

46ESS-43: Alternative Fuels for Industrial Gas Turbine Engines

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In the near future 81% of the world electric power demand will be met by industrial gas turbines, due to their efficiency, compactness, reliability and relative low capital cost. Nowadays current gas turbine systems are developed to burn fuels derived from petroleum (domestic fuel oil) and natural gas (mainly Methane C₂H₄), and use conventional diffusion flame technology with relatively high levels of NO_x and partially unburned species emissions. Due to increasingly strict requirements of emission regulations and high cost of fossil fuels, seriously depleted unrenowable natural sources, research is looking for sustainable and environmental friendly solutions. Apart from dry low emission technologies based on lean premixed combustion (for low NO_x emissions), great progress has been made towards clean combustion through the development of alternative fuels which may power gas turbines into the future. As Dr Eric M. Goodger claims, an alternative fuel "either augments or replaces the design fuel with no adverse effects on engine performance, maintenance requirements or operational life". The objective of this paper is to report the current selection and characterisation (combustion and emission characteristics) of a wide range of potentially commercial fuels, like waste process gas, those of lower calorific value obtained by gasification of biomass and hydrogen enriched fuels.