



# Utilization of Renewable Biogas and Landfill Gases as Chemical Production and Power Sources

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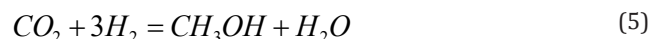
## Short Communication

Hydrogen production from renewable sources such as biogas and landfill gas is a very desirable route in today's progressive world [2,3,12,13]. Several related chemical routes which involve renewable energy sources are investigated at the present time. At the same time, the use and conversion of carbon dioxide effluent which is part of the feed mixture of these gases (i.e., biogases and landfill gas) is also a very desirable outcome which we have investigated in several of our previous communications [4-13]. We have used several kinds and configurations of reforming reactors and catalysts to convert methane and carbon dioxide (which are the two main constituents of the above renewable gas feedstocks) with or without steam in the feed [4,7,12]. The products are hydrogen and carbon monoxide based on the following main reactions:



In this communication we report on the products hydrogen and carbon monoxide and the unreacted carbon dioxide as feed components for the production of renewable methanol or for

electricity generation via fuel cells. Methanol is a valuable chemical that can be used in several applications including its direct use as an automobile fuel. Methanol among other uses it can be converted into gasoline with the use of the Mobil-zeolite process [1]. Also, it can be used directly in a methanol fuel cell for direct electricity generation. The following are the main reactions for methanol production:



Moreover, the above reaction products of hydrogen and carbon monoxide and the unreacted carbon dioxide can be utilized as feed components in high temperature molten carbonate fuel cells for electricity generation. Further, after the separation of unreacted carbon dioxide from the reformer exit the products hydrogen and carbon monoxide can be utilized as fuels in high temperature solid oxide fuel cells.

A flow sheet of the processes is shown in Figure 1. To summarize, we report on the use of renewable gas resources such as biogas and landfill gases after catalytic reforming for the production of methanol or for electricity generation via fuel cells.

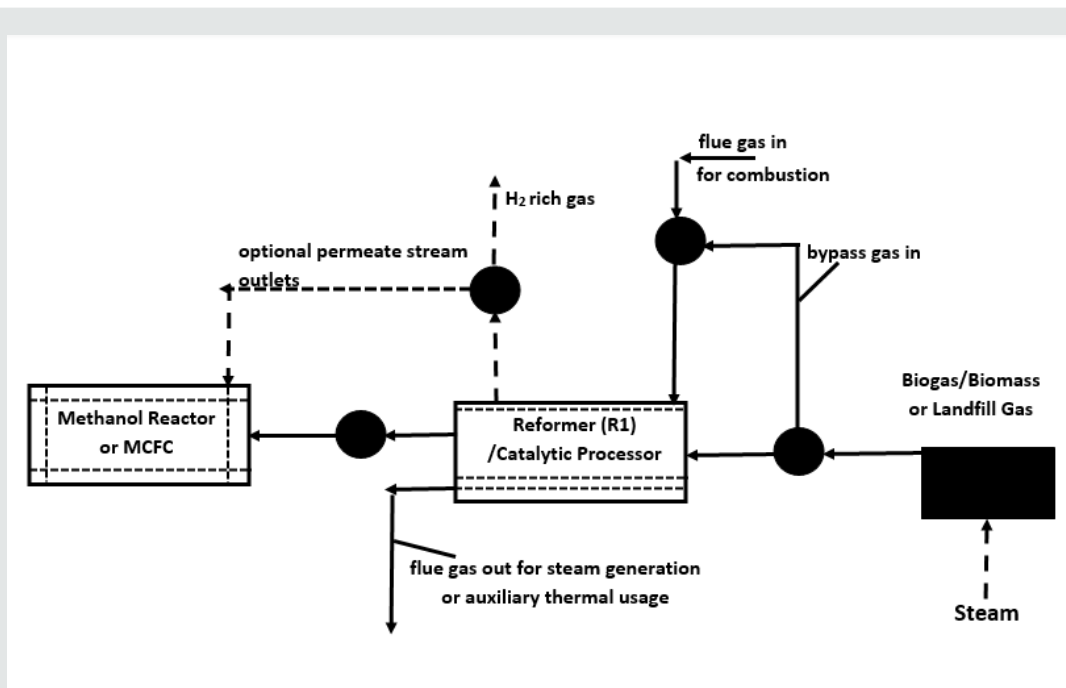


Figure 1: Flowsheet of the processes

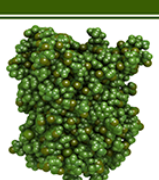
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