

Life Cycle Assessment Comparison between Methanol and Ethanol Feedstock for the Biodiesel from Soybean Oil

Authors : Pawit Tangviroon, Apichit Svang-Ariyaskul

Abstract : As the limited availability of petroleum-based fuel has been a major concern, biodiesel is one of the most attractive alternative fuels because it is renewable and it also has advantages over the conventional petroleum-base diesel. At Present, productions of biodiesel generally perform by transesterification of vegetable oils with low molecular weight alcohol, mainly methanol, using chemical catalysts. Methanol is petrochemical product that makes biodiesel producing from methanol to be not pure renewable energy source. Therefore, ethanol as a product produced by fermentation processes. It appears as a potential feed stock that makes biodiesel to be pure renewable alternative fuel. The research is conducted based on two biodiesel production processes by reacting soybean oils with methanol and ethanol. Life cycle assessment was carried out in order to evaluate the environmental impacts and to identify the process alternative. Nine mid-point impact categories are investigated. The results indicate that better performance on Abiotic Depletion Potential (ADP) and Acidification Potential (AP) are observed in biodiesel production from methanol when compared with biodiesel production from ethanol due to less energy consumption during the production processes. Except for ADP and AP, using methanol as feed stock does not show any advantages over biodiesel from ethanol. The single score method is also included in this study in order to identify the best option between two processes of biodiesel production. The global normalization and weighting factor based on eco-taxes are used and it shows that producing biodiesel form ethanol has less environmental load compare to biodiesel from methanol.

Keywords : biodiesel, ethanol, life cycle assessment, methanol, soybean oil

Conference Title : ICCCE 2014 : International Conference on Chemistry and Chemical Engineering

Conference Location : Amsterdam, Netherlands

Conference Dates : May 15-16, 2014