

BIODIESEL PRODUCTION OPPORTUNITIES IN RURAL AREAS IN TURKEY

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Abstract. Rural areas and farmers are important elements for developing countries. Especially, socio-economic conditions and opportunities in the agriculture can affect economy directly. One of the high production cost is fuel consumption, which can affect farmers' income negatively. Nowadays, fuel cost increases and directly or indirectly disturbs farmers. New kinds of technologies and concerns about climate changes cause alternative energy opportunities for rural areas. Biodiesel is one of the new important energy sources. This environmental-friendly source contributes rural economy and is likely to be a new opportunity for rural area and economy. In this paper, rural areas, biodiesel production and opportunities in rural areas were discussed.

Key words: rural development, biodiesel, biofuels, Turkey

INTRODUCTION

Agricultural sector has an important share in the economies of developing countries such as Turkey. In Turkey, the share of rural population in total population, which was 75% in 1927, fell 40.9% in 1990 and 35% in 2000. It is estimated to be 24% in 2007. On the other hand the portion of agricultural sector in general employments is yet very high (26.4% in 2007). Agricultural sector has a unique importance as being the main activity field of people living rural parts of country. 67.5% of these people, living rural areas, make agricultural activities [MARA, 2004].

In recent years, not only in the World but also in Turkey, regional disparities seem to have increased. The rural sections have always been given a particular significance to some extent since the very initial years of first planned development period (1963–1967).

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For this purpose, regional and rural development projects have been carried out, several irrigation projects have started. Recently, thanks to European Union (EU) process, several social supporting projects has been implementing in the country. Likewise, some actions have been taken to develop multifunctional of agriculture sector. To support this process, EU funds have been used, particularly for small-scale infrastructures, regional development enterprises and Small and Medium size Enterprise (SME) in rural sections. The main purposes of these funds can be summarized like creating supplementary income resources, stabilization of producers' income, producing crops of economic advantage for the region, using natural resources such as soil, water, sun and energy more efficiently. Another very important benefit of these funds is to create a demand on agricultural products of rural sections from industry and services.

Biofuel, especially biodiesel is one of the opportunities which can create demand on some agricultural products growing in rural areas: It looks very important concerning less-dependent energy politics, creating new jobs and its contribution to other related areas, such as transportation, by-products.

MATERIAL AND METHOD

The aim of this paper is understand the effects of biodiesel's on rural areas in Turkey. Agricultural population, energy consumption and biodiesel are examined together. Moreover, the current situation of biodiesel, its supply and demand balance, and related legal arrangements in Turkey are examined. In order to emphasize critical role of rural areas in Turkey, some secondary resources such as official documents were also used as well as many national and international resources.

RURAL AREAS AND BIODIESEL IN TURKEY

In generally, the structure of rural areas depends on the culture of country itself, as well as their geographic situation and socio-economic conditions. On these grounds, rural areas and their definitions can be changed among different countries, cultures, even among regions in the same country. In this context, it is mostly difficult to define what rural area means. According to the OECD classification scheme, communities are called rural if their population densities are less than 150 persons per square kilometre. According to this definition, the share of rural population is 21.5% in EU-15. In Turkey, population is the main criterion to classify a region as rural or urban. According to Turkish legislation, communities are classified as "köy" (village) if their total population is till 2000, if their total population is between 2001 and 20.000, these communities can be categorized such as "ilçe" (municipal town), if their total population is over 20.000, these communities can be categorized as "il" (city) [Kýlýç 1997]. Actually, rural areas in Turkey are accepted as production points between rural and urban. So rural areas are sections, which are out of municipal town (ilçe) and out of province centre (il) in the country. According to this definition, 33.4% of population is living in rural areas. In Turkey, EU-15 and world rural population change in 1970–2004 is given below (Fig. 1).

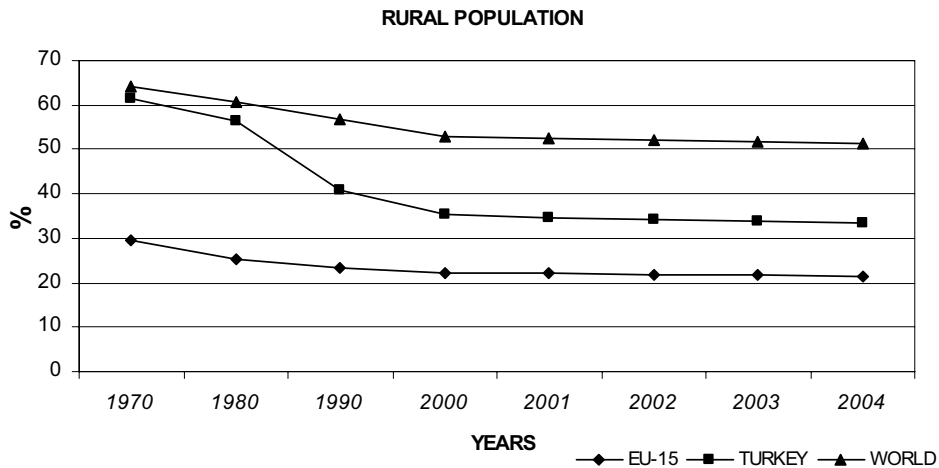


Fig. 1. Development of rural population

Rys. 1. Zmiany populacji wiejskiej

Source: Authors' study.

Źródło: Opracowanie własne.

In Turkey, it can be summarized that main characteristics of rural areas are low population density, agricultural-dependent economic activities, insufficient infrastructure, and poor, if any, sanitation, education and communication facilities. The community is understandably governed by harsh natural conditions and disordered land structure. All of these and some others seem to cause insufficient revenue, uneven income distribution, low education level and high mortality rate in these areas [Gürlük 2001]. Moreover, heritage legislation leads to minimization of farms by allowing many agricultural lands to be broken into small parts, which undoubtedly lead to inefficiency and planning difficulties, eventually poverty. According to OECD criteria, 14.8% of rural population, 14.2% of rural households is below poverty limit in Turkey [Pamuk 2002]. Poverty is a bigger problem in rural than urban. In 2002, it was estimated that 36.6% of people who are working in agricultural activities are under poverty [TURKSTAT 2002].

Several programs and projects have been implemented to remove or manage these problems and to improve the living standards and trigger a lasting rural development in rural sections. Before planned term (1963–1967), these studies were limited, but some arrangements, such as Village Law, the first economics congress, the first village congress, abolition of tithe (Aşar tax), establishment of Village Institutes, getting titles to the lands, were made to deal with rural problems. However, during the period of planned term, thanks to the model village approach, many-sided arrangements of rural sections, programs for society development, city-village model, the projects of rural development evolved [Kýlýç 1997].

Recently, in the EU membership process, there have been made new expansions against rural section in Turkey such as acceptance of EU regulation by Turkish Government (21 March 2001), against economic and social adaptation in EU, a national development plan, include 2004–2006 period, was accepted (22 December 2003/61). On the other hand, administration system reform studies were accepted (23.07.2004 /5216), and also

NUTS regulation was made (22 September 2002/4720). According to this regulation, the regions were divided into three groups: in the first group, there are 12, in the second group, there are 26 and in the third group there are 81 regions (provinces). Therefore, regional development programs prepared for 12 regions, which are in the second group, were accepted by EU. Finally, 26 regional development agencies were created in Turkey (25.1.2006/5449). The basic principles in all regulations made by Turkish Government were creation of employment and amelioration of regional human resources, subvention of Small and Medium size Enterprises, subvention to small infrastructure investments, rural development, reinforcement of institutional capacity and governance mechanisms [MARA 2006]. In this context, it is important to emphasize multi-functionality of agriculture sector or rural areas. So it can be ensured to create supplementary income, discover new investing areas by reinforcement of sectors without agriculture in rural. This is also important for stability of producers' income, cultivating new products with more economic offers and especially for creating demand for the products in rural. Actually, the expenses about building operations, material purchase (machine, equipment etc), counselling services, and project administration are covered by EU funds in rural. However, such expenses as land, construction, irrigation and fuel are not covered by EU funds. We see that there are some problems in this supporting system used. For example, energy costs are important in rural sections in developing countries like Turkey. This cost, which is an agricultural energy problem, is out of supporting system of EU funds.

It is estimated that the energy use in agriculture sector will rise due to mechanisation. In Turkey, energy volume used in agriculture 3.96 GJ/ha in 1990 raised 5.30 GJ/ha in 2000 and 6.20 GJ/ha [Öztürk, Barut 2005].

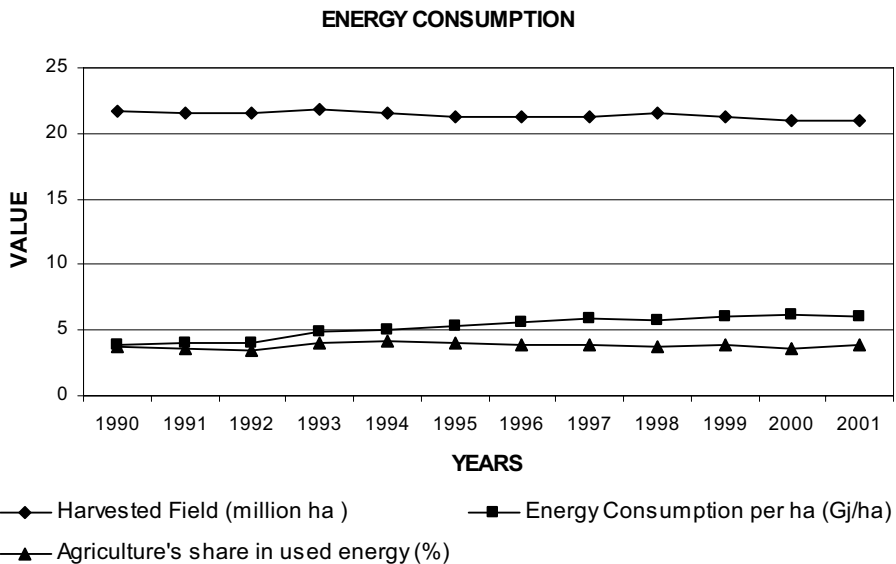


Fig. 2. Energy use in agricultural sector in Turkey

Rys. 2. Zużycie energii w sektorze rolnym Turcji

Source: Authors' study.

Źródło: Opracowanie własne.

Accordingly, increasing energy demand requires producing new energy resources, which are supposed to be environmentally-conscious, economical and convenient for agricultural use. One of these new energy resources is biodiesel, which is provided by agricultural products. This may be a new opportunity for Turkish agriculture, since it takes its raw material from agriculture, to create new employment areas, which may start new other possibilities in different sectors in rural. The main reasons to prefer biodiesel are to use national agricultural potentials for energy use, to contribute energy supply and to benefit from EU markets. Needless to say, to achieve this, some challenges, most of which are stemmed from some legislation procedures, must be removed.

BIODIESEL TECHNOLOGY GROWTH IN TURKEY

The countries using their natural resources excessively and thoughtlessly are certain to face the problem of satisfying demand. The world countries have just to find some better ways and policies for a balanced energy production and use.

With the difficulty in satisfying energy demand, alternative energy pursuits have begun. At present, one of these alternatives is biofuel (biodiesel) technology.

Biodiesel is a product used as fuel, which is a resultant of reaction between the vegetable oils, obtained from oilseed plants such as rape (canola), sunflower, soya, or animal fats, and short chained alcohol (methanol or ethanol) with a catalyst. [EIE 2006]

In 2005, total petroleum (gases, diesel oils, gas oils, heating oil and fuel oil) consumption in Turkey decreased by 3.1% compared to 2004. While the consumption was 18.1 million tones in 2004, it decreased to 17.5 million tones in 2005 [Petder 2005]. However, when petroleum market is investigated; it seems that since 1998, situation of diesel oil's consumption have taken an upward trend; there is similar tendency in the market share in total petroleum products, as well. When the market shares of petroleum sector are analyzed; by 2005 diesel oil is 13%, unleaded gasoline is 13% and high octane gasoline is 4%, respectively (Table 1).

More than 90% of petroleum demand in Turkey is supplied by importation. The amount of consumed petroleum in Turkey is 17.500 millions m³ in 2005. 12.908 millions m³ of this amount (approximately 74%) is consisted by the diesel oil (Petder, 2005).

Table 1. The market shares of petroleum products in Turkey

Tabela 1. Struktura rynku paliwowego w Turcji

The variety of fuel	2004	2005
	Rate (%)	Rate (%)
Diesel Oil	62	59
Unleaded gasoline	13	13
High Octane Gasoline	3	4
Heating Oil	3	3
Fuel oil-6	19	21

Source: Petder 2005.

Źródło: Petder 2005.

Diesel oil is important cost factor in the agricultural production as means of subsistence in rural areas. It has important role in the land processing, irrigation and transportation costs. Otherwise, raw material of biodiesel which might be alternative to diesel gas is also obtained from agriculture. In this regard, biodiesel production farming is especially interested by rural areas.

Increasing energy need should be supplied by alternative energy sources like sunflower, rapeseed (canola), soya and aspir which obtain raw materials from agriculture. Sunflower, soybean, cottonseed, rapeseed and aspir are products which cultivated in the Turkey's rural might be used as raw material of biodiesel production. When production amounts of this plants are investigated; total raw material of these is 2.6 million tonnes; 55,6% of this amount is cottonseed, 42,1% of sunflower, 1,8% of is soya and 0,5% of rapeseed, respectively (Table 2).

Table 2. The amounts of oil plants production might be used in the biodiesel production in Turkey (tonnes)

Tabela 2. Rozmiary produkcji roślin oleistych, która może być przeznaczona na produkcję biopaliwa w Turcji (w tonach)

Years	Sunflower	Soybean	Cottonseed	Rapeseed	Total
1987	1.100.000	250.000	858.858	340	2.209.198
1988	1.150.000	150.000	1.040.000	1.400	2.341.400
1989	1.250.000	161.000	987.200	3.000	2.401.200
1990	860.000	162.000	1.047.360	2.100	2.071.460
1991	800.000	110.000	895.082	1.046	1.806.128
1992	950.000	95.000	905.350	1.000	1.951.350
1993	815.000	63.000	899.868	9	1.777.877
1994	740.000	70.000	929.902	10	1.739.912
1995	900.000	75.000	1.287.527	9	2.262.536
1996	780.000	50.000	1.219.579	5	2.049.584
1997	900.000	40.000	1.193.286	10	2.133.296
1998	860.000	60.000	1.334.778	300	2.255.078
1999	950.000	66.000	1.157.583	330	2.173.913
2000	800.000	44.500	1.295.066	187	2.139.753
2001	650.000	50.000	1.353.888	650	2.054.538
2002	850.000	75.000	1.457.122	1.500	2.383.622
2003	800.000	85.000	1.337.065	6.500	2.228.565
2004	900.000	50.000	1.425.850	4.500	2.380.350
2005	975.000	29.000	1.291.180	1.200	2.296.380
2006	1.118.000	47.300	1.476.556	12.615	2.654.471

Source: TURKSTAT 2008.

Źródło: TURKSTAT 2008.

Although there are several other oil seed plants for using in the biodiesel production in Turkey, canola (rapeseed) has been used the main material for biodiesel production since EN 14214 standards was accepted by TSE (Turkish Standard Institute). The reason why canola is considered as very suitable for biodiesel is that it is within the permissible maximum iodine level that is 120, accepted by EU. Because higher iodine index damages the diesel cars, using this product in the biodiesel production is approved more suitable by TSE.

BIODIESEL PRODUCTION AND DEVELOPMENT IN TURKEY

The rapid development of biodiesel issue in the world, especially in EU, affects Turkey in the EU membership progress. As a natural result, biodiesel in Turkey became widespread. Institutional and legitimate and infrastructural regulations (legal and technical) are completed to some extent; At least its existence was recognised in the country. Biodiesel may be a solution point for such countries as Turkey, which is dependent on foreign energy resources and having rapid increasing in the numbers of vehicle and fuel usages.

The occurrence of the sector was very sudden and intense in Turkey: The firm number was increased from 156 in 2005 to 268 in 2006. In the same year, another 211 firms applied for license. Correspondingly, the official production increased from 90.000 in 2005 to 10.000 tonnes in 2006. However, after 2006 there seems a sudden decrease in both firm numbers and production amount. This may be explained mostly with legal necessities, which has led many firms to withdraw from the market. However, it is estimated that nearly 3000 unlicensed small-scaled organizations are still actively producing biodiesel, which misleads the searchers and authorities about the total production amount. [Albiyobir 2006].

THE AVAILABLE ISSUES ON BIODIESEL TOPIC IN TURKEY

As biodiesel sector has grown rapidly in Turkey, its challenges have grown as well. One of the most important problems in the biodiesel is raw material supply. Turkey, which has supply problems about oil plant and oil seeds, tries to fill this gap by importation. Of course, this dependence affects the growth negatively. There are also some other implementations which have affected the biodiesel sector negatively in Turkey: processing license given by Turkish Standards Institution (TSE) and ÖTV (Specific Consumption Tax): Despite economic development and increasing number of vehicles in Turkey, diesel gas consumption has decreased since 2004–2005 period, which can be explained by unregistered production. Since the legal arrangement was made in 2006, it won't be wrong to say that firms seem to feel obliged to shut and pass to unregistered production, which is free of licence or ÖTV: When investigated economically, it is estimated that the economic volume of non standard production amount which is sold in the name of biodiesel made from totally vegetative oils or waste oils are more than 500.000 tonnes annually, and ÖTV losses is more than 300.000 USD/year [Petder 2005]. Although some legitimate regulations were made to stop non-standard and illegal production, these rules haven't been enforced properly so far.

THE BENEFITS OF BIODIESEL TO RURAL ZONES

As explained above; although this product is very important for both agricultural sector and rural areas as well as energy supply in the Turkish economy, there are still some problems to be solved: In the rural area productivity in agricultural production is not augmented; capital usage is not rational; there is not an integration between agriculture and industry; it is not easy to gain added value; production costs are fairly high; marketing problems are predominant; there is no agricultural planning or qualified labourer [Ödüt et al. 2006].

To solve these problems related to rural areas, biodiesel production can be a solution. By producing plants like canola and aspir as a source of biodiesel, farmers can increase their incomes and finance their other products. Producing new products in a rotation can also help to increase soil fertility. Moreover, since only 40–45% of canola is used for biodiesel, the rest of the plant can be used as forage and significant for stockbreeding. Glycerin, a by-product of biodiesel production process, is also very important in cosmetics.

RESULT AND RECOMMENDATIONS

Increasing energy demand in the world and Turkey will gradually appear in the agricultural sector, and eventually lead to increase in production costs. Owing to diesel oil usage in the agriculture and rural area doesn't minimizing the minimum cause attracting of biodiesel development in Turkey. Biodiesel gets its raw material from agriculture and is also used in agriculture sector for production. This feature effects biodiesel growth positively.

There are negative factors which effects the growth of biodiesel in Turkey too. However, it is not impossible to find solutions: By legal and technical measures, these problems will be dealt with, and new employment opportunities and income sources in rural areas can be created. Effective cost-benefit analysis should be done to display the economic magnitude of biodiesel. Especially, rural region has to be made conscious of this subject. After all, effective function of rural regions can be fulfilled by this kind of technology, which is one of the most important topics in the EU adaptation process in Turkey.

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SZANSE PRODUKCJI BIOPALIW NA OBSZARACH WIEJSKICH W TURCJI

Streszczenie. Obszary wiejskie i sektor rolny stanowią ważny element gospodarki państw rozwijających się. Do najważniejszych elementów, mających wpływ na zmniejszenie poziomu dochodów rolniczych, należy zaliczyć rosnące koszty produkcji, w tym koszty paliw. Coraz większego znaczenia nabierają technologie umożliwiające produkcję alternatywnej, przyjaznej środowisku energii na obszarach wiejskich. W artykule poddano dyskusji znaczenie gospodarcze oraz szanse produkcji biopaliw jako jednego z najważniejszych źródeł energii na obszarach wiejskich.

Słowa kluczowe: rozwój obszarów wiejskich, biopaliwa, Turcja

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