Learning From 80 Years Global Experiences Gas To Power: An Innovative Concept For Stranded Oil And Gas Fields

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Abstract

Objectives/Scope: This paper describes a concept to develop stranded gas field for power generation to local residential, small industrial uses or power storage. In addition, natural gas can be decarbonized and make it attractive for energy transition. With long standing 80 years global experiences of gas to power development, monetizing stranded gas still require field development strategy. Some novel approaches such as multi-well pad, advanced drilling techniques, effective stimulation, modular skid facilities selection, optimized surface production network system, liquid handling and end-power grid, energy storage utilization including CCUS/ hydrogen are explained.

Methods, Procedures, Process: Key screening criteria which can help stranded gas field development in remote location are described in the paper. Techno-matrix and SWOT business model is proposed to ensure the overall life cycle is benefiting positively to the business, environmental (sustainability) and social. The development consideration for gas to power employ five main processes which are economic (gas monetization), drilling, facilities selection, safety and environment (sustainability). The first process is to integrate the size of reservoir, and to conduct heating value assessment, which will be going through facilities and power generators. The gas flow rate and gas impurities will dictate the surface processing sizing to generate power through turbine generators (GTGs), either in simple-cycle or combined-cycle configurations. Gas-turbine then will be sized to the power output storage and grid requirements. Next, life-cycle-cost studies is performed with the alternative scenario of number of wells, production network, gas processing, turbine, liquid handling and power grid. Decarbonization will also be weighted as an attractive actions towards sustainability benefit. Finally, digitalization, operability, safety and its reliability finally considered to enhance a robust economic of gas to power development.

Results, Observations, Conclusions: Based on techno-matrix, SWOT screening and life cycle analysis, gas to power is a win-win solution to fields located in remote area and meeting net zero, where it can provide clean energy to local residents and industry. Wells, reservoir and facilities requirements can be designed for fit for purpose use, limited land footprint and as per demand and economic. New upstream technologies related to drilling, completion and modular skid facilities, special designed gas turbine can further enhance feasibility of remote gas field development. Managed Pressure Drilling (MPD), improved drilling mud and casing design, innovative well completion methods, and specially designed well frac for improved productivity, including CCUS and hydrogen production.

Novel/Additive Information: The amount of power available from a fixed quantity of feed gas depends on several factors including the type of turbine, mode of operation, and transmission system. With regard to long-distance power transmission, there are general rules in relation to the “break-even” distance. The proposed concept combining gas to power to local, decarbonization and hydrogen can be attractive.