May 28, 2024

EPA-HQ-OAR-2024-0135-0002

Nonregulatory Public Docket: Reducing Greenhouse Gas Emissions from Existing Gas Turbines at Power Plants

The Institute of Clean Air Companies (ICAC) appreciates the opportunity to offer responses to EPA's framing questions related to existing stationary combustion turbine electric generating units. ICAC is a national trade association of companies that supply greenhouse gas management solutions, air pollution control and monitoring systems, and equipment and services for stationary sources.

For 60 years, ICAC member companies have helped to clean the air by developing and installing reliable, cost-effective control and monitoring systems. Our members' extensive experience in deployment of proven technologies directly informs our views relating to our customers being able to deliver clean, reliable, and cost-effective power generation. We support technology-neutral and flexible policies that enable cost-competitiveness and a diverse set of technologies to compete in the market.

Again, ICAC appreciates the opportunity to offer responses to these framing questions. We are ready to further respond and help provide technical information as EPA looks to address standards and guidelines for existing combustion turbines.

Best regards,

Clare Schulzki
Executive Director
Institute of Clean Air Companies
cschulzki@icac.com

ICAC Background and Overview

ICAC is a national trade association of companies that supply greenhouse gas management, air pollution control and monitoring systems, equipment, and services for stationary sources, including utilities. For over 60 years, ICAC member companies have developed, commercialized, and installed reliable, cost-effective control and monitoring systems. This extensive experience in deployment of proven technologies directly informs our views relating to our customers being able to deliver clean, reliable, and cost-effective power generation. ICAC understands that technology innovation addressing regulatory compliance can be an uneven and unpredictable process, with climate change demanding rapid deployment of decarbonizing technologies. ICAC believes policies should be technology-neutral, flexible, and enable cost-competitiveness.

Key Framing Question #1

We understand that a Best System of Emission Reduction (BSER) must be defined to establish a basis for emission reduction for the Existing Gas Turbine Category. However, there are no industry-wide technologies currently available today when considering "cost, energy requirements, and other statutory factors that have been adequately demonstrated for the purpose of improving the emissions performance of the covered sources." While there are technologies that are being developed, deployed, and applied to reduce emissions, including CCS and H_2 combustion, there is no one-size-fits-all solution that is applicable to all existing turbines. Site specific considerations, such as required land space and necessary infrastructure to transport and store the carbon, also impact technology selection. As a result, policy flexibility will be essential to consider the range of installations, land availability, infrastructure needs, and other factors.

Specific Comments to Proposed Technology

a) and b) **Combustion turbines integrated with battery storage or solar**

Integrating combustion turbines with batteries or solar does not cost-effectively optimize and leverage the full capabilities of the technologies. A grid operator has a lot more potential to receive benefit from operation (black start, ramping, voltage regulation, solar peak storage, spinning reserves) of a BESS than one dedicated only to serving to improve only a single aspect of the capabilities of a combustion turbine. Many of these BESS and solar applications are being considered "behind the meter". This approach essentially results in curtailment of these valuable non-emitting BESS and solar resources.

c) **Improving efficiency of simple cycle turbines by upgrading to combined cycle plants**

Conversion to combined cycle will fundamentally impact the operating capabilities of the gas turbine. Simple cycle plants are installed to satisfy short term generation requirements, often with multiple start and stop cycles in a single day. Combined cycle plants, while flexible in operation, are not well suited to be started this frequently or to run for short durations. This set-up is not a viable option.

d) **Improving the efficiency of existing turbines with retrofit options for both simple and combined cycle turbines**

Gas turbine OEMs are continually improving turbine designs and efficiency, and many of the improvements are integrated into the existing turbine fleet. While efficiency improvements, where available, are a viable means to some emission reductions, there is no universal efficiency improvement that would form the basis for BSER. Having both simple cycle and combined cycles technologies operating on the same grid provides an opportunity for the grid operator to choose the most effective utilization of the technologies factoring in emissions reductions goals and resiliency of the grid.

e) **Utility scale fuel cells integrated with combustion turbines**

Integration with fuel cells has similar challenges as integrating with BESS or solar. It would only take advantage of a single aspect of providing support for a specific generation asset, versus the benefit of being available for overall grid control and stability, which is needed in a high-renewables penetration environment.

Key Framing Question #2

Unless all resources, “new and existing”, have the same regulatory requirements on the grid, the effectiveness of any market mechanisms is limited. This would also encourage grid operators to dispatch market favorable assets, and thus be incentivized to compromise the reliability and resiliency of the overall grid. The Acid Rain program has been effective in creating a market-based system that has significantly driven down NOx and SO_2 emissions over the last 25 years. EPA does not have the same authority under CAA Section 111 for GHGs, but it could work more closely with the state agencies and encourage a broader implementation of something like the Regional Greenhouse Gas Initiative in place in the Mid-Atlantic and Northeast. Cap-and-trade programs have been largely successful in the places they have been implemented and should continue to be encouraged to encompass larger regions.

Key Framing Question #4

States need the authority to provide exemptions for locations and regions that experience extreme weather conditions. This weather impact could range from extreme cold to extreme heat to flooding. There needs to be flexibility for a grid operator to optimize for reliability in these higher-risk periods without having to declare an emergency and seek compliance relief.

Key Framing Question #5

It would be irresponsible for EPA to require CO_2 capture and sequestration or a hydrogen fuel without considering the significant impediments to permitting pipeline projects in the U.S. In most cases, these applications would require pipelines going through several states, which may not equally benefit the local populations. The industry along with the investment community would face a significant “chicken and the egg” issue if a combined cycle plant could become a stranded asset due to not getting a hydrogen pipeline, transmission interconnect line, CO_2 pipeline or Class VI sequestration permit.

Key Framing Question #6

In order for any rule to be efficient in the system, both existing and new sources need similar requirements. If certain requirements only apply to new sources, then they risk becoming entirely stranded assets if they are competing against a market that does not have those obligations.

Market participants cannot assume that clean energy tax credit incentives, such as 45Q and 45V, will be extended past their current timeframes. Historically, Congress has only provided these incentives to new assets (with exception of existing nuclear plants in the IRA of 2022). Risk of operating a 40+ year asset for only 12 years would result in wasting those investments and lead to higher emissions.

Key Framing Question #7

While combustion turbine manufacturers express confidence that they can combust 100% hydrogen in the future, no one has demonstrated this yet on a large frame turbine. The flame burns hotter with hydrogen and thus increased NOx will be expected. All of these units will have a selective catalytic reduction (SCR) system. EPA needs to develop further definitions for alternative carbon neutral fuels like hydrogen and ammonia and establish separate emission limits specific to the fuel. Blended fuels need to be included in this development.

One further comment specific to hydrogen fuel: Standard conventions report NOx on a part per million dry exhaust gas basis corrected to 15% oxygen content in the exhaust gas. When firing hydrogen fuels with the same NOx formation as natural gas, the reported NOx is as much as 40% higher for hydrogen than for natural gas. This reporting difference results from higher water content and lower oxygen in the air the exits the gas turbine. In short, the actual NOx mass emission rate may be similar to natural gas, but the reported NOx value is artificially higher when using ppmvd @ 15% O2 basis. A mass/energy input or mass/work output emission limit would remove this discrepancy. This reporting discrepancy will need to be addressed in the upcoming NSPS review.

Conclusion

ICAC is committed to regulatory actions that support environmental stewardship and protect human health. We believe that there is no one-size-fits-all solution applicable to turbines and flexibility will be essential. We also believe that unless both new and existing resources have the same regulatory requirements on the grid, effectiveness of any market mechanisms is limited. We urge EPA to consider the significant impediments to pipeline permitting and its impact on CO_2 capture and sequestration, hydrogen fuel and the risk of stranded assets. EPA should consider developing further definitions for alternative carbon neutral fuels like hydrogen, ammonia and blended fuels, and establish separate emissions limits specific to those fuels.

Finally, we are ready to further respond and help provide additional technical information as EPA looks to address standards and guidelines for combustion turbines.