

Techno-Economical Optimization of Autonomous Hybrid PV/Wind/Fuel cell Power System

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Abstract. The electricity demand to supply building houses is rising in all over the world, due to the growth of population, and economic advances, more than 80% of electricity used is coming from fossil fuel, which is considered as a main cause of green gas emission and climatic changes. The integration of renewable energy sources in building is imperative to avoid the energy crisis and the environment pollution. Solar and wind energy are the two viable renewable sources in the world, they have a good compensation characters between each other, but the stochastic nature of them makes the optimization and the sizing of such systems a very complex task, the present paper present a techno-economic study of PV/Wind/FC hybrid power system (HPS) to supply an off grid house located in Adrar region (Algeria). The main objective of this study is the design an optimal (HPS), through the combination between the loss of power supply probability (LPSP) method and the total annual cost (TAC) of energy. The results obtained shows that the cost of electricity produced by wind/fuel cell system is more economically viable than those produced by PV/fuel cell or PV/wind/fuel cell system.

Keywords: Hybrid systems; PV/wind/fuel cell; Optimization; Power Supply Probability.