

Eco-efficiency analysis: Case study of palm biodiesel in Brazil

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Biodiesel, the most likely alternative to petrodiesel, is composed of methyl or ethyl esters from fatty acids, obtained by a transesterification reaction between any triglycerides and an alcohol with short chain, methanol or ethanol. It has almost the same properties of petrodiesel, but comparing with this, it can eliminate the sulfur oxides emissions and significantly reduce the CO₂ emissions.

Brazil is being considered as a future leader in biodiesel production due to its excellent climate and soil conditions and vast territorial extension, propitious to a crop of varied oil plants. With so many speculations, the Brazilian federal government created the National Biodiesel Production and Use Program (PNPB), aiming to the implementation of a sustainable production and use of biodiesel. With this focus, a federal law was promulgated in 2005 establishing the addition of 5% biodiesel to petrodiesel sold to final customer. This establishment must be implemented within a period of 5 years in which companies must start using the minimum of 2% biodiesel within the period of 3 years.

This paper presents an environmental and economic comparison between biodiesel (from palm oil and ethanol) and petrodiesel for Brazilian conditions, using the Eco-Efficiency Analysis developed by BASF.

This methodology considers the environmental indicator based in the life cycle inventory associated to potential risks to human health, according to severity of consequences and probability of occurrence.

The economical indicator is calculated from the life cycle costs of the product.

To illustrate the concept of eco-efficiency, the normalized values are plotted in a portfolio that demonstrates which alternative is more eco-efficient.

The results can subsidize the decision-making process of the Brazilian Biodiesel Program.