

# Dual Fuel Issues Related to Performance, Emissions and Combustion Instability in Gas Turbine Systems

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## Abstract

Lean-premixed combustion has become one of the most promising means of meeting stringent environmental requirements for the reduction of NO<sub>x</sub> emissions produced by land-based gas turbine engines, which predominantly burn natural gas for both performance and pollutant emission reasons. While allowing for efficient low pollutant operation, lean pre-mixed systems are prone to the occurrence of undesirable combustion instabilities under certain operating conditions. Land-based gas turbines must also be fuel flexible such that when the availability of natural gas is limited, of poor quality, or cost prohibitive, liquid fuels such as kerosene may be utilized. However, high performance, low emissions, and the absence of detrimental combustion instabilities must also be maintained. The major objective of the present study was to provide detailed measurements of the effect of liquid hydrocarbon fuels on the performance, pollutant emissions, and combustion instability characteristics of a model lean pre-mixed gas turbine combustor under well-controlled conditions. The results of this study are being used by both industry and university researchers who are modeling combustion instability as part of a larger effort under the South Carolina Institute for Engine Studies Advanced Gas Turbine program to develop robust design methodologies for gas turbine engines.