

Fuel quality issues with biogas energy: An economic analysis for a stationary fuel cell system

Dionissios D. Papadias, Shabbir Ahmed, Romesh Kumar

ABSTRACT

This paper reviews the information available on the impurities encountered in stationary fuel cell systems, their effects on the fuel cells, and the maximum allowable concentrations of select impurities suggested by manufacturers and researchers. A generic model of a molten carbonate fuel cell-based power plant operating on digester and landfill gas has been developed; it includes a gas processing unit, followed by a fuel cell system. The model includes the key impurity removal steps to enable predictions of impurity breakthrough, component sizing, and utility needs. These data, along with process efficiency results from the model, were subsequently used to calculate the cost of electricity. Sensitivity analyses were conducted to correlate the concentrations of key impurities in the fuel gas feedstock to the cost of electricity.

Citation: Dionissios D. Papadias, Shabbir Ahmed, Romesh Kumar, "Fuel quality issues with biogas energy e An economic analysis for a stationary fuel," *Energy*, 44 (2012) 257-277