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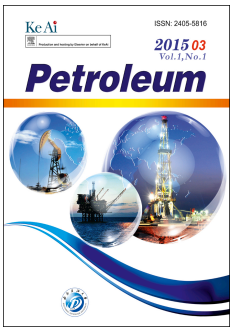

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Carbone dioxide capture and utilization in gas turbine plants via the integration of power to gas

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Abstract

Recent studies have shown that the concentration of greenhouse gases such as carbon dioxide in the atmosphere is growing rapidly over recent years and this can lead to major dangers for the planet. This growth is mainly due to the emissions from fossil power source such as diesel plants and gas turbines. The purpose of the present paper is to study the feasibility of integrating a technique based on power to gas concept in fossil power plants such as gas turbine. This work is based on the reduction of pollutant gas emissions produced from a gas turbine plant, especially the carbon dioxide. This captured gas (CO_2) can be converted once again into energy via the technique of power to gas concept. This concept starts by extracting CO_2 from exhaust gases which is carried out by multiple chemical process. On the other side, H_2 is produced from water electrolysis using the excess electricity which is produced but not consumed by the existing loads. finally the production of Methane (CH_4) can be achieved by combination of the captured CO_2 and the extracted H_2 via a reactor known as a reactor of Sabatier, this operation is called methanation or hydrogenation of carbon dioxide. Simulation results are presented for the validation of the proposed technique based on real data obtained on site from a gas turbine plant.

Keywords : Gas Turbine, Electrolyzer, Hydrogene, Carbone dioxide, Methanizer, Methane.