Energetic balance of biodiesel productive chain from microalgae

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Abstract

After the end of World War II, studies began for the cultivation of microalgae in large scale with the purpose of obtaining proteins and pharmaceuticals. However, from the 1970s, with the successive variations in the price of a barrel of oil has been a certain energy and economic instability that initiated the study of renewable energy sources with the aim of expanding the energetic matrix. Biodiesel is an alternative to oil-derived diesel and diversification of raw material for the production of it, biodiesel from microalgae stands out as a new and promising technology capable of supplying and completely replacing the fossil diesel (40 billion liter per year in the world) in a sustainable manner. In this study the energy balance of biodiesel production from microalgae was evaluated for comparison between the different technological alternatives. There are several advantages of cultivation of microalgae in relation to the cultivation of oilseeds; for example, the microalgae, with technology and the appropriate procedures, can present productivity in oil at least ten times higher compared to Palm oil (oil with most productivity). To achieve the balance, the comparation was done considering the production of 1 liter of biodiesel with specifications for vehicular use. With the information gathered, it was determined the critical parameters for the energy consumption of the process. Different technological options available for each step of the process, as raceway ponds and photobioreactors, in cultivation, centrifuging or flocculation, in harvest and *sun-drying*, in drying, were compared to the size of the microalgae, concentration of biomass and revenue and energy demand.