

Techno-economic and environmental assessment of renewable electricity generation systems based on biogas from food waste

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This research aims to develop an environmentally benign energy model using biogas generated from food waste. The primary steps are as follows. Firstly, a dataset of food waste available is gathered and analyzed in order to determine a specific quantity of biogas generation via the anaerobic digester. Secondly, the biogas upgrading technique such as the pressure swing adsorption process is employed to capture carbon dioxide in biogas, in doing so, the methane yield increases up to around 95%. Thirdly, the produced methane plays a role as the feed component in molten-carbonate fuel cells that consist of high-temperature fuel cells coupled with the steam methane reforming process and water-gas shift reactions. Lastly, the developed model is applied for a case study of Korea and the techno-economic and environmental assessment is implemented to make sure that it has an impact on Korean energy policy. It can contribute to the carbon-free world as carbon dioxide separated from the biogas upgrading process is stored in a tank, recycled to support the mainstream, or utilized to produce a variety of chemicals.