

Public Policy and Biofuels: Energy, Environment and Food Trilemma

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Current policies in energy sector address issues including renewable energy supplies and encourage more efficient energy use. As expected biofuels can reduce dependence on imported fossil fuels, strengthen political and economic security, revitalize the economy by increasing demand for agricultural products. At the same time biofuels production can threaten food safety by making influence on price and demand for agricultural commodities. The article examines the influence of public policy in the sphere of biofuel on energy, environment and food security. As a result of this analysis, energy, environment and food safety impact of public policy for biofuels production were identified.

Key words: public policy, government regulations, biofuels, impact, energy, environment, food safety.

I. Introduction

The use of biofuels has been given much attention by governments around the world, especially in countries with limited reserves of energy resources. Governments that have public policy with the aim to increase the use of biofuels assert that these fuels have various advantages over hydrocarbon fuel, especially in minimizing greenhouse gas emissions, reducing dependence on oil-exporting countries, providing additional financial income and improving the quality of farmer's life. Currently the majority of assessments of the biofuel impact have only the preliminary estimates. There is no in-depth analysis of the impact of biofuels and biofuel production policy on economic, environmental and food safety of the state.

The aim of the research is to analyze the impact of governmental policy in biofuels on energy, environmental and food situation in major biofuel production countries. In particular, there have been studied political stimulation measures of the production and consumption of biofuels, taking into consideration the consequences of the increasing demand for bioethanol and biodiesel.

II. Material and Methods

This study was conducted to analyze the impact of public policy in support of biofuels on energy, environment and food security. Source of the data used in this analysis are regulatory documents, statistical and analytical data of international governmental institutions, organizations, associations that are used for theoretical analysis, graphic processing.

III. Results and Discussion

Countries that do not have sufficient reserves of fuel and energy resources, as well as those that are concerned

about the harmful effects of the production and use of fossil fuels, actively stimulate the development of alternative energy in general and biofuel in particular.

A world leader in the field of bioenergy is the United States. Since 2005, the country is the largest producer of bioethanol and biodiesel. The share of bioethanol in the market of gasoline in the US increased in volume from 1% in 2000 to 10% in 2016.

However, the production of biofuels in the US would not have had such a significant success without effective public policies in this direction. In order to stimulate the production of cars working on alternative fuels, in 1988 the Law "On Alternative Motor Fuels" was adopted. The law encouraged biofuels producers to provide preferential loans for the production of cars that can run on a certain type of alternative fuel. Other government measures to stimulate the use of biofuels were caused by numerous interests including the desire to reduce dependence on imported fossil fuels, to reduce greenhouse gas (GHG) emissions, and to increase demand for domestic farm commodities serving as a raw material for biofuels. The current US biofuel policies consist of three main instruments – output-connected measures, support for input factors and consumption subsidies. Tariffs and mandates benefit biofuel producers through direct or indirect price support. While the mandates are indirect subsidies and do not provide direct price support, the tax credits serve as the largest direct subsidies [3].

However, the success of the United States in the field of bioenergy is ambiguous. Since corn is the main raw material for the production of bioethanol, the volumes of this crop, processed for bioethanol are constantly growing. The price increase can be considered as a positive and negative phenomenon. The positive effect of rising corn prices in the US is that farmers receive higher incomes, and the government is saving money by lowering the costs of subsidizing farmers for federal programs. At the same time, an increase in the price of corn has a negative socio-economic effect, because it leads to an increase in the cost of food.

Brazil is the second largest world producer of ethanol and the largest exporter of the ethanol fuel in the world. The ethanol-use mandate in Brazil has been mandatory since 1977 when the legislation required a 4,5 percent blend of ethanol to gasoline. According to the legislation, the ethanol blend can vary from 18 to 27,5 percent and it is currently set at 27 percent (E27).

At the initial stage, the Brazilian government provided three important tools for the production of bioethanol: guaranteed purchases by the state oil company, low interest loans for agro-industrial ethanol producers and fixed prices for gasoline and ethanol, for which ethanol is sold for 59% of the price of gasoline set by the government at gas stations. Subsidizing the production of ethanol in this way and installing an artificially low price have made ethanol a competitive alternative to gasoline.

The commercial production of Brazilian flex-fuel engine vehicles, which run on any fuel combination – from 100 percent ethanol to 100 percent gasoline, started in 2003 and as the result became very attractive for consumers who

own these cars, as ethanol and gasoline became perfect substitute goods. Currently more than 90 percent of all vehicles sold in Brazil use flex-fuel technology and, as a result, there has been a rapid increase in ethanol demand.

Production of ethanol in Brazil is based on the use of sugar cane as a feedstock. The economic dimension of Brazilian sugarcane sustainability is not a controversial issue. It is internationally recognised that Brazilian ethanol is produced at low costs and its feasibility does not depend on subsidies [2].

Regardless its economic feasibility, Brazilian ethanol production has been criticized for its potential environmental and social impact which includes direct and indirect land use changes; potential impacts on water availability and quality; impacts of fertilizer and agrochemical use on biomass production; soil impacts.

Some analysts argue that biofuels may lead to increased deforestation pressure, since farmers may convert forestland into biofuel feedstock production areas. However, the graphic analysis of the production of bioethanol in Brazil and the area of deforestation indicate that there is no connection between them.

The available evidence does not provide support to the argument that sugarcane expansion may lead to food supply disruption. Recent analysis of trends in land use changes indicates that the expansion of sugarcane areas has not occurred to the detriment of subsistence crops.

The third largest producer of biofuels is the European Union (EU). The EU biofuels policy was designed primarily in order to meet obligations made under the commitment to the Kyoto targets of GHG emissions and to meet a pressure from the EU population to address environmental issues. The policy of stimulating the production of biofuels in the EU consists of a combination of several regulatory instruments that include exemption from the payment of a tax on fuel made from renewable feedstock; mandatory addition of a fixed percentage of biofuels to the composition of petroleum fuel; loans and subsidies for the cultivation of energy crops (payments to farmers, compensation in case of failure); fines for failure to meet the established indicators; preferential loans and subsidies for plants engaged in the production of biofuels.

In 2009, the EU Renewable Energy Directive (2009/29) established a "20-20-20 Policy" for the post Kyoto period beyond 2012, which includes the targets on the biofuel consumption. Under this "20-20-20 Policy", the share of renewable energy in the total EU energy consumption is set at 20% by 2020. Due to the effectiveness of these mechanisms, the EU was able to achieve significant growth in the field of bioenergy. However, considering the limitations of its own resources, a significant portion of feedstock for biofuels production is imported from neighboring developing countries, therefore the biofuel production policy affects not only the agriculture of the EU countries but also neighboring countries.

In particular, the growth of demand for the oil crops usage at the biofuels industry led to a considerable increase of oilseeds gross yield in Ukraine. Currently, almost all grown in Ukraine rapeseed and soybean are being exported abroad.

In general biofuels present great opportunities both for developed and developing countries. The biofuels production and consumption cause a number of social, economic, environmental and technical issues. Economic advantages of a biofuel industry would include value added to the feedstock, an increased income taxes, investments in plant and equipment, reduced greenhouse gas emissions, reduced a country's reliance on crude oil imports and supported agriculture by providing a new labor and market opportunities for domestic crops [1]. The ecological effect of production and consumption of biofuels is the reduction of harmful substances emissions into the atmosphere that result from the production, transportation, processing and use of oil and its derivatives. The socio-economic effect of production and consumption of biofuels is the creation of additional jobs, as a consequence, reduction of the number of unemployed people and developing rural areas

Conclusion

As a result of the performed analysis, the authors came to the following conclusions: public policy in biofuels have positive and negative impacts on environment, food system; social-economic conditions, energy sector and environment. The advantages of production and consumption of biofuels vary significantly and depend on the market conditions and the political situation in the country. Although increase of biofuel production has positive impact on energy and environmental sector, gasoline and diesel consumers and improves welfare of farmers, it has a significant negative impact on food consumers, especially among poor people. The various policies that have been implemented or proposed, directly affect biofuels, including subsidies, mandates and a regulation of carbon in the fuel. However, current policies do not provide incentives for private and social welfare, as well as the safety of biofuel production and its impact on the environment, as well as food security, especially in countries that are developing. Countries that were the first on their way in research and production of bioethanol and biodiesel feedstock that also can be used as food should provide more attention and policies in favor of second-generation biofuels produced from non-food crops and other sources of renewable energy. The next generation of biofuels can provide improved net benefits, but will require significant technological breakthroughs.

References

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