

A PROPOSAL FOR STANDARDIZATION OF THE BIOFUEL ENERGY BALANCE CALCULATION



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BACKGROUND

The first decades of the 21st century could be recognized as the period when a world environment awareness really redirected the global economy, affecting individual and collective actions in order to reduce the unsustainability of our current mode of living. In this *bioage* in which the costs of each product need to be analyzed in terms of its use of natural resources, and emissions released to the environment, the production of biofuels takes an important role. It is extremely important to know all the aspects related to the production of these new energy sources as there are several possible *biosources*. One of the key issues related to biofuel is the energy balance. Considering that this parameter had been calculated in different ways by many researchers, the objective of this paper is to propose a consistent methodology to establish a standard way to obtain this factor.

METHOD FOR ENERGY BALANCE CALCULATION

The most important parameter related to energy balance has already been called by other researchers as the “renewability factor”. This factor measures the ratio between the renewable energy produced and the fossil expenditure to obtain the biofuel.

$$FER = \frac{\text{HV of fuel product}}{\sum \text{FE of all inputs}}$$

FER= Fossil energy ratio (Renewability Factor)
HV=Heating Value
FE=Fossil Energy

The proposed method uses the principles of life cycle assessment methodology and includes all the productive steps that begin in nature, follows the sequence of the productive chain, includes the transportation steps and goes up to the biofuel available at the filling station. The embodied energy associated with agricultural machinery, industrial equipment and buildings should not be considered as they are not directly related to the renewability capacity of the specific biofuel. The use of natural resources or inputs can be split between the byproducts of the productive chain preferably by a mass allocation method, but only for the products that already have an established market. Environmental costs cannot be shared between co-products which do not have a market at a high enough volume able to consume them. This methodology was fully detailed, discussed and applied to calculate the energy balance of a soybean biodiesel production in Brazil in article published by the same authors (Mourad and Walter, 2011).

Key words: method, biofuel, energy balance, energy ratio, standardization

Reference:

Mourad,Anna Lúcia; Walter, Arnaldo. The energy balance of soybean biodiesel in Brazil: a case study. *Biofuels, Bioproducts & Biorefining*, v. 5, p. 185-197, 2011.