January 17, 2025

U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20004

Re: Review of New Source Performance Standards for Stationary Combustion Turbines and Stationary Gas Turbines (Docket #: EPA-HQ-OAR-2024-0419)[1]

The undersigned health organizations offer the following comments on EPA's proposal on Standards of Performance for new, modified, and reconstructed stationary combustion turbines used in industrial and power generation sources, to limit emissions of pollutants including nitrogen oxides (NOx) and ammonia (NH_3), and determination of available and feasible advanced technologies to achieve those emission limits.

We urge EPA to strengthen and then finalize the proposed rule by the court-ordered deadline of November 2025. Stronger standards are many years overdue, and finalizing them is a health imperative. The following comments outline the health impacts of the pollutants that must be reduced under this rule, urge EPA to strengthen the emissions limit for NOx and limit emissions from NH_3, urge the agency to ensure emissions control systems are run optimally and emissions are monitored continuously, and raise concerns with current potential loopholes in the proposal.

Contents

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[1] Federal Register :: Review of New Source Performance Standards for Stationary Combustion Turbines and Stationary Gas Turbines

A. Health Impacts

Nitrogen oxides are a group of harmful pollutants that irritate lungs and increase susceptibility to respiratory illnesses, such as asthma, and respiratory infection. They are also precursors to ozone, which is a pollutant linked to multiple health problems including reduced lung function, onset of asthma and asthma attacks, and chronic obstructive pulmonary disease. Beyond the lungs, ozone is also linked to metabolic disorders, brain inflammation, and reproductive and developmental harm for babies, including reduced fertility and preterm births. Ozone further causes premature death. NOx also forms nitrates, which are a form of fine particulate matter that aggravates the cardiovascular system and increases risk of heart attacks and stroke. Ammonia pollution is toxic and ammonium sulfates that may form from ammonia slip can cause respiratory and eye irritation.[2]

B. Emission Control Technologies

To limit NOx emissions, EPA proposes a best system of emission reduction (BSER) that includes both combustion controls (lean premix/dry low NO_X systems, wet combustion controls such as water or steam injection) and post-combustion control technology (selective catalytic reduction, or SCR.)

We strongly support the determination of SCR as the primary post-combustion technology for all categories of combustion turbines in all covered facilities irrespective of the turbine size, load, capacity factor, operating levels, duration of operation, and the turbine operating system, i.e. simple cycle, regenerative/recuperative cycle, combined cycle, combined heat and power (CHP) systems, etc. We ask that EPA ensure not only the installation of SCR systems but also their optimal operation at all times of gas turbine operation, including startup and shutdown. EPA must also require covered facilities to develop contingency planning to reduce NOx emissions in the event of a malfunction of normal turbine operation.

We ask EPA that dry Ultra Low-NOx Burners (UNLBs)[3] be identified as the combustion controls of BSER within the gas turbine system, including in fuel combustors and steam generating units (duct burners or supplementary-fired boilers used to increase the steam production in high efficiency heat recovery steam generators (HRSG) that capture the heat of the turbine flue gases to run steam turbines for additional power production or for industrial process heat needs). Most of the current natural gas-fired power generation comes from combined-cycle gas turbines,[4] which use a primary gas turbine and also a steam turbine for additional power generation. ULNB technologies complement SCR and could also improve the efficiency and durability of the SCR system and prolong the life of the catalyst by significantly lowering NOx emissions entering the system through UNLB properties of optimized fuel and air mixing, staged combustion, flame temperature control, etc.[5] Like SCR, UNLBs should not only be installed but operated optimally for efficient NOx reduction.

[2] Comment submitted by American Lung Association *et al*. (Feb 9, 2023). Request for Information: Integrated Science Assessment for Oxides of Nitrogen-Health Criteria. Tracking #: ldu-r99a-b9cp

[3] Achieving Ultra-Low NOx Emissions without EFGR in Burner Retrofit Applications

[4] Narrative 2023 - U.S. Energy Information Administration (EIA)

[5] California Air Resources Board, California Environmental Protection Agency April 2010. FINAL REPORT - Integrated CHP Using Ultra-Low-NOx Supplemental Firing. Prepared by Gas Technology Institute, IL; Pratchard, E. *et al*. Advancement in Ultra-Low-NOx-Burner Technology – Next Generation Burner for Hydrogen Firing

C. Pollutant Emission Limits

NOx

The proposed rule notes: "For those subcategories of stationary combustion turbines for which the EPA is proposing SCR as a component of the BSER and which are firing natural gas, the EPA is proposing an emissions standard of 3 ppm. However, the EPA is soliciting comment on a range of possible emissions rates, from 2 to 5 ppm, recognizing the potential for some variation in SCR performance among units and operating conditions."

We strongly ask that EPA set the NOx emission limit to 2 ppm as this limit has long been technologically feasible and demonstrably achievable. Eight years ago, the best-in-class NOx emission limit achieved by SCR was demonstrated to be 2.0 - 2.5 ppm at gas turbine-operating CHP plants at Cornell University, Massachusetts Institute of Technology, and the University of California San Diego.[6] In 2020, the South Coast Air Quality Management District (SCAQMD) determined that a combination of SCR technology and dry Ultra-Low NOx Burners can achieve NOx emissions as low as 2 ppm with proper engineering and design.[7] Commercially available SCR systems for gas turbines such as Nationwide Boiler's CataStak-GT have demonstrated reliable performance in achieving NOx levels as low as 2.5 ppm in different applications.[8] The long-delayed NSPS NOx emission limits should align with levels achievable with demonstrated current advanced technologies that are feasible and readily available.

NH_3

The proposed rule notes: "The EPA is not proposing to establish a BSER or standards of performance for ammonia emissions from stationary combustion turbines. However, the EPA is soliciting comment on opportunities to reduce ammonia emissions—either through operational changes or though incorporation of downstream ammonia control technology. The EPA requests comment on the commercial availability, cost, and performance of technologies that reduce the amount of ammonia emitted in association with SCR operation. The EPA requests comment on whether there are practices associated with SCR operation to limit ammonia emissions based on these technologies or other approaches."

Ammonia is a pollutant that harms health on its own, in addition to being a precursor to particulate matter. Because it is the reducing agent that converts harmful NOx to inert N_2 and thus integral to the SCR technology, we ask EPA to set an ammonia emission limit at 2 ppm (shown to be achievable more than a decade ago by the Institute of Clean Air Companies[9]) as well as determine the BSER to prevent the loss of unreacted ammonia (i.e. ammonia slip).

This level of ammonia slip reduction can be achieved through a combination of advanced process control strategies and catalyst technologies.[10] Some proven and feasible strategies to reduce ammonia slip include:

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[6] Bill Powers. (Jan 10, 2017). A Nitrogen Oxide Limit of 2.5 ppm or Less Is the Best-In-Class Control Level for the Proposed Duke University 21.7 MW CHP Plant, Not 25 ppm as Proposed by Duke Energy. Powers Engineering, San Diego, California.

[7] South Coast Air Quality Management District (SCAQMD). (Feb 18, 2020). Working Group Meeting #10: Rule 1109.1 – NOx Emission Reduction for Refinery Equipment.

[8] Nationwide Boiler Inc. CataStak™ SCR Systems for Gas Turbines

[9] Institute Of Clean Air Companies (ICAC), Emissions Measurement Division. (Jun 2011). Whitepaper: Ammonia Measurement For Combustion Sources

[10] ICAC. (Jun 2011). Whitepaper: Ammonia Measurement For Combustion Sources

- Optimizing ammonia injection, i.e. ensuring uniform distribution of ammonia across the SCR by improving the design of the ammonia injection grid (AIG) and using computational fluid dynamics (CFD) to analyze and optimize the flow precision[11]
- Deploying real-time monitoring technologies like Tunable Diode Laser (TDL) Spectroscopy,[12] Differential Chemiluminescence,[13] or Field Effect Gas Sensors[14] to monitor ammonia levels in flue gases and provide feedback for dynamic adjustment of ammonia injection
- Process optimization of the SCR system[15] achieved through regular maintenance (including the use of sootblowers/acoustic horns to prevent particulate deposition on SCR[16]) to maintain high catalyst efficiency
- Fine-tuning the SCR system by adjusting the temperature, flow rates, and ammonia-to-NOx ratio to enhance reduction reaction efficiency and minimize unreacted ammonia.[17]
- Implementing these strategies in combination with installation of high-performance Advanced Catalysts for SCR that have a higher affinity for ammonia and can improve the NOx reduction reaction efficiency
- Ammonia Slip Catalysts (ASC)[18] which can be installed downstream of the main SCR catalyst to convert any remaining ammonia into nitrogen and water can ensure effective ammonia utilization and help minimize ammonia slip down to 1-2 ppm.

We ask that emission limits for both NOx and NH_3 limits be applied to methane ("natural" gas), methane-hydrogen blended fuels (irrespective of the blending ratios), petroleum distillate oils, or any other combustible fluid fuels, and at all times of the gas turbine operations including during fuel switches.

D. Process Optimization

The best achievable NOx emissions reduction that can be obtained using SCR technology is dependent on its optimal operation through the optimization of the various independent turbine system parameters. For continued efficient operation of SCR to maximize NOx reduction while helping extend the life of the SCR system and preventing its malfunction, we ask that operators of covered facilities be required to document constant monitoring and adjustment of process parameters, e.g. gas flow to the turbine, exhaust flow rates to HRSG and SCR, temperature of exhaust-gas before passing over the SCR catalyst, minimal O_2 concentration required in flue gas, residence times required for NOx, O_2, and NH_3 to react on the catalyst, lowest operating catalyst temperature, uniform delivery of ammonia and effective ammonia injection/mixing in the flue-gas stream in an optimal ratio of around 1.0 (alpha ratio of ammonia to NOx) to ensure complete NOx reduction to nitrogen and also to prevent the loss of unreacted ammonia (ammonia slip), etc. The catalyst being the most expensive part of the SCR, we ask that monitoring, routine preventive-maintenance inspections, and periodic evaluations be required (and reported) for its reliable operation and to reduce catalyst lifecycle costs.

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[11] Improve NH_3 distribution to reduce NOx and ammonia slip – Combined Cycle Journal
[12] Jeremy Whorton 07.16.2019 Reducing NH_3 Slip in Selective Catalytic Reduction (SCR) - Identifying Threats. ThermoFisher Scientific
[13] Reducing NH_3 Slip in Selective Catalytic Reduction (SCR) - Identifying Threats
[14] L. Khajavizadeh & M. Andersson. (2023). Monitoring ammonia slip from large-scale selective catalytic reduction (SCR) systems in combined heat and power generation applications with field effect gas sensors. Sens. Sens. Syst., 12, 235–246,
[15] SCR Optimization FAQ - SVI BREMCO. ThermoFisher Scientific
[16] SCR Catalyst Cleaning:Sootblowers vs. Acoustic Horns
[17] Improve NH3 distribution to reduce NOx and ammonia slip – Combined Cycle Journal
[18] SCR and Advanced Ammonia Slip Catalyst June 11, 2015 Alec Miller Johnson Matthey

E. Emissions Monitoring

We ask that all covered facilities be required to install, calibrate, maintain, and operate continuous emission rate monitoring system (CEMS) for measuring NOx throughout the operating load cycle of the turbine and for stack emissions monitoring of NOx, O_2, VOCs, CO, NH_3 to monitor the effectiveness of the BSER technologies, to assure the compliance with emission standards, and of all environmental air permitting requirements by creating a comprehensive baseline for each facility prior to operation commencement. CEMs data must reported regularly to EPA and also be made available to the public. Real-time detection and reporting of violations is crucial for immediate corrective actions and ensuring compliance.

F. Exemptions and exclusions

We are very concerned about the following provisions that EPA proposes in this rule:

> *"The EPA is soliciting comment on creating a subcategory for temporary combustion turbines, defined as turbines in one location for less than 1 year. Consistent with a BSER of combustion controls, this subcategory would be subject to a requirement for the owners or operators of such units to maintain records of manufacturer certification that the combustion turbine meets an emissions standard based on the use of combustion controls consistent with the otherwise applicable subcategory—25 or 15 ppm NO_X. This would be similar to the NSPS for Stationary Compression Ignition Internal Combustion Engines and the NSPS for Stationary Spark Ignition Internal Combustion Engines, which provide that temporary replacement units located at a stationary source for less than 1 year."*

> *"The Agency is also proposing to add a provision allowing for a site-specific NOX standard for an owner/operator of a stationary combustion turbine that burns by-product fuels…The Agency also solicits comment on whether to amend existing subpart KKKK to provide a provision allowing for a site-specific NOX standard for an owner/operator of a stationary combustion turbine that burns by-product fuels."*

> *"Exemption of Certain Low-Emitting Facilities From Title V Permitting: The EPA is soliciting comment on whether it would be appropriate to exempt certain low-emitting stationary combustion turbines subject to subparts GG, KKKK, or new subpart KKKKa from title V permitting requirements under CAA section 502(a). According to section 502(a), the EPA may exempt certain sources subject to CAA section 111 (NSPS) standards from the requirements of title V if the EPA finds that compliance with such requirements is "impracticable, infeasible, or unnecessarily burdensome" on such sources."*

> *"The EPA included exemptions for combustion turbines used in certain military applications and firefighting applications from the standards of performance for gas turbines in 40 CFR part 60, subpart GG.[95] The EPA is soliciting comment on whether it is appropriate to include these exemptions from subpart GG in subparts KKKK and KKKKa. The exemptions include military combustion turbines for use in other than a garrison facility, military combustion turbines installed for use as military training facilities, and firefighting combustion turbines. These combustion turbines only operate during critical situations and the EPA is soliciting comment on whether requiring advanced combustion controls could impact reliability or otherwise impact the ability of the combustion turbines to serve the intended purpose."*

We strongly caution against the above proposed provisions, exemptions, and exclusions which are loopholes that could be used to skirt pollution control requirements to the detriment of public health. Applying different standards for different turbines based on location and other parameters is a piecemeal approach. A patchwork of regulations defeats the purpose of this rule to create uniform emission and technology standards. We ask that "temporary or portable combustion turbines" and applicable turbines in military/firefighting applications be subject to the same emissions limits and technology requirements of BSER identified for the universe of turbines covered by this rule irrespective of the duration or times or applications of turbine operation.

Because this proposed rule covers new major stationary sources that potentially emit several pollutants along with NOx (sulfur oxides, particulate matter, CO_2, NH_3, HAPs), we ask that stringent construction and operation permits be required, with transparent and timely reporting of operational compliance of the revised emission NOx limits and other applicable regulations.

Also, in the siting of new facilities covered by the rule, we ask that EPA enable states to consider the cumulative impacts of existing sources at the site. Cumulative health impacts of pollutants emitted from multiple diverse sources in an area can have a outsized impact on public health even if all those sources are legally compliant in meeting emission standards for individual various pollutants. We also ask EPA to review current SOx emission standards in the broader context of cumulative impacts of multiple pollutants from multiple sources. In siting (construction and operation permitting) of new covered facilities, we ask that states be required to consider impacts on fenceline, frontline, and environmental justice communities, as is currently done in New Jersey and Massachusetts.[19] Requiring a cumulative impacts assessment in the siting of new facilities falls within the EPA's recently proposed "Interim Framework for Advancing Consideration of Cumulative Impacts."[20]

The proposal also notes: "The EPA is soliciting comment on whether the proposed requirements would result in fewer new combustion turbines being constructed, modified, or reconstructed and if that would result in increased generation from existing EGUs, including coal-fired EGUs, or greater reliance on reciprocating engines to meet energy needs." According to the Energy Information Administration, the country's methane gas generating capacity is expected to increase between 20% to 87% through 2050, relative to 2022.[21] This projection suggests that on-the-books and on-the-way rulemakings such as the current proposal (which has been long overdue) may not affect the energy landscape in a way that would lead to increased power generation from existing coal-fired EGUs or greater dependence on reciprocating engines to meet energy needs, if they are also already subject to strong pollution control rules.

G. Reporting Requirements and the Public Right to Know

The importance of and the critical need for robust monitoring, transparent record-keeping and reporting in the implementation of these new standards cannot be overemphasized. A regulation is only as good as its effective compliance and enforcement. EPA must exercise strict oversight and ensure robust enforcement of the rule provisions. EPA should also require each covered entity to make its compliance/monitor data transparent and be easily accessible by the public in real time on the entity's website without requiring filing a legal public access request from the local air pollution agency. Specifically, requiring reporting of violations in real-time is crucial to allow for immediate identification and correction of non-compliance issues, thereby enhancing the overall effectiveness of the standards and ensuring public health safety from pollutant exposures.

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[19] Massachusetts Department of Environmental Protection. (3/28/2024). Massachusetts Becomes First State to Require Analysis of Cumulative Impacts for Air Quality Permits near Environmental Justice Populations; as part of their applications MA-DEP requires certain air permit applicants to conduct a cumulative impact analysis of the proposed projects which involves evaluating 33 environmental (e.g. existing pollution sources), health vulnerability, and socio-economic indicators that could be worsened by increased air emissions from the proposed project.

[20] Interim Framework for Advancing Consideration of Cumulative Impacts.

[21] Narrative 2023 - U.S. Energy Information Administration (EIA)

The undersigned health organizations urge EPA to strengthen this rule and finalize it without further delay. These stronger standards are long overdue. Section 111(b) of the Clean Air Act requires EPA to review and revise "standards of performance" to regulate pollutant emissions from new or modified major stationary sources "at least every 8 years." In a dereliction of this duty, EPA has not reviewed the nitrogen oxides (NOx) NSPS for gas combustion turbines for the past 18 years. It has taken a legal consent decree[22] for the agency to propose this rule. We ask the Agency to seriously consider all comments it receives, including the above, to expeditiously finalize a rule by the court-ordered deadline of November 2025 that reflects advances in science and technology and protects public health from NOx pollution.

Signed,

Alliance of Nurses for Healthy Environments

American Lung Association

Asthma and Allergy Foundation of America

Medical Students for a Sustainable Future

Medical Society Consortium on Climate and Health

National Association of Pediatric Nurse Practitioners

National League for Nursing

Physicians for Social Responsibility

[22] 2022 9-29 final 111(b) CT NSPS NOI