

NATURAL GAS: OVERCOMING THE CHALLENGES TO GAS TURBINES  
IN ADOPTING CARBON CAPTURE UTILIZATION & STORAGE

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Abstract

In the AHEE 9th ENERGY TRANSITION SYMPOSIUM, May 2024, the author presented the paper “**DO NOT COUNT NATURAL GAS / GAS TURBINES OUT YET2030 & 2050 TARGETS ECONOMICS WILL GOVERN**”. This paper argued for the fact that due to delays in the evolution of the Green Hydrogen Technology, Natural Gas (NG) will continue to take a principal role in meeting energy needs both in industrial heating and power generation. The importance of Carbon Capture for NG combustion in these facilities to minimize / avoid the CO<sub>2</sub> emissions was underlined. Building on the directions outlined in the referenced paper, the proposed paper will focus on what can be done to overcome the challenges facing Power generation; NG Fired Gas Turbines, operating both in Simple Cycle (SC) and/or Combined Cycle (CC). What ways can be selected to yield economical solutions to overcome the diluted CO<sub>2</sub> in the products of combustion from SC/CC in the typical SC/CC power generation plants. It is necessary to concentrate CO<sub>2</sub> in these gases in order to avoid excessive costs in dealing unnecessarily with other gases (e.g. transport capital and operational costs) that accompany the CO<sub>2</sub> at the SC/CC plant. This comes up from the large Air Fuel (AF) ratio typically used in SC/CC plants.

The following means will be addressed: I) Pre-Combustion, II) Post Combustion. For I), the separation of Oxygen O<sub>2</sub> to be subsequently forwarded to the intake of the GT, from air will be discussed. The possible uses the separated Nitrogen N<sub>2</sub> will be addressed. For II), the capture and separation of CO<sub>2</sub> from the SC/CC flue gases will be discussed. The application of I) and II) for existing plants and new plants will be discussed. The possible CO<sub>2</sub> utilizations post the separation from the flue gases will be made. Completed / planned examples of applications of the I) and II) technologies will be cited. Tentative discussions of the economics of the candidate schemes will be presented.