

# THEORETICAL CONSIDERATIONS REGARDING THE NEED AND IMPORTANCE OF BIODIESEL PRODUCTION IN THE EUROPEAN UNION

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## Abstract

Scientists around the world found that conventional energy sources are both polluting and depleting. In this context, scientists are looking for alternative solutions to provide the necessary energy in industry, agriculture, transportation and other economic fields. Main alternative energy sources are wind, wave, biomass, solar, hydro, etc. An important role among these is held by the energy from biomass (biogas, bioethanol, biodiesel). Because of the environmental strategies globally applied, unconventional energy sources gain a growing share of analysis and use. Among them, biodiesel is an important alternative fuel that has oil from vegetable crops as raw material. This paper outlines the evolution of biodiesel production in recent years within the European Union and advantages found in the alternative fuel both in terms of environmental protection and financial terms. The paper will analyze the strategies discussed so far in terms of promoting and using biodiesel in the European Union, and future trends. Also, the paper will emphasize the current situation regarding biodiesel production in European Union and Romania.

**Key words:** Alternative energy, Biodiesel, European Union.

The rapid growth of demand for energy, a basic component of human evolution, has been made over time by ignoring the effect it has on the environment, many environmental accidents occurring, some with irreversible effects.

Operation and use of fossil fuels is a major source of pollution as a result of extraction, processing and using them.

The main problems caused by the use of fossil fuels in addition to environmental pollution, that is economic instability and the energy dependence of many regions and nations, have stimulated extensive research on fuels made from renewable sources, especially biodiesel.

Besides the advantage of energy autonomy, alternative energy provides sustainable development. Countries or regions that implement an effective system of production and distribution of alternative energy from vegetal sources enjoy energy autonomy while removing risks regarding instability caused by energy trade.

Unlike fossil fuels, biofuels are produced from biomass, so that by their use, the carbon dioxide which results is neutral. The resulting quantity of carbon dioxide by their burning is comparable to the quantity taken up by plants by photosynthesis. Thus, the circuit of carbon cycle in nature is completed.

## MATERIAL AND METHOD

The studies have been made during 2009 and 2010, using as sources of information literature from Romania and foreign sources.

The study aimed at collecting statistical data regarding the current situation of energy from agricultural crops, particularly biodiesel. Also the reports of empowered central administration institutions were studied regarding the situation of the European Union and Romania as regards the current consumption of biofuels, and trends in this regard.

Data from literature was statistically processed and interpreted in such a way as to highlight opportunities in obtaining and use of biodiesel.

## RESULTS AND DISCUSSIONS

In the year 2009, Europe was the region with the highest biodiesel production capacity in the world, of 20.909 million tonnes annually. This amount represents a share of approximately 60% of the world production capacity. Three countries from the European Union, Germany, France and Italy, produced in 2006 a volume of biodiesel 5 times higher than the U.S.. These results are the consequence of sustained investments throughout the past years.

In 2008, biodiesel represented a 78% share of biofuels used in the EU (in addition to bioethanol) and it is the main biofuel used so far.

The raw material mainly used in producing biodiesel, both in Romania and in Europe is rapeseed. This is the crop with the highest productivity of all conventional oilseed crops.

Rape can supply about 1000 liters of oil per hectare, which is why in the European Union rapeseed oil is about 40% of the total production of biodiesel. In contrast, soybean oil is used in a mixture of 30-40% and in addition, for this crop iodine is a limiting factor. Sunflower oil may be also used to produce biodiesel and unlike the others is distinguished by a high content of oleic acid. However, sunflower oil is being used only in rare cases for biodiesel production, being mainly a constituent to many products for human consumption.

Biodiesel production in Europe has started on an industrial scale since 1992, due to the incentive policies and actions initiated by the competent institutions of the European Union. Because of these institutions, there are now a total number of over 270 production units in the European Union, which is a substantial increase from only 50 production units in operation in 2004.

Most production units are located in Germany, France, Italy, United Kingdom, Austria, Poland, Czech Republic, Spain, Portugal and Slovakia. Among these countries, Germany is the largest European producer, with a capacity of nearly a quarter of the full capacity of the entire European Union, approximately 4.9 million tons per year in 2010.

This position of European leader in terms of biodiesel production capacity was determined by several factors. On one hand, additional financial incentives were established by the Government granted to farmers who cultivated land with plants suitable for the production of biodiesel, and on the other hand, production and use of biodiesel as a final product was encouraged by some other financial instruments. At the same time, many organizations (UFOP the most important) have conducted lobbying, PR and promoting the production and use of biodiesel (*tab.1*).

At European level, both production capacity and actual quantity produced by EU member states has increased every year, according to market demand (*fig. 1*). 2007 was the first year with a lower growth than the previous year. Also 2008, had a relatively small increase or even a reduction in production for two countries, Austria and Germany. Also, it could be observed a stagnation in production levels in most EU countries.

This appeared due to the occurrence of an unfair competition from the U.S.. Since 2007, both Germany and other producers in the EU have had to compete with U.S. producers of biodiesel, the latter benefiting from substantial subsidies for the production of biodiesel, as well as a dumping strategy. Thus, the biodiesel produced in the U.S., and called B99, was exported to the European

Union and sold here with a considerable reduction in price, lower than one of raw materials for biodiesel, the soybean oil.

Table 1  
Production capacity of biodiesel, in the European Union, for the years 2010, 2009 and 2008

Thousand tonnes				
No.	Country	Year 2010	Year 2009	Year 2008
1	Germany	4.933	5.200	5.302
2	Spain	4.100	3.656	1.267
3	France	2.505	2.505	1.980
4	Italy	2.375	1.910	1.566
5	The Netherlands	1.036	1.036	571
6	Poland	710	580	450
7	Belgium	670	705	665
8	Greece	662	715	565
9	United Kingdom	609	609	726
10	Austria	560	707	485
11	Portugal	468	468	406
12	Czech Republic	427	325	203
13	Bulgaria	425	435	215
14	Finland	340	340	170
15	<b>Romania</b>	<b>307</b>	<b>307</b>	<b>111</b>
16	Denmark	250	140	140
17	Sweden	212	212	212
18	Hungary	158	186	186
19	Latvia	156	136	130
20	Slovakia	156	247	206
21	Lithuania	147	147	147
22	Estonia	135	135	135
23	Slovenia	105	100	67
24	Ireland	76	80	80
25	Cyprus	20	20	6
26	Malta	5	8	8
27	Luxembourg	0	0	0
<b>TOTAL</b>		<b>21.547</b>	<b>20.909</b>	<b>15.999</b>

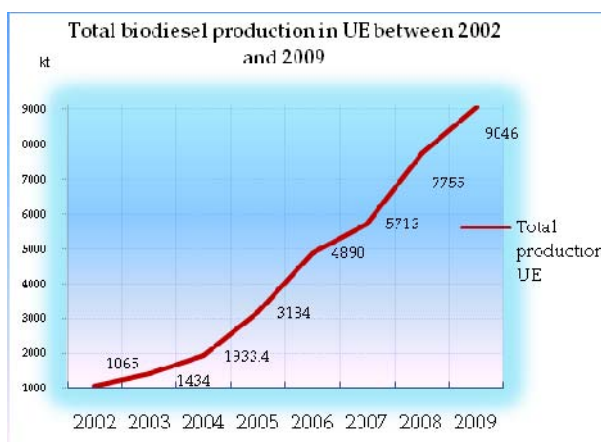


Figure 1 Total biodiesel production in the European Union made between 2002 and 2009, thousand tonnes (kt)

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The consequences were significant: in 2008 and 2009, much of the existing European factories operated at reduced capacity or were closed, being under conservation. Statistics show that in this period there was produced an amount of biodiesel of less than 50% of the production capacity of all plants in the EU. In 2009, however, capacity has grown by 31% compared to 2008 due to some investments started in previous years, before the occurrence of biodiesel in the U.S., and completed in 2009.

Due to these circumstances, it appeared a large difference between the total production capacity of factories within the EU, and the amount actually produced in this area.

Following investigations made by the European Commission on this case showed the circumstances that occurred, and found that the B99 biodiesel produced significant imbalances in the EU biodiesel industry, particularly in terms of profitability such as business and depreciation investments in the field.

Consequently, in early 2009, the European Commission launched a series of measures to combat these imbalances caused by imports of American biodiesel in Europe. These measures were applied and began to propagate their effect, but the significant size of the European market having a large inertia, will produce the desired effects in medium term.

Concerning the romanian production of biodiesel, we can observe in table 1 that our country is in 2010 on the 15th position among the 27 member countries of the European Union, with a production capacity of about 307.000 tonnes. An increase in the capacity production is seen in respect with 2008 due to the numerous investments in production units.

European Directive 2003/30EC is the law emmited by the European Parliament and European Union Council in may 8 2003 on the

promotion of the use of biofuels or other renewable fuels for transport.

This Directive, in its primary form, imposed the replacement with biofuels of 2% of the fossil fuels energy used in transports until 2005 and 5,75% until 2010. Recently, the transpose in the romanian law of this Directive was modified by the Gouvern Decision no. 829 from august 4 2010, establishing the following legal rules regarding the replacment of diesel fuel with biodiesel (table 2)

Table 2  
**Biodiesel share in the conventional diesel placed on the romanian market**

Implementation date	Biodiesel share in the conventional diesel placed on the romanian market
July 1st 2007	2%
January 1st 2008	3%
July 1st 2008	4%
January 1st 2011	5%
January 1st 2013	7%

This European Directive transposed in the romanian legislation determined the opening of a new market, concerning vegetal production as raw material for biodiesel, and also a new market biodiesel as a final product. Therefore, starting with 2005, numerous investments for producing biodiesel were made, the investors counting on the integration of biodiesel on the market blended with conventional diesel. Therefore, in 2008, in Romania there were already 30 companies registered as biodiesel producers. The positive evolution of these units and their use at maximum capacity, could make Romania an exporter of biodiesel. As encouragement measures for producing and placement on the market of biofuels, fiscal instruments were used like the removal of excise tax for the products that according to law were fit in the biofuels category.

In the same time, the assigned areas for oilcrops grew rapidly at a national level, especially for the rapeseed, because of the raising demand of rapeseed oil as a primary raw material for biodiesel production.

Between 2003 and 2006 there was a certain equilibriun between areas cultivated with rapeseed and soybean, but the balance modified in the detriment of soybean crops due to banning of GMO soyabeans. Starting with 2005 because of the national and european founding initiatives of several units for biodiesel production, the demand for raw material raised and determind the growth of cultivated areas with rapeseed, so that in 2006 the ratio became favorable to rapeseed.

For the last years and especially for 2010, the total area allocated to rapeseed grew strongly reaching about 579 thousand hectares in 2010, because of the high selling price on the national

and international market. For comparison, in 2006 the area cultivated with rapeseed was about 110 thousand hectares.

The areas that were used for sunflower crop had suffered a downward in the last years, from an area of 1188 thousand hectares in 2003, to about 821 thousand hectares and they are forecasted to remain around this size.

As mentioned above, in contrast to the rapeseed oil which is used in Romania mainly for producing biodiesel, sunflower oil has a larger variety of use, as raw material for different products, especially in the food industry.

## CONCLUSIONS

Biodiesel utilisation offers on one hand energetic autonomy and on the other hand environmental protection against GHG emissions;

At european level it is promoted the use of biodiesel by the decision factors and also by numerous organisations in this field.;

Starting 2007, the production units for biodiesel located in the European Union suffered a reduction in activity because of a decreasing demand for biodiesel. The decrease was caused by the unfair competition from the North America. Anti-dumping measures have started to take effect, but the results will appear in a medium term;

The national production of biodiesel in the last years was due to the UE requirements of biodiesel introduction blended with conventional diesel, and also because of the incentives for the cultivation of oilseed crops which can be raw material for biodiesel. These incentives were given by the romanian Gouvernment, and also by the European Commission;

The main raw material used in biodiesel production in Romania and also in Europe is rapeseed oil, because the rapeseed has the best yield in producing the oil, while sunflower oil is

mainly used for other products in the food industry.

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