BIOFUELS ARE NOT A SUSTAINABLE SOLUTION TO COMBAT CLIMATE CHANGE

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Abstract: As the population grows, we are exhausting our natural resources such as oil reserves and agriculture land. The threat of climate change caused bythe increased emission of CO2 from burning of fossil fuels exerts pressure on much use of renewable energy resources. In return to declining natural fossil fuels, biofuels are more and more being explored as a renewable alternative. Most of the global biofuel is produced in the form of ethanol by fermentation of sugar cane and maize. However, use of these crops for biofuel production rather than food has attracted some criticism. In this study, we found that in the most cases it is not true. Over use of biofuel poses threat to sustainable development of today's world. It is going to be presented that the production of biofuels from agricultural crops is, in many cases, unsustainable due to the fact that it reduces the access to food by devoting cultivatable land to crops designated for the production of biofuels. Besides, it also reduces biodiversity, pollute water and, what is questioning, not in all cases the use of biofuels leads to the reduction of CO2 emission. Our paper also highlights the effects of the production of biofuels on the environment having regard to greenhouse effect, and we will characterize threats of agricultural crops used to the production of biofuels in order to provide especially poor countries with food.

Keywords: biofuels, climate change, sustainable development.

Introduction: Converting food into fuel has been extensively promoted by many countries as a big way to beat the fuel crisis and to combat the climate change. But this process has also been blamed for higher food prices, food shortages in the poorest nations, hunger riots and even fall of governments. The agenda of climate change, raising an awareness of the possibility of draining the resources has led to the foundation of the sustainable development concept [1]. Its prime aim was to create such development, which would assure the living requirements of present generations without complaining needs of their future generations.

Sustainable development is linked with almost all areas of human activities, setting drifts for society development [2-5]. Even in 2000, the United Nations Millennium Development Goals also highlighted the need to secure both intergenerational justice and also intragenerational justice. But unfortunately, the problem is that political and economic system in today's world supports increasing abuse of all resources which are nonrenewable.

If the same trend is continued, the sum of oil is expected to last for about 40-50 years, natural gas for about 60-70 years, and coal for about 140-150 years. The problem of fossil fuel depletion is real and present. However, more concentration is paid to global warming, which is caused by the increase in atmospheric CO_2 concentrations resulting from fossil fuel combustion. The IPCC reports also predict that if we do not cease from burning fossil fuels, the climatic consequences will be severe. But fact is that the climate change is going to occur in the face of huge costs associated with the introduction of a low-carbon economy [6].

Energy supply affects all aspects of human life (social, economic and environmental including access to water, food production, the health of the human population, education and even gender related issues) [8-12]. Therefore, the prerequisite of energy for our society is one of the key tasks in the implementation of the sustainable development [2-5, 13].

Focusing an energy policy only on counteracting CO_2 emissions threatens global sustainable development. One important sustainable development paradigm is intragenerational justice demanding that all people should have equal access to the basic goods, which are essential for living, one of which food is the most important example. Even though the production of grain is growing approximately 1% annually it does not maintain with the rate of population growth 1.1% [14, 15]. Further, it spins out that the commitment to introduce a 10% minimum share for biofuels in transport by 2020, adopted by the EU in 2009, leads to a significant threat to food supply with a uncertain impact on reducing CO_2 emissions [17, 18] and affect quality of life especially developing nations [19-21].

Renewable energy sources (solar energy, exploited both as thermal energy as well as electricity generated in photovoltaic cells, wind energy, hydropower and tidal power, geothermal energy and energy derived from biomass)are exceptionally important for energy supplies. In a number of countries, actions have been taken to increase the use of biomass for energy generation [13, 22, 23] which is the most controversial. Extensive use of biomass sourced from agricultural crops is often mismatched with the sustainable development principle, and the aim of the present paper is to demonstrate it.

Biofuels may be often characterized by low energetic effectiveness. According to a research the amount of

energy used to production of bioethanol is higher than energy obtained by the combustion of ethanol in car engines. Therefore, in the process of ethanol production about 29% more energy is used for its production in comparison with energy obtained the combustion of produced ethanol from crop, 45% from grass and 57% from wood [17, 22].The situation is similar with biodiesel also which requires soy 27% more energy than energy obtained from the combustion of produced biodiesel. As for the production of biodiesel from sunflower seeds, it uses up to 118% more energy [17, 22].

Biofuel and the environment: Promotion of Biofuel is based on the wrong assumption that during their burning only as much CO_2 is released as the plants absorbed earlier. This unsophisticated reasoning does not take into account the entire biofuel production cycle. What is more, the changes in the land use and the energy expenditure for the cultivation and processing of biomass into biofuels are omitted from these estimates.

In developing countries, tropical forests underwent deforestation and in their place crops designated for biofuels were cultivated. From the research conducted by Danielsen etal, it come outs that CO_2 absorption by the tropical forests is significantly greater than the cultivated plants in their place used for the production of biofuels. Converting rainforests and peat lands for the production of biofuels leads to additional CO_2 emission in an amount of about 55 Mg of CO_2 per hectare per year for a period of about 120 years. Thus, the use of biofuels obtained from crops often does not lead to the reduction in CO_2 emissions. The tropical forests are the habitat for more than half of the terrestrial species. The most endangered are forests in south-east Asia.

Large single crop plantations require large amounts of herbicides and pesticides, which then penetrate into the groundwater contaminating it. The pesticides and herbicides, used on a large scale, threaten the Pantanal wetland area [24, 25] which is one of the most important areas for hundreds of bird species, mammals and reptiles [23].

The 20,000 hectare sugar cane plantation intended for ethanol production is located in the Tana River Delta in Kenya. With a planned uptake of 1,680 m^3 of water/min, representing about 30% of the river flow rate, it poses a serious threat to the local ecosystem, habitat for 345 species of water birds and marsh birds. Furthermore, in order to produce a biofuel from corn, energy is essential for cultivation, production of fertilizers, plant collection, processing into fuel during fermentation and distillation. Using LCA technique, it was revealed that the amount of CO_2 released per unit of energy obtained from bioethanol produced from corn is higher by as much as 60% compared to the amount of CO_2 released during the combustion of fuels derived from crude oil [17]. Even in the case of bioethanol production from sugar cane in Brazil, where the biofuel production is in the most developed stage and the remaining biomass is fully used, for instance stalks are used in the production of heat, it has not been possible to reduce CO_2 emissions per unit of output energy below that of the emissions from liquid fuels derived from crude oil.

The development of bioethanol production from sugar cane in Brazil, allowed for the creation of about 700,000 new jobs, which can be regarded as a positive social effect which increases social sustainability. The development of ethanol production has ensured Brazil's independence from imported liquid fuels, and the price of energy from ethanol is competitive with petrol prices. Therefore, it can be said that in the case of Brazil it has succeeded in providing a sustainable supply of liquid fuel for transport; but, without decreasing CO_2 emissions. It should be taken into consideration that this is an exception.

The production of liquid biofuels for transport purposes also has a negative impact on the aquatic environment due to high water consumption used for both crop irrigation and in treatment process of energy crops into biofuels. Furthermore, during the processing, large quantities of waste water harmful to the environment are produced.

Problems with food supply: The population growth from 7.2 billion in 2030 will direct to the 35% increase of food demand. However, today 25,000 people die of hunger, and about 780 million people in developing and 27 million in developed countries suffer from malnutrition each day [27]. In this condition, granting huge areas for biomass fuel cultivation raises moral concerns. In accordance with the European Commission's decision from 2009, as much as 10% of the energy used for transport should come primarily from biofuels made mainly from food crops. To make biofuels viable, European governments are providing powerful industry and farming lobbies with huge sums of money. For instance, by 2020 biofuels will annually cost each person in Great Britain about £35 (£1-2 billion total) and in Germany about €30 (€1.4-2.2 billion total) [26].

Also, due to subsidies, in the United States ethanol production as a fuel additive rapidly expanded. In the USA, ethanol is produced mainly from corn and in 2011 as much as 127 million tonnes *ie* 40% of annual production was allocated for bioethanol production. Ethanol production for fuel purposes consumed a $6 billion subsidy from the national budget. In the period 2007-2012, allocation of such a large amount of corn for ethanol production resulted in a twofold rise in the price of corn. Therefore, large imports of food crops for biofuels by the European Union countries led to a dramatic 2.5 fold increase in the FAO food index [16].An increase in food prices is particularly

severe for the poor, who spend most of their income on food.

Taking into consideration above mentioned statements, it may be concluded that the use of biomass obtained from agricultural crops for energy purposes frequently threatens the implementation of the sustainable development strategy because it violates the intragenerational justice paradigm by limiting the poor's access to food.

Conclusions: At the present time, there is an urgent search for a sustainable supply of primary energy in order to slow down fossil fuel exhaustion and to reduce CO_2 emissions to minimise climate change. However, the majority of the biofuels do not meet the criteria for sustainability. Often, but mostly in tropical areas, biofuel plantations have a very negative influence on the local environment. Biofuel use, mainly by the European Union countries causes an increase in food prices which threatens intra generational justice. First generation biofuels (food into fuel) have directly linked energy prices with food. The poorest will never be able to compete with industrial giants and the result is likely to be further shortage of food. Second generation biofuels using biowaste also face major hurdles. It is technically more difficult to make fuel from cellulose (plant stalks). Harvesting biowaste means more fertilizers need to be used, reducing the net energy gain. Non-foodcrops can also be grown and harvested, but only by using land that could otherwise be used to grow food, or to grow trees. Third generation biofuels can be made using algae which produce up to 30 times more energy per acre per year. Growth can be encouraged by cultivating them in a high CO2 atmosphere, using processed gases from power stations. A fourth generation approach is to use genetically modified microorganisms which convert carbon dioxide into carbon. However, microorganism fuel farms can require large amounts of water, which may become an additional challenge. The development of the electric vehicle is a promising direction, whose batteries will be recharged from electricity generated by photovoltaic cells.

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