GAS TURBINE ASSOCIATION

October 31, 2018

RE: Environmental Protection Agency
Docket number EPA-HQ-OAR-2017-0355
Proposed Emission Guideline for Greenhouse Gas Emissions From Existing Electric Utility Generation Units; Revision to Emission Guideline Implementing Regulations: Revisions to New Source Review Program
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The Gas Turbine Association (GTA) is a trade organization representing the major gas turbine manufacturers in the United States. GTA members produce turbines ranging from 1 to over 400 MW in size. Member companies produce gas turbines for the power industry, oil and gas operations, commercial operations such as hospitals and campuses, and industrial operations.

The GTA serves as the unified voice for the gas turbine industry. Today gas turbines produce more than a quarter of our nation's electricity. They are a cornerstone energy conversion technology, providing electricity and heat for industries and communities. Gas turbines will play an increasingly important role in the achievement of national objectives related to energy and the environment. Recent technical advances make gas turbines the logical choice for new power generation and for replacing the aging fleet of thermal facilities operating on oil or coal due to their beneficial attributes, including but not limited to:

- Flexibility - they may be used to "shadow" renewables to keep the power grid stable (i.e. load following)
- Use of low-carbon, plentiful, inexpensive natural gas to reduce criteria air pollutants and greenhouse gas (GHG) emissions
- Lower capital costs
- Easier permitting
- Quicker to construct
- Smaller footprint
- Portable (in smaller sizes) for emergency power and temporary needs

The GTA appreciates the opportunity to comment on EPA's proposed rule to regulate GHG emissions from electric utility generating units (EGUs). GTA's comments focus on EPA's request for comments pertaining to natural gas fueled gas turbines (simple, combined cycle, and cogeneration).

Comment C-3

EPA solicits comment on systems of emission reduction that might be the BSER [Best System for Emissions Reduction] for these types of EGUs.

The gas turbine industry has invested billions of dollars to improve gas turbine designs, enhance performance, and improve efficiency, largely in response to the nation's call for energy conservation and environmentally protective energy production. It is important to recognize that the thermal efficiency of the gas turbine and the way it is operated by the end user in any specific configuration will determine the performance based emission profile (mass of CO_2 per unit work generated).

While heat rate improvement (HRI) projects are available for a portion of existing gas turbines, there is no one-size-fits-all solution. Each project would be case-by-case and dependent upon the model, vintage, operating history (baseload, load following, low capacity, peaking), and maintenance history of the unit. Short of modifying an existing gas turbine with upgrades or changing out the turbine for newer efficient models and systems, the way in which a gas turbine is operated has the next largest impact on plant efficiency. The operational requirements of the system will determine the average efficiency, and the final greenhouse gas, emissions profile of the facility.

Operating at peak performance is desired, but flexible operating capability, namely the ability to continue operation at reduced load, rapidly ramp both up and down in load, and rapid and frequent start and stop cycles is increasingly critical to maintain grid stability and balance the performance of intermittent supplies (renewables and other non-traditional generation) added to the system. Future market designs are expected to require a high degree of component flexibility, which is expected to come at the expense of the annually averaged efficiency, even if the gas turbine is a state-of-the-art machine.

Comment C-5

EPA solicits information on adequately demonstrated systems of GHG emission reduction for such units – especially on the efficiency, applicability, and cost of such systems.

See response to Comment C-3. There are no single applicable HRIs for all existing gas turbines. HRI options are unique to the specific turbine model and will vary significantly which each turbine as previously noted.

Comment C-10

EPA takes comment on the estimates in this paper and is seeking any other information commenters have about the performance and cost of potential HRIs for turbines.

The referenced 2002 vintage paper is one of many that have been written on the topic of HRI improvements and discusses a small set of potential HRI options for older model gas turbines. There are many more recent papers that provide better granularity to the upgrade options listed. In addition, the costs of any HRI will vary by turbine make and model and be specific for each

facility. Estimated costs per MW (or hp) will be specific to a size range and will not likely be valid across all sizes of gas turbines. One factor that is clearly indicated in this paper is the very wide range of potential heat rate improvements and the variability of costs. The GTA asks that EPA draw no conclusions from this or any single paper.

Comment C-11

We also take comment on whether if EPA determined that HRIs in that range were available for similar costs, it would be appropriate for EPA to reconsider its determination that there are no HRIs that represent the BSER.

An exhaustive literature review would be necessary to determine if the costs in the 2002 paper are appropriate for the existing fleet of gas turbines today. As noted in earlier responses, the cost of an HRI is site and unit specific. In addition, many HRI upgrades have occurred organically over the years on the installed fleet. While there is a potential for additional HRI upgrades on a fraction of the installed fleet, the net improvement is likely to be negligible overall and potentially nullified by the operating profile of any gas turbine at any given time.