

Power and hydrogen co-generation from biogas

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Description

The present work investigates the implementation of molten carbonate fuel cells (MCFCs) for power generation from landfill biogas, coupled to the on-site production of hydrogen for vehicle-fueling purposes. The system modeling of the plant has been performed in steady-state conditions, with the aim of assessing the overall power efficiency. Because MCFCs are highly exothermic and their working temperatures (650 °C) are compatible to steam reforming, the syngas is produced directly inside the vessel containing the fuel cell stack, with the reaction being thermally self-sustained. Moreover, the high-temperature flue gases from the MCFC are expanded in a turbine, thus increasing the total power generated. Hydrogen is produced through a pressure swing adsorption system, whose feed can be from either the MCFC anode outlet or a split of the reformat before the anode inlet. The overall net power efficiency of ...