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TECHNO-ECONOMIC FEASIBILITY STUDY OF A GAS-BASED POWER GENERATION ISLAND INTEGRATED WITH UTILITY SCALE PHOTOVOLTAIC PLANT

Power generation islands serving gas processing plants are still strictly dependent on gas-fired machine and consequently contribute to the main causes of anthropogenic greenhouse gas emissions. In this paper we will evaluate the integration of a photovoltaic (PV) power plant coupled with a battery energy storage system (BESS) with the purpose to decrease the impact in terms of CO₂ emissions of the overall power produced by the hybrid plant. The intermittent and aleatory nature of the solar source in a power generation island introduces several uncertainties which are necessary to be managed in order to ensure however the reliability and the availability required by the application served by the plant.

The study case evaluated in this paper analyses a hybrid power generation unit supplying power to a liquefied natural gas (LNG) process plant which requires both electrical and thermal power. A first step of techno-economic study is conducted to verify the sustainability, the economic viability, and the technical feasibility of the hybrid solution. Specifically, the economic and environmental assessment is performed considering some relevant Key Performance Indicators (KPI) able to quantify the costs, GHG emissions associated to the performance of the solution.

Moreover, an high level comparison between the hybrid and the traditional solution is reported with the aim to point out the advantages derived by the integration of renewable systems into a gas-based power generation island.

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