

Techno-economic modelling of a Power-to-Gas system based on SOEC electrolysis and CO₂ methanation in a RES-based electric grid

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Description

Renewable energy sources (RES) are growing rapidly as an alternative to fossil energy sources in order to disjoin the society from carbon sources. Wind and photovoltaic power generation is intermittent due to weather conditions. Therefore, remarkable centrality is given to the storage of the electric excess of production, and Power-to-Gas (P2G) systems seem to be one of the most promising technologies to achieve this purpose. In the case analysed in this research, a high temperature electrolyser based on solid oxide cells technology was considered, coupled to catalytic reactors for the hydrogenation of carbon dioxide into methane. The product is a synthetic natural gas (SNG) which could be directly injected into the natural gas distribution network.

This work investigates the coupling between a completely RES-based electric profile in a future scenario and a P2G plant to perform a comprehensive technical ...