last reset process, it is critical for NYISO Staff to uphold the Consultants' and NYISO Staff's own initial recommendation to equip proxy units in all locations with SCR technology when it issues its final report in this reset process.

II. Staff Should Adopt the Consultants' Recommendation That the Proxy Peaking Unit in Zones C and F Be Configured with Dual Fuel Capability.

IPPNY strongly supports Staff's concurrence with the Consultants' recommendation that the determinations reached in the last reset process to include dual fuel capability for the proxy peaking units in the LHV, NYC and LI Zones remain just and reasonable, and thus, the proxy peaking units should continue to be configured with dual fuel capability in these zones. The need for siting flexibility in this part of the system, which continues to be highly constrained, and reliance on natural gas as the predominant fuel remain key considerations supporting the need for dual fuel capable proxy units in the LHV, LI and NYC Zones.

IPPNY opposes, however, Staff's recommendation that the proxy peaking unit for Zones C and F should be gas-only. To justify its divergence from the Consultants' recommendation that a dual fuel capable unit be used in all zones, Staff contends that, unlike in other Zones, the LDCs in Zones C and F do not mandate dual fuel capability. Staff asserts that this moots the

[9] *Id.*

siting flexibility advantages inherent with dual fuel capability because a gas-only plant could be sited throughout the LDC systems in Zones C and F. According to Staff, the absence of a dual fuel mandate combined with the general availability of gas in Load Zones C and F and the limited incremental net energy and ancillary services ("EAS") revenue benefits of a dual fuel unit in the ROS market makes the use of a gas-only proxy unit in these areas reasonable.

As the Federal Energy Regulatory Commission determined when assessing this issue in the last reset process, the State's growing reliance on natural gas as the predominant fuel for generators, coupled with the fact that siting in close proximity to interstate pipelines and procuring firm capacity are prohibitively expensive undertakings, support incorporating dual fuel capability into the proxy unit's design.[10] These factors remain probative today. Indeed, as the NYISO has highlighted in its just-issued Power Trends 2016 report, New York's dependence on facilities fueled by natural gas has only grown since the last reset process, rising from 55% in 2012 to today's level of 57%, a trend that, as discussed below, is expected to continue for the foreseeable future.[11]

The Consultants' findings are further supported by a review of current and projected system conditions. As NYISO Staff itself recognized, dual fuel facilities provide important reliability benefits "particularly in consideration of the potential future unit retirements and increasing levels of intermittent renewable resources, both of which may further increase reliance on gas fired capacity in New York."[12] Natural gas facilities will, in fact, be needed to balance the large amount of renewable power that is anticipated to be developed to meet the

[10] *See New York Independent System Operator, Inc.*, 146 FERC ¶ 61,043, at P 83 (2014) ("2014 DCRP Order").

[11] *Power Trends 2016: The Changing Energy Outlook*, NYISO (July 5, 2016), at 3, http://www.nyiso.com/public/webdocs/media_room/publications_presentations/Power_Trends/Power_Trends/2016-power-trends-FINAL-070516.pdf.

[12] *See* Draft Report at 8.

State's clean energy goals. Indeed, the NYISO has commissioned its Clean Power Plan study, in part, to identify and quantify increased ramping and regulation needs on its system. Given that the State's proposed 50x30 renewable energy goal far surpasses the levels otherwise required under the Clean Power Plan, the impact on ramping and regulation requirements will only be magnified.[13] Thus, New York's growing dependence on natural gas supply is expected to continue in the coming years. Yet, it has come at a time of ever-increasing difficulties in siting new gas pipelines, making dual fuel capability critical.[14]

Moreover, as revealed by the NYISO's report for the 2013–2014 peak winter conditions, a number of gas-only units were forced to take derates due to a lack of fuel during peak winter conditions.[15] Thus, New York has already experienced the impacts of increasingly tight gas supply conditions in winter months. In fact, New York's dual fuel fleet has often been cited as one of the main reasons that New York was less susceptible than the adjoining regions during the 2013–2014 winter to price spikes and was in a better position to manage core reliability concerns effectively.[16]

Nor is the need for dual fuel capability simply a polar vortex issue. As the NYISO's peak winter report for this past winter showed, even in years when New York has experienced a very mild winter overall, natural gas supply became stressed during the multi-day periods of cold

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[13] *See, e.g.*, Peter Carney, CPP Study Plan: Phase I Status Report and Preliminary Findings, NYISO (July 5, 2016), http://www nyiso.com/public/webdocs/markets_operations/committees/bic_espwg/meeting_materials/2016-07-05/NYISO%20CPP%20Study.pdf.

[14] *See, e.g.*, *New York State Department of Environment Conservation Denies Water Quality Certificate Required for Constitution Pipeline*, N.Y. State Dep't of Envtl. Conservation (Apr. 22, 2016), http://www.decny.gov/press/105941.html.

[15] Wes Yeomans & Kelli Joseph, Winter 2013–2014 Cold Weather Operating Performance, NYISO (Mar. 13, 2014), at 5–8, 11–12, 14–16, 18, http://www.nyiso.com/public/webdocs/markets_operations/committees/bic_miwg/meeting_materials/2014-03-13/Winter%202013-1014%20NYISO%20Cold%20Snap%20Operations%20EGCW-MIWG.pdf.

[16] *Id*. at 22.

temperatures.[17] In recognition of the increasing tightness of the gas system, which could result in more frequent gas curtailments in the future, the NYISO has been pursuing a project to consider the development of new critical day performance rules.[18] This project has been included in the list of candidate projects for 2017.[19] These rules may potentially penalize generators that do not have dual fuel capability or firm gas transportation, which is likely to be much more costly than dual fuel capability and does not provide any scheduling benefits to peaking generators that are not likely to have been committed for full days prior to the Timely Nomination Cycle window closing. There would be no reason to develop these rules if all units were always able to obtain natural gas, especially during the operating day.

If Staff does not recommend dual fuel capability as a component of the proxy peaking unit in Zones C and F, or any other Zone in the State, it should recommend that the tariff require that the net cost of new entry ("Net CONE") of the proxy peaking unit and the associated reference prices be adjusted automatically. This adjustment should be made on upon the effective date of any performance rules that effectively require a dual fuel or firm gas requirement by excluding generators that do not have dual fuel capability or firm gas from the capacity market or imposing penalties on them for failing to perform when gas supply becomes tight or unavailable entirely.

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[17] *See* Wes Yeomans, *2015–2016 Winter Capacity Assessment & Winter Preparedness*, NYISO (Dec. 17, 2015), at 9, 16, http://www.nyiso.com/public/webdocs/markets_operations/committees/mc/meeting_materials/2015-12-17/Agenda%2005_Winter%202015_16%20Capacity%20%20Assessment_Winter%20Preparedness.pdf.

[18] *2017 Project Candidates*, NYISO (June 24, 2016), at 8, http://www.nyiso.com/public/webdocs/markets_operations/committees/mc_bpwg/meeting_materials/2016-06-24/2017%20Project%20Candidate%20Descriptions.pdf.

[19] *See* Ryan Smith, *2017 Project Prioritization & Budgeting Process*, NYISO (June 24, 2016), at 12, http://www.nyiso.com/public/webdocs/markets_operations/committees/mc_bpwg/meeting_materials/2016-06-24/2017%20Project%20Prioritization%20Process.pdf.

In addition, to the extent a proxy peaking unit is not dual fuel capable in the ROS, the Net EAS model must be adjusted to accurately reflect that there will likely be days when the gas system will be congested and gas-only peaking units will be curtailed. Pursuant to Niagara Mohawk Power Corporation's Gas Transportation Service for Dual Fuel Electric Generators service classification, a generator's gas transportation service is subject to interruption up to 30 days per year.[20] Niagara Mohawk may disconnect and cancel service to a customer that does not discontinue use when called to do so. Thus, if the proxy plant for the ROS is gas-only, the Net E&AS revenues must be reduced to reflect that the peaking unit could be off-line up to 30 peak days of the year.

III. The Assumed Property Tax Rate Outside of New York City Should Reflect the Recent Pressures on Municipalities to Maximize Tax Revenues from New Gas-Fired Generators

In its Draft Report, Staff states that it is continuing to evaluate the Consultants' recommendation for property tax rates outside New York City. The Consultants recommended a 0.75% tax rate outside New York City based on their review of 11 Payment in Lieu of Taxes ("PILOT") agreements for gas-fired plants in New York, a proposal that was already 0.08% and 0.05% less than the median effective tax rate and the weighted average by PILOT payment, respectively. As Staff noted, some market participants advocated for a tax rate for peaking plants outside of New York City of only 0.5% based on a 20-year amortization period. A 0.75% tax rate is too low because it is based on PILOT agreements that were executed many years ago and therefore does not reflect the more recent pressures on municipalities to require higher tax rates from new gas-fired generators.

[20] *See*, Niagara Mohawk Power Corporation, PSC No. 219, Schedule for Gas Service, Leaf 221.

There are two recent circumstances that are likely to pressure municipalities to require higher tax rates from gas-fired plants. The first circumstance is the change in public attitude regarding gas-fired generation. Opposition to gas-fired generation is much greater than it was only a few years ago. The change in attitude is demonstrated by the State's recent adoption of the Clean Energy Standard, which strongly discourages the development of any new non-renewable generation, and the significant growth of highly organized groups opposed to fossil fuels and fossil generation in the State. Groups opposed to hydraulic fracturing have been successful in blocking developments of new gas pipelines in New York.[21] Other groups opposed to new gas-fired generation being developed in New York have staged demonstrations blocking access to the construction site of gas-fired generation.[22] In the western part of the State, well-organized environmental groups opposed the conversion of a coal plant to natural gas firing in favor of transmission upgrades. It is likely that developers of new gas-fired generation in New York will face significantly more local opposition than they have faced in the past and will be pressured into providing greater community benefits, in the form of higher PILOT payments, to facilitate the permitting process.

The second recent circumstance that is likely to influence municipalities to require higher tax rates for gas-fired plants is New York's real property tax cap, which requires local governments and school districts to raise taxes no more than two percent or the rate of inflation per year, whichever is less, unless overridden by a local law or resolution by at least a 60% vote. The tax cap, which was enacted in 2011, has greatly reduced local governments' flexibility to

[21] *See, e.g.*, Scott Waldman, *Cuomo Administration Rejects Constitution Pipeline*, Politico (Apr. 22, 2016), http://www.politico.com/states/new-york/albany/story/2016/04/cuomo-administration-rejects-constitution-pipeline-101005.

[22] *See, e.g.*, Michael Randall, *Six Protesters Taken into Custody in Anti-CPV Power Plant Demonstration*, Times-Herald Record (Dec. 18, 2015), http://www.recordonline.com/article/20151218/NEWS/151219398.

raise taxes assessed to the general public and has stimulated local citizens to more closely monitor their elected officials with respect to tax matters. According to the Governor's report on the first year of the tax cap's operation, the cap "succeeded in curbing the average rate of property tax levy growth to 2 percent—less than 40 percent of the previous 10-year average" and it "increased voter participation and communication between school boards and the voters."[23] Local governments will likely be under a great deal of pressure to negotiate higher tax rates for new gas-fired generators to offset lost tax revenues due to the tax cap and to placate local citizens' demands to shift more of the tax burden to new, disfavored developments, such as gas-fired generators.

Thus, the 0.75% tax rate recommended by the Consultants should be raised, not lowered as requested by some stakeholders.

IV. Staff Should Recommend a Higher Cost of Debt for the Proxy Peaking Units to More Accurately Reflect the Risks That Developers Face.

The Consultants recommend a nominal after tax weighted average cost of capital ("ATWACC") of 8.60% in Zones outside of New York City, and 8.36% in New York City. The Consultants state that their proposed ATWACC is slightly higher than the current ATWACC approved during the NYISO's 2013 Demand Curve reset process and in neighboring RTOs to reflect increased risk in the NYISO relative to its neighboring RTOs. Two driving factors have changed since the last reset process that warrant a higher ATWACC. First, the NYISO is now projecting flat load growth for at least the next ten years.[24] Thus, the past ability for load growth

[23] *Reducing Property Taxes for New Yorkers: The New York State Property Tax Cap's Successful First Year*, N.Y. Governor's Office (Sept. 27, 2012), at 1, https://www.governor.ny.gov/sites/governor.ny.gov/files/archive/assets/documents/CappingPropertyTaxReport.pdf.

[24] *See 2016 Load & Capacity Data*, NYISO (Apr. 2016), at 1, http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Documents_and_Resources/Planning_Data_and_Reference_Docs/Data_and_Reference_Docs/2016_Load__Capacity_Data_Report.pdf.

to ameliorate other impacts has disappeared. Second, the Consultants recognized that failing to account for RTC pricing resulted in inflated Net E&AS revenues but ultimately elected to retain RTD-based pricing. Issues were also acknowledged with the intra-day fuel premium that was utilized in the model (e.g., its inability to accurately represent operational flow order conditions) but the Consultants ultimately determined that a measurably better approach had not been identified. A higher ATWACC ameliorates the acknowledged shortcomings in fully addressing these two issues.

IPPNY agrees with the Consultants that a higher ATWACC is necessary to account for the lack of long-term contracts, uncertainty over changes in regional markets and energy policies, flat load growth, and more challenging siting and development opportunities in New York. The Consultants' proposed ATWACC needs to be increased, however, to more accurately reflect these risks and the other risk factors identified above that the Consultants did not address.

V. The Level of Excess Adjustment Should Be Based upon the Recent CARIS II Database Without Any Additional Adjustments.

At the ICAP working group meeting on July 19, the NYISO asked market participants which CARIS database should be used to determine the Level of Excess ("LOE") adjustment. The initial LOE estimates were performed based on the CARIS I database because CARIS II had not been completed yet. The estimates for the final report were performed using the approved CARIS II database. Some market participants at the meeting proposed that the CARIS II database be further revised by assuming that the upstate nuclear units are retained in the database.

The CARIS II database was developed based upon the NYISO's inclusion rules and includes the most recent information regarding unit status. Even if the CARIS II were developed today it would not include the FitzPatrick and Ginna nuclear units because they do not meet the

inclusion rules. Proposals to add those units back to the database are nothing more than a proposal to violate the NYISO rules because the parties do not like the result of applying those rules.

The NYISO should not cave into pressure to deviate from the result of its inclusion rules. As the NYISO is well aware, the LOE adjustment is quite controversial when combined with a Net Energy and Ancillary Service estimate process based upon rolling actual rules. Making the ad hoc adjustment to the LOE estimate process that some MPs have proposed only makes the Level of Excess adjustment more controversial and looks like the NYISO is trying to influence the results rather than holding to its defined rules.

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Position Paper – August 19, 2016
NYISO Demand Curve Reset Peaking Unit

Introduction

The New York Independent System Operator (NYISO) is currently preparing the Demand Curve Reset (DCR) study. As part of the study, electric generation peaking unit designs are being evaluated to serve potential peak power requirements. The peaking unit design study includes consideration of emission controls required to successfully obtain an air permit for a peaking unit in New York State. The Independent Power Producers of New York (IPPNY) requested that Ecology and Environment, Inc. (E & E) evaluate relevant aspects of the *Study to Establish New York Electricity Market ICAP Demand Curve Parameters (Values for the 2017/18 ICAP Demand Curves)* prepared by the Analysis Group ("Analysis Group Study") and provide an independent opinion on the control technology selection and ability to successfully permit peaking units in New York State.

E & E provides innovative, multidisciplinary solutions to complex environmental issues. Employing experts in 85 engineering and scientific disciplines, E & E has offices in 42 cities across the United States and in 17 locations around the globe. Beginning with the Trans-Alaska Pipeline project in the early 1970s, E & E has a long history of supporting complex energy projects representing the full array of emerging and evolving technologies. E & E has collectively worked on more than 200 energy projects in 34 states. Our resources, qualifications, and experience provide effective strategic consulting services to the energy industry. E & E's power generation permitting experience includes siting, permitting, and development of Natural Gas Combined-Cycle (NGCC), Simple Cycle Peakers ("peakers"), and syngas power (IGCC). We assist with every stage of planning and implementation, from the early stages of site selection through construction support, facility startup and operation, and post-construction monitoring and compliance. Two of E & E's permitting and air quality specialists, Ms. Janine Whitken and Mr. Bruce Wattle, performed the review of control technology selection and review of peaking units successfully permitted in New York State.

Ms. Whitken has 32 years' experience in shaping and implementing environmental standards and practices for government and industry. She has provided strategic planning and management of complex projects involving a wide range of technical and regulatory issues, successfully obtaining environmental approvals for numerous energy projects throughout the United States, and has developed pioneering solutions for impact mitigation and avoidance, emission offsets, and regulatory challenges. She also has provided expert witness testimony before the New York State Public Service Commission on environmental permitting and the power plant certification process. Ms. Whitken obtained her Bachelor of Engineering degree from Stevens Institute of Technology in Civil/Environmental Engineering.

Mr. Wattle has 36 years' experience in mobile, stationary, and fugitive source air emission projects; air quality regulatory compliance evaluations; preparation of air permit applications; and meteorological and dispersion modeling studies. He has written over 75 climate, air quality, and cumulative climate/air quality sections for environmental impact studies, prepared air permit applications and air dispersion modeling studies for energy projects throughout the United States. Mr. Wattle received his Bachelor of Science in Atmospheric Science from the University of Michigan.

Summary

The peaking unit proposed in the Analysis Group Study includes gas turbines with selective catalytic reduction (SCR) to reduce oxides of nitrogen (NO_X). It is the opinion of E & E's permit and air quality specialists that this peaking unit configuration is consistent with (1) meeting regulatory requirements designed to reduce emissions of NOx and reduce the formation of ozone in the Northeast, (2) a facility design more likely to successfully meet ambient air quality modeling demonstration requirements, and (3) similar units permitted recently in the Northeast. In addition, the New York State Article 10 process requires a project to minimize adverse environmental impacts and implement a rigorous public involvement process that may result in a Certificate with conditions at least equal to and potentially more stringent than federal or state regulatory requirements.

This opinion reflects the challenge of meeting ambient air quality standards, including the lowering of the ozone National Ambient Air Quality Standard (NAAQS) in 2015 and a new 1-hour nitrogen dioxide (NO_2) NAAQS in 2010. Other factors beyond the scope of this review may also affect the ability to obtain an air permit in New York State, such as site-specific conditions, community input, and other environmental impacts.

This document provides background information on the air quality regulations and conditions driving the need for NO_X emission controls and discusses recent permits issued in New York, New Jersey, and Connecticut for simple-cycle power generation facilities. The choice of the peaking unit emission controls is related to existing air quality conditions, control technology requirements dictated by air permitting regulations, and recent permits issued for similar facilities in New York and in the New York, New Jersey, Connecticut (NY-NJ-CT) Air Quality Control Region (AQCR).

I. Background air quality and air permitting requirements drive the need for post-combustion controls such as selective catalytic reduction (SCR).

A. Concentrations of ozone in New York City exceed federal and state air quality standards for ozone, and all of New York State is within the ozone transport region (OTR); thus, its precursor pollutants—nitrogen oxides and volatile organic compounds—are a key consideration for obtaining a permit for an emission source.

Ozone forms from the reaction of NO_2 (a component of NO_X) and volatile organic compounds (VOCs) in the presence of sunlight. In this context, NO_2 and VOCs are referred to as ozone precursor compounds. Combustion sources such as power plants emit NO_2 and VOCs from burning fuel.

Ozone has been regulated for several decades. The timeline for the ozone NAAQS is as follows:

- Established in 1979 as a 1-hour standard at 0.12 parts per million (ppm);
- Revised in 1997, changing from a 1-hour to 8-hour standard at 0.08 ppm;

- Revised in 2008, lowering to 0.075 ppm; and
- Revised in 2015, lowering to 0.070 ppm.

Ozone levels measured in the New York City metropolitan area exceed the 2008 NAAQS for ozone. Although measured ozone concentrations elsewhere in New York State are below the NAAQS, all of New York State is within an ozone transport region (OTR). Certain counties in New York State have not met previous ozone NAAQS, do not meet the current 2008 NAAQS, and may not meet the 2015 NAAQS. Areas that do not meet the ozone NAAQS are designated as "nonattainment."

The revisions to the ozone NAAQS since 1979 have made the standard more stringent, driving the need for greater control of ozone precursor compounds. In the New York City metropolitan area, ambient ozone concentrations exceeded the ozone standard dating back to the 1979 NAAQS. The area continued in nonattainment for the revised ozone standards in 1997 and 2008. Ambient ozone concentrations also exceeded the 1979 NAAQS in Essex County, Jefferson County, and the counties in the Buffalo-Niagara Falls area and Albany-Schenectady-Troy area. The 1997 revision brought additional upstate counties into nonattainment, including several counties in the Rochester area and Chautauqua County (Jamestown). The 2008 NAAQS lowered the concentration value of the standard, and all upstate New York counties except Chautauqua were shown as attaining the standard.

In 2017, the USEPA will officially issue attainment/nonattainment designations for the 2015 NAAQS based on 2014–2016 monitoring data. Preliminary monitoring data collected by the New York State Department of Environmental Conservation (NYSDEC) in 2012–2014 indicate that the following counties in New York State may be nonattainment (USEPA 2016a):

- In the New York City metropolitan area – Rockland, Westchester, Bronx, Queens, Richmond, and Suffolk; and
- Erie and Chautauqua.

Layered on top of the county-by-county assessment of compliance with the ozone NAAQS is regional control of ozone. In the Northeast, ozone is considered a regional issue; therefore, regulatory programs designed to control ozone are coordinated with multiple states within the region. To acknowledge the transport of ozone precursors and ozone in the Northeast and to accomplish regional control of ozone precursor compounds, the Ozone Transport Commission (OTC) coordinates the activity of member states. The OTC and OTR were established as part of the Clean Air Act of 1990. The OTR defines the area within which enhanced control of ozone precursors from emission sources is needed. The OTR is a multi-state area in the northeastern United States; all of New York State is in the OTR.

B. Emission sources in the OTR must meet the same stringent emission limits for areas designated nonattainment for ozone in order to obtain an air permit.

The U.S. Environmental Protection Agency's (USEPA's) New Source Review (NSR) regulations pursuant to the Clean Air Act require a company planning to build a new plant that will result in air pollutant emissions that meet or exceed the major source threshold amount to obtain an NSR permit. The NSR permit is a construction permit that requires the company to minimize air pollution emissions to meet emission levels of facilities of similar type and size. This is usually accomplished by installing air pollution control equipment.

In nonattainment areas, the NSR rules require installation of the most stringent level of control or Lowest Achievable Emission Rate (LAER). Emission sources in the OTR are required to essentially meet the same limits (LAER) as if the area were designated nonattainment.

Table 1 shows the major emission source size definition for air permitting purposes with respect to location in ozone attainment/nonattainment areas and the OTR. The annual emissions from an emission source reflect its "potential to emit" defined as:

> "The maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of fuel combusted, stored or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable". (40 CFR Sections 52.21(b) (4))

Therefore, whether a source is above or below the ozone related major source thresholds reflects use of emission controls, hours of operation, and fuel use. A source may use any combination of these to stay below the major source threshold, if desired. After design limits for emissions, a source may decrease annual emissions by limiting hours of operation and avoid the associated emission control requirements.

Table 1 New York State Locations and Ozone-Related Major Source Thresholds

Location	Load Zone	Ozone Status	NO_X Major Source (tons per year)	VOC Major Source (tons per year)
New York City Metropolitan Area and portions of Orange County	Part of G, all of H, I, J, K	Moderate Nonattainment[1]	25	25
Rest of State	A through F and part of G	Ozone Transport Region	100	50

[1] Nonattainment designations for the 2008 NAAQS include Extreme, Severe, Serious, Moderate, and Marginal, depending on the ambient ozone concentrations. Although the New York City Metropolitan Area and portions of Orange County are designated moderate ozone nonattainment for the 2008 NAAQS (https://www3.epa.gov/airquality/greenbook/hnca.html#Ozone_8-hr.2008.New_York), NYSDEC continues to regulate the New York City Metropolitan area with major source thresholds comparable to a severe ozone nonattainment area to prevent "backsliding," previous gains in attaining the previous 1-hour ozone NAAQS.

To reflect a recently permitted Siemens SGT6 5000F unit in New York State, we reviewed the CPV Valley Energy Center Draft Environmental Impact Statement and Air Permit Application (CPV Valley Energy 2009). Table 2 illustrates the relationship between potential to emit, hours of operation, and use of SCR on a Siemens SGT6 5000F. As shown in Table 2, the SGT6 5000F unit could operate a full year when firing natural gas and operating at the SCR controlled NO_x emission rate. Based on an estimated NO_X control level from SCR of 80% to estimate uncontrolled NO_X emission rates, we estimated the hours of operation on natural gas and oil without SCR. As shown in Table 2, the proposed unit could operate 2,633 hours when firing exclusively natural gas and 872 hours when firing exclusively ultra-low sulfur distillate fuel and stay below the major source threshold and the requirement for SCR.

Table 2 Estimated Annual NO_X Potential to Emit (PTE) With and Without SCR Compared to Major Source Thresholds[1]

Fuel	Emission Control	Operating Hours	NO_X PTE (tons per year)	Exceeds NO_X Major Source Threshold
Natural Gas	With SCR	8,760	66	No
	Without SCR	2,633	99	No
Distillate Oil	With SCR	4,358	99	No
	Without SCR	872	99	No

[1] Based on the recently permitted CPV Valley Energy Project Draft Environmental Impact Statement, Appendix 9-B, and assuming 80% reduction in NO_X emissions with SCR.

The operating hours on natural gas without SCR we calculated is similar to the Analysis Group Study estimate of "approximately 2,500 hours" (AG 2016). We also concur with the Analysis Group Study conclusion that the SGT6 5000F unit with SCR could operate for a full year when firing natural gas and remain below the major source threshold.

C. In addition, SCR may be necessary to demonstrate compliance with the 1-hour NO_2 NAAQS adopted in 2010.

Ambient air quality modeling required as part of the air permitting process also drives emission control requirements. The air quality modeling must show compliance with all NAAQS. Typically for power generation facilities, the 1-hour NO_2 NAAQS can be problematic.

Demonstrating compliance of conventional peaking units without SCR through modeling is difficult because of the statistical form and concentration value of the 1-hour NO_2 NAAQS. Modeling of NO_X emissions from relatively simple, minor emission sources often show noncompliance with the standard. Locating emission sources close to property boundaries or fence lines and short exhaust stack heights can also contribute to a modeled NO_2 NAAQS noncompliance. Using SCR to reduce the NO_X emission rate may be necessary to model compliance with the 1-hour NO_2 NAAQS.

II. Permits issued for projects in New York similar to the Analysis Group Study peaking unit in both a dual-fuel and natural gas only configuration incorporate SCR.

A. The USEPA and New York State Department of Environmental Conservation (NYSDEC) databases on permits issued for emission sources identify the types of controls and key data pertinent to design and operation.

The USEPA maintains a database of specific information provided by state and local permitting agencies on the Reasonably Available Control Technology (RACT), Best Available Control Technology (BACT), and Lowest Achievable Emission Rate technologies required to reduce the emission of air pollutants from stationary sources, including power plants. The USEPA established the RACT /BACT /LAER Clearinghouse (RBLC) to provide a central database of air pollution technology information to promote the sharing of information among permitting agencies and to aid in future case-by-case determinations (USEPA 2016b). LAER is required on major new or modified sources in nonattainment areas. As discussed above, the OTR, of which New York State is a part, is treated as an ozone nonattainment area.

Data in the RBLC includes sources subject to RACT, BACT, and LAER requirements. The RBLC permit database contains over 5,000 determinations of permitted technologies to mitigate most air pollutant emission streams (USEPA 2016).

The NYSDEC database of facilities that emit contaminants to the air in New York State includes facilities required to obtain a Title V permit, a state facility permit, or a registration certificate. The NYSDEC website posting of permits is intended to enable interested parties to view and print the language of draft and issued Title V facility permits (NYSDEC 2016).

Table 3 summarizes key information on turbines used for peak generation in the NY-NJ-CT AQCR. The results of the search were limited to facilities permitted after 1990 to reflect historical and current trends in emission control technology. Although these databases do not include every permitted power generating facility, they provide a reliable insight into the regulatory process for determining required emission controls and the most likely emission control requirements.

Table 3 Selected Turbines Identified from the USEPA RBLC and NY-NJ-CT AQCR Permit Databases that Have Been Permitted Since 1990[1]

Facility Name and Location	State	Zone	Turbines	SCR for NO_x Control
Allegany Alliance NYGT, LLC Allegany County	NY	B	GE LM6000 plus HRSG	YES
Ravenswood Generating Station Queens	NY	J	GE 7FA (peaking)	YES
Edgewood Energy LLC Suffolk County	NY	K	GE LM6000	YES

Table 3 Selected Turbines Identified from the USEPA RBLC and NY-NJ-CT AQCR Permit Databases that Have Been Permitted Since 1990[1]

Facility Name and Location	State	Zone	Turbines	SCR for NO_X Control
Equus Freeport Power Nassau County	NY	K	GE LM6000	YES
Glenwood Landing Nassau County	NY	K	GE LM6000	YES
Harlem River Yards Plant Bronx	NY	J	GE LM6000	YES
Hell Gate Bronx	NY	J	GE LM6000	YES
Vernon Boulevard Plant Queens	NY	J	GE LM6000	YES
Pouch Terminal Staten Island	NY	J	GE LM6000	YES
N 1st Street Plant Brooklyn	NY	J	GE LM6000	YES
NYPA Joseph J Seymour Brooklyn	NY	J	GE LM6000	YES
Consolidated Edison Development (Ocean Peaking Power)[2] Lakewood	NJ	NA	GE 7FA	NO
Bayonne Energy Center Hudson	NJ	NA	Rolls Royce Trent 60WLE	YES
PSEG Fossil LLC Kearny Station Hudson	NJ	NA	GE LM6000	YES
Howard Down Station Cumberland	NJ	NA	Rolls Royce Trent 60WLE	YES
PPL Wallingford Energy New Haven	CT	NA	GE LM6000	YES
PSEG Power Connecticut, LLC[3] (New Haven Harbor) New Haven	CT	NA	GE LM6000	YES

[1] Although these databases do not include every permitted power generating facility, they provide a reliable insight into the regulatory process for determining required emission controls and the most likely emission control requirements.
[2] Title V Permit Modification Facility PI No 78896 Activity No BOP010001 and permit issued October 2002.
[3] The PSEG Power Connecticut New Haven Peaking project was not listed in the USEPA RBLC but is included here for completeness.

B. In New York State, permits issued include SCR for NO_X control.

As shown in Table 3, all peaking units identified in the database searches and permitted in New York since 1990 include SCR for NO_X control. This includes frame and aero-derivative turbines. Although LAER is by definition an emission rate, it is achieved in practice by selected

control technologies. As the achievable emission rate decreases due to advances in design and operation of technology, only SCR can achieve the LAER of 2 to 3 ppm for simple and combined-cycle gas turbines, which is reflected in recent permits.

C. Results of the search for the NY-NJ-CT AQCR of the Ozone Transport Region identified SCR as the predominant method of NO_X control on peaking units.

As shown in Table 3 for New Jersey and Connecticut, peaking units, except one in New Jersey, include SCR for NO_X control. This includes frame and aero-derivative turbines.

The Consolidated Edison Development project in Lakewood, New Jersey, also known as Ocean Peaking, is the exception and includes dry-low NO_X control and a limit on operation of 1,050 hours per year. The New Jersey Department of Environmental Protection issued the permit with a LAER emission limit of 9 ppm, although USEPA disagreed with this determination. USEPA disagreed that the frequent start and shutdown events and the hot exhaust gas temperature made the application of SCR infeasible (USEPA 2001). The peaking facilities identified in Table 3 permitted after Consolidated Edison Development/Ocean Peaking include SCR for NO_X control.

III. USEPA Greenhouse gas limits affect the choice of fuel and use of distillate oil.

The USEPA finalized the "Standards of Performance for Greenhouse Gas Emissions from New, Modified and Reconstructed Stationary Sources: Electric Utility Generating Units" on October 23, 2015. The standard for non-base-load natural gas-fired combustion turbines is a heat-input-based standard set at an average of 120 pounds (lb) of carbon dioxide (CO_2) per million British thermal units (MMBtu) combined with the use of clean fuels as the best system of emission reduction (BSER). Clean fuels are defined as natural gas with a small allowance for distillate oil. The USEPA states this standard will apply to the "vast majority" of simple-cycle combustion turbines, or peaking units.

In determining this standard, the USEPA stated that this standard is readily achievable using "business-as-usual" fuels. The USEPA based this conclusion on (a) a natural gas emission rate of 117 lb CO_2/MMBtu, (b) use of distillate oil (the most common backup fuel) at an emission rate of 163 lb CO_2/MMBtu, and (c) the fact that a non-base-load turbine burning 9 percent distillate oil and 91 percent natural gas has an emission rate of 121 lb CO_2/MMBtu, which the USEPA stated, "rounds to 120 lb/MMBtu using two significant digits." The "small allowance for distillate oil" equates to 9 percent (Federal Register 2015).

Thus, the standard of performance for greenhouse gas emissions defines the type of fuel mix that is expected to result in compliance with GHG standards in a simple-cycle combustion turbine.

IV. The New York State Article 10 process requires a project to minimize adverse environmental impacts and implement rigorous public involvement that may result in a Certificate with conditions at least equal to and potentially more stringent than federal or state regulatory requirements.

Any new electric generating facility that will generate 25 MW or more is subject to Article 10 and must obtain a Certificate of Environmental Compatibility and Public Need. The Article 10 Certificate is issued by the New York State Board on Electric Generation Siting and the Environment (the "Siting Board"). The Siting Board is comprised of the heads of five state agencies (Department of Public Service, Department of Environmental Conservation, Department of Health, Energy Research and Development Agency, and Empire State Development) and two citizens from the locale of a proposed project appointed to the Siting Board by the Governor. In addition to verifying compliance with laws and regulations, the Siting Board, in order to issue an Article 10 Certificate, must find, among other requirements, that the project:

> Minimizes adverse environmental impacts, considering the state of available technology, the nature and economics of reasonable alternatives as are required to be considered, the interests of the State with respect to aesthetics, preservation of historic sites, forests and parks, fish and wildlife and other pertinent considerations.

The Siting Board is also responsible for overseeing the public decision making process that consists of a required public participation program, the opportunity for public statements and comment, and a trial-type hearing process in which qualifying municipalities and citizens can participate using funds provided by an Applicant. The Article 10 process allows for significant public involvement, as well as consideration of factors other than minimum regulatory requirements.

In addition, the Article 10 process relies on input from NYSDEC with respect to required federal or state air permits. The NYSDEC reviews a proposed generating facility design with regard to applicable emission regulations, emission limits, control technology requirements, and ambient air quality standards. Thus, a proposed unit that does not include control technology required by the air permitting process, such as SCR, would not meet the Article 10 requirement to comply with laws and regulations and the requirement to minimize adverse environmental impacts. Similarly, the combination of site-specific factors, public involvement, and a desire to minimize adverse impacts may result in a Certificate with conditions more stringent than federal or state regulatory requirements and may include control technology beyond minimum regulatory requirements.

V. Conclusion

Based on the information examined for this analysis, it is the opinion of E & E's air quality specialists that control of NO_X emissions with SCR is required in New York State in order to (1) address ozone NAAQS nonattainment in the New York City Metropolitan Area and the requirement for NO_X control in New York State as part of the OTR and (2) comply with federal and state requirements under the Clean Air Act. This level of NO_X control also contributes to the

successful modeling demonstration of compliance with the 1-hour NO_2 NAAQS. In our opinion, the peaking unit design described in the Analysis Group Study that includes use of SCR for NO_X control addresses both of these requirements and complies with the letter and spirit of Article 10. This design is also consistent with recently permitted units in New York, New Jersey, and Connecticut.

Although an operating hour limit of approximately 2,500 hours would cap emissions from the peaking unit design described in the Analysis Group Study below the major source threshold, other factors in the air permit process drive the need to include an SCR for successful air permitting. The Analysis Group Study acknowledges that a project without SCR may receive significant local and environmental opposition, and heightens risk and costs of the future need to install SCR to meet future NOx control requirements (AG 2016). Based on our experience, the local and environmental opposition can be significant for a unit that does not propose installation of controls considered meeting BACT or LAER control requirements, particularly given the mandatory public involvement in the Article 10 process. Modeling compliance with the 1-hour nitrogen dioxide NAAQS may also require additional stack height, property acquisition and other considerations in order to model NAAQS compliance. Therefore we concur with the conclusions in the Analysis Group Study that SCR should be incorporated into the initial design.

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