

46ESS-54: Fuel cell driven gas turbines

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Gas turbines and fuel cells are power generation systems whose particular features make them suitable to be combined to obtain a cycle with a superior performance. Fuel cells, which convert energy available in fuel to electricity directly by chemical reactions, improve their own performance with the increasing temperatures and pressures that a gas turbine can provide, whereas fuel cell exhaust gases can be used to preheat the air entering the gas turbine combustor chamber or even to remove the combustion process. The combined cycle can reach efficiencies higher than 70% along with reduced emissions. These properties make fuel cell driven gas turbines suitable for a wide range of applications, including stationary electricity production and mobile applications. However, the integration of these devices is not exempt from technology challenges. This paper presents a review of the development and state of the art of this hybrid concept and analyses future applications and current studies which will contribute to make fuel cell driven gas turbines commercially available in the next years.

Keywords: fuel cell, gas turbine, combined power, hybrid system, solid oxide fuel cell (SOFC)