



THE IMPORTANCE OF NON-CONVENTIONAL BIOFUEL UTILIZATION FOR POLLUANT EMISSIONS REDUCTION

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Abstract

In this paper are presented aspects concerning biofuels utilization as a result of traditional fuels disadvantages. Global depletion of oil resources and global warming has caused the occurrence and development of biofuels market although the production of energetic plants competes with crops for food products. Combining the benefits of economic, environmental and energy security resulting from the utilization of biofuels, attracts the interest and support of the population, but also of many governments, and the result will probably be the increase of biofuels utilization.

Key words:

biofuel, emissions, greenhouse effect, energetic plants, transport

1. INTRODUCTION

The reducing of global recoverable reserves of fossil hydrocarbons and successive increase of the oil barrel price, as a result of the oil crisis, have created favourable premises to approach other sources for obtaining fuels. The restrictive legislation on the environmental pollution caused by the combustion gases of conventional fuels also contributes to finding alternative energy sources. So, there are concerns for the production of biofuels from renewable feed stocks (biomass).

The fossils resources are worldwide distributed and quantitative limited while the annual consumption is growing. Analyzing the distribution of the world of crude oil reserves, an alarming situation has been discovered in some areas which are big petroleum derivatives consumers, such as Western Europe [5].

Oxides of nitrogen and sulphur, smoke and incompletely burned hydrocarbons from exhausted gases of engines using classic fuels, are major pollutants of the atmosphere. The accumulation in the atmosphere of carbon dioxide resulting from classic fuels combustion, also contributes to enhance the greenhouse effect. Therefore, is necessary to obtain alternative fuels, as by their combustion to reduce considerably the quantity of pollutants emissions exhausted into the atmosphere and by using resources from renewable raw materials to eliminate the greenhouse effect due to an accumulation of carbon dioxide in the atmosphere.

One of the most recognized and consumed biofuels is the biodiesel, which is a fuel of plant origin obtained from rape oil, sunflower, soy, palm, or of animal origin obtained from burned and UFO materials (animal scraps, fat, hair, etc.)

Biofuel represents any fuel with 80% minimum content of materials derived from living organisms harvested no more than 10 years before producing that fuel. [3].

2. THE BENEFITS OF BIODIESEL

2.1. EFFICIENCY OF BIOFUEL PRODUCTION

The market of classics fuel is one of the reasons for switching to biofuels. Great American auto manufacturers are already working on series engines with biofuels operation, and some European states are giving substantial subsidies to producers and importers of ethanol, a biofuel made mostly from corn.

Theoretically, any plant can be used for the production of biofuels. Practically, are preferred - from obvious economic reasons - plants that have a high content of oil or rich in starch. Americans, for example, are intensively cultivating mostly corn and soybeans; EU uses rape crops, and exotic countries as Brazil and the whole South-East Asia exploits at full the production of cane sugar and palm (palm oil is one of the cheapest raw materials for biofuel).

At present, the most efficient biofuel is produced from sugar cane or palm oil, therefore coming from the least developed countries in Africa, Asia and South America. Taxes imposed by certain powers to the biofuel import are excessive, making the profits of producers to be minimal, although they gave up on basic agriculture land for biomass crops. [5].

Biodiesel fuel is the first and only alternative fuel which has a full evaluation of the emissions produced by its combustion in internal combustion engines. The U.S. Environmental Pollution Agency (EPA) has evaluated in the "clean air" section, the effects on health caused by burning of diesel biofuel. Thereby, in the last 2 years were developed a series of programs related to the most stringent testing protocols required by EPA for certification of fuels and / or additives.

Many countries have a competitive advantage in producing biofuels. Meanwhile, many other countries are unable to meet their biofuel needs from domestic sources (Fig. 1).

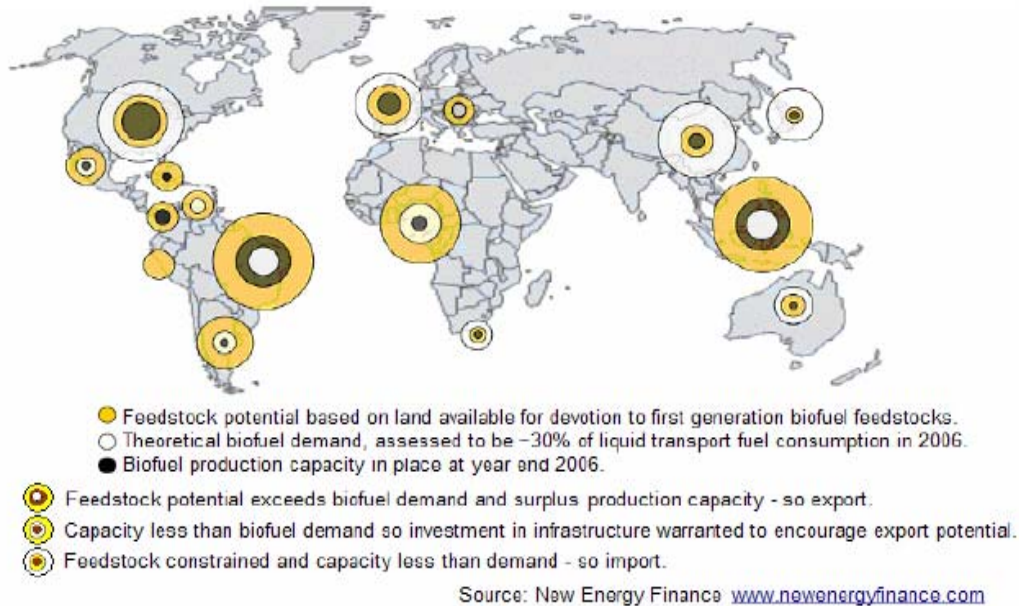


Fig.1 Biofuel demands and production capacities for selected world regions

Also, when bioenergy displaces fossil fuels, in transport and power generation, or is produced in conjunction with soil carbon storage in the form of bio-char for example, opportunities arise for trade in carbon emission reduction units. [2]

Benefits of biodiesel:

- ✚ The potential for altering the ozone layer by forming „smog” is 50% lower for diesel biofuel (B100 and B20) than conventional diesel fuel due to nitrate polycyclic aromatic hydrocarbons reduction.
- ✚ Emissions of sulphur are completely eliminated by using B100. Exhaust gases pollutant emissions no longer contain sulphuric oxides and sulphates (important components of acid rains), because in the molecular structure sulphur cannot be found in the case of B100 compared to the diesel one.
- ✚ Criteria for emissions estimations present a strong reduction of their values compared with conventional diesel fuel.
- ✚ Diesel biofuel reduce the disease risks that are usually caused by diesel. The emissions produced by biodiesel show the HCAP and nitrate-nHCAP reduction, both responsible for cancer [3], [1].

2.2. REDUCING EMISSIONS AND THE GREENHOUSE EFFECT OF USING BIOFUEL

Biodiesel - an ultra-clean fuel - contains no sulphur or aromatics, which contributes to emissions reduction.

Biofuel is used mainly as a source of reduction pollution caused by cars. It is well known the fact that the largest source of greenhouse gases is the transport. Used as fuel, biofuel reduces oxides of nitrogen, monoxide and carbon dioxide pollution.

Transport and fuel production are responsible for one quarter of gas emissions with greenhouse effect, and the percentage is continuously increasing.

„Energy crops” for biofuels have the potential to decrease by over 10% the emissions of greenhouse gases (compared to gasoline and diesel) because such cultures retain the carbon in the ground as they grow. [4]

For example in Ireland, emissions of the different gases can be aggregated on the basis of their Global Warming Potentials which are a measure of their relative warming effect. The relative contributions of the different gases are shown in Figure 2.

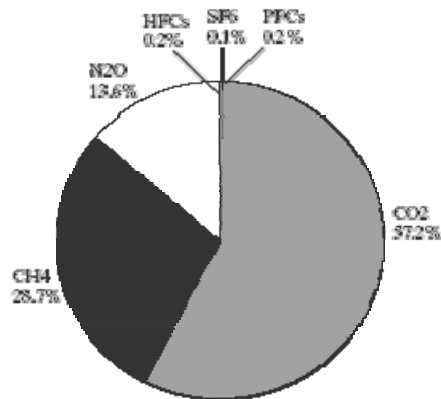


Fig.2 Contribution of different greenhouse gases to aggregate emission

The contribution of methane and nitrous oxide to total emissions is unusually high compared to that in other developed countries. This is because of the significance of agriculture in the economy; agricultural emissions represent 35% of total emissions. [6]

The development of biofuel industry in Romania provided an explosive progress in agriculture: in 2005 rape crops covered 88,000 hectares. In 2006, the area has reached to 160,000, and in the autumn of last year 370,000 hectares were sown with rape.

EU Commission White Book acknowledges that by 2010 the CO₂ emissions will reach a significant increase, their amount being of approximately 1113 million tones. The major responsible is the road traffic which causes from transports 84% of total CO₂ emissions. Therefore, from ecological point of view the White Book campaigns to reduce the oil dependence in transports (which is currently approximately 98%) by using alternative fuels such as biofuels. Using biofuels on a large-scale in transports constitutes only a part of the package of measures to be taken to achieve the reduction in CO₂ emissions. The increase of biofuels utilisation in the transport sector, without excluding other possible alternative fuels for the automotive industry, is one of the ways through which the dependence on energy imports can be reduced, can be influenced the fuel market for transports and can be ensured the security of energy supply on medium and long term.

4. CONCLUSIONS

The gradual transition from fossil fuels to biofuels involves both compromises and many risks, besides benefits and opportunities, under the circumstances of which there already exists a young but rapidly growing market. Simultaneously the political and economic interests around biofuels are immense. The mode of producing and using the alternative energy makes the difference.

Even if Romania has resources of fossil hydrocarbons, the production and utilisation of biofuels has a great importance, both in the national and in European context.

REFERENCES

- [1] D Dragota, Ing V. Moiescu, s.a.- Biocarburanti in Romania, Monografie Bucuresti, 2004.
- [2] A SUSTAINABLE BIOFUELS CONSENSUS, Rockefeller Foundation Bellagio Center Bellagio, Italy, 24-28 March, 2008
- [3] V.D. Negrea, V. Sandu. Combaterea poluării mediului în transporturile rutiere. Ed. Tehnică, București, 2000
- [4] www.green-report.ro, 02.02.2009
- [5] www.biodieselmagazin.ro, 02.02.2009
- [6] O. Byrne, Economic and Social Research Institute, Limitation and Reduction of CO₂ and Other Greenhouse Gas Emissions in Ireland, Dublin, 1998.