



National Report on biodiesel in Bulgaria

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BIODIESEL CHAINS

Biofuels in Bulgaria

Project: Biodiesel Chains

“Promoting favorable conditions to establish biodiesel market actions”

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1. Introduction

In order to implement the main strategic objectives, formulated in the *Directive 2003/30/EC for encouragement of utilization of biofuel and other RES in the transport sector*, the EU member states must guarantee the minimum share of biofuels from the fuels utilized in the transport sector, while setting national indicative objectives in accordance with the referred objectives of the Directive – 2% from the fuel utilized in the transport sector during 2005 and increase this share to 5,75% during 2010.

Each member country is free to select policy and measures to be introduced for the implementation of the national indicative objectives. With EU Communiqué, in February 2006 the European *Biofuel Strategy* was presented, which is based on the Biomass Action Plan and sets the following main priorities:

- Future encouragement of biofuel utilization in the EU and the developed countries;
- Wide application of biofuels, while securing their competitiveness;
- Support the scientific and research activities during the development of the second generation biofuels;
- Study the possibilities for developed countries to produce biofuels;

In Bulgaria, the biofuels are still considered as alternative of the conventional fuels, but the increasing fuel prices, their practical exhaustion and the global objectives for GHG emissions reduction and environmental preservation, place the biofuels in a new position – fuel for the future.

The support of biodiesel production, distribution and consumption represents an important part of the Bulgarian renewable energy policy, as this is specified in the *National Long-Term Program for Support of Renewable Energy Applications 2005–2015* [EEA 2005]. Currently existing biodiesel support measures in Bulgaria consist of tax relief and agricultural subsidies.

Since January 1, 2006, a zero excise duty rate was introduced for pure biodiesel (B100) – according to Articles 32 and 33 of the *Law on Excise Duties and Fiscal Storehouses* [SG 2005]. This tax relief immediately resulted in a spectacular growth of biodiesel production capacities.

On January 1, 2007, Bulgaria became a member state of the European Union and all biofuel requirements and indicative targets of *Directive 2003/30/EC for encouragement of utilization of*

biofuel and other RES in the transport sector and other EU documents became applicable also in Bulgaria.

As of 01.01.2007, the new amendments in the *Excise Duty and Tax Warehouse Act*¹ entered into force. These changes are in accordance with the European policy for encouragement of production and utilization of biofuels and introduce the zero excise for motor biodiesel and bioethanol motor fuel.

The new *Renewable and Alternative Energy Sources and Biofuels Act*, proposed by the Ministry of Economy and Energy, envisages the introduction of zero excise duty also for the biodiesel component in blends and for bioethanol. This will be accompanied with a planned increase of excise duties on conventional types of fuel.

Other existing support measures, related to biodiesel, are the agricultural subsidies for growing oleaginous crops. For example, subsidies for rapeseed cultivation in 2006 amounted to BGN 35 (17.90 Euro) per hectare. Currently the agricultural subsidies for energy crops are BGN 90 (46.01 Euro).

The European norm for biodiesel EN 14214 was officially adopted in Bulgaria. Some suggestions exist also for the development of a national norm, more easily achievable characteristics (e.g. iodine number) for biodiesel, produced from sunflower oil.

2. Historical background

Biodiesel production started in Bulgaria in 2001, at the plant of SAMPO AD in Brussartzi (North-Western Bulgaria), with a capacity of 3,000 tonnes per year. The feedstock consisted mostly of used cooking oil, collected from restaurant chains. In addition to operating this plant, SAMPO AD is also a producer of biodiesel plant equipment.

Another Bulgarian biodiesel plant equipment producer is the company M Engineering. This producer has supplied equipment for several plants in Bulgaria, for a plant in Jalgava, Latvia (5,000 t/yr) and is currently installing a biodiesel plant in Romania. Two other producers of biodiesel are the companies Gamakol EOOD (Plovdiv) and Bioenergomach (Aksakovo).

In recent months, many new plants have started operation – e.g. the newly constructed plant in Dimovo, close to Vidin, with a capacity of 7,000 tonnes per year, belonging to the company Ecoproecti OOD, and several other new biodiesel producers (in the areas of Plovdiv, Rousse, Dobrich, etc.). It is difficult in the moment to obtain precise information about the output, the capacity and even about the exact number of biodiesel plants in our country. Some recent press publications [Hristova 2006] estimate the overall number of biodiesel plants in Bulgaria to have reached 100. According to [Andonova 2006], the biggest plants already in operation are as follows:

¹ Published in State Gazette, Issue 105/22.12.2006 and Issue 108/29.12.2006

- Green Oil OOD (in Silistra), with a capacity of 15,000 t/yr
- Nora AD (in Lovech), with a capacity of 30,000 t/yr
- Klas Olio OOD (in Dobrich), with a capacity of 30,000 t/yr
- A second plant of Green Oil OOD is being constructed in Pleven (with a capacity of 30,000 t/yr). Some future projects concern the construction of a plant in Provadia by the company Slunchevi Luchi EAD – with a design capacity of 100,000 t/yr and of a plant in Vidin, planned by the company Eco Petroleum OOD – with a design capacity of 200,000 t/yr [Andonova 2006].
- Several of the above biodiesel and equipment producers participate in the National Association for Biofuels and Renewable Energy Sources in Bulgaria. It is interesting to note that several biodiesel producing companies have previous experience in producing cooking oil (e.g. Green Oil OOD, Klas Olio OOD, Sluchevi Luchi EAD). A branch organization representing nearly all Bulgarian producers of cooking oil is the Oilseed Oil Producers Association Bulgaria.

3. Raw material supply

When biodiesel production started in Bulgaria in 2001, it was first based on waste cooking oil. Yet, since the beginning of 2006, there is a rapid growth of biodiesel production and most of it is already based on sunflower or rapeseed oil. Of course, a substantial part of sunflower and rapeseed quantities continue to be used for the production of cooking oil.

According to [Hristova 2006], the theoretical potential for collection of waste cooking oil from restaurants and cafeterias amounts to about 8,000 tonnes annually. Some statistical information about the sunflower seed and rapeseed harvests during the period 2001-2006 are presented on Table 1 and Table 2.

Table 1 Sunflower seed harvests in Bulgaria during the period 2001–2006 [JICA 2006]

Year	Harvested area (hectares)	Average yield (t/hectare)	Harvested quantity (t)
2001	389,700	1.040	405,087
2002	427,838	1.400	599,551
2003	659,631	1.200	788,763
2004	592,785	1.820	1,078,832
2005	653,371	1.470	934,855
2006	753,200	1.590	1,157,000

Table 2 Rapeseed harvests in Bulgaria during the period 2001–2006 [JICA 2006]

Year	Harvested area (hectares)	Average yield (t/hectare)	Harvested quantity (t)
2001	16,700	1.130	19,000
2002	6,901	1.170	8,061
2003	12,687	0.890	11,291
2004	11,250	1.99	22,388
2005	10,993	1.98	21,778
2006	16,500	1.80	28,000

The low average yield in 2003 most probably was due to freezing of the crops during winter.

It should be noted here that sunflower is traditionally grown in Bulgaria. Concerning rapeseed, it was first cultivated in the 19th century, but only in small quantities. Larger scale cultivation started again from about 10 years ago. However, there are still some problems, due to climatic conditions and other reasons (e.g. rapeseed needs a lot of humidity in September, there are freezing hazards during winters in Bulgaria, etc.).

According to [BMAF 2007a], the average sunflower and rapeseed prices in 2005 were:

Sunflower seed: BGN 402 (205.54 Euro) per tonne;
 Seeds of rapeseed crops: BGN 405 (207.07 Euro) per tonne.

An interesting calculation is provided in [JICA 2006], concerning the additional needed agricultural land area needed to meet the indicative target for a share of 5.75% biofuels in the overall fuel consumption for transport purposes. Based on 2004 transport fuel consumption in Bulgaria, this percentage corresponds to an overall amount of 104,075 tonnes of oil equivalent annually (toe/yr). With the assumption of a proportional distribution of biodiesel and bioethanol percentage respectively to the 2004 consumption of diesel oil and gasoline, the 2010 indicative target for consumption of biofuels would be as follows:

Biodiesel: 70,265 toe/yr (which corresponds to 79,500 t/yr);
 Bioethanol: 33,810 toe/yr (which corresponds to 53,000 t/yr).

With the current yields, the additional agricultural areas, needed for cultivation of the corresponding quantities of sunflower and of wheat would amount to 207,230 hectares, which is about 45% of the currently non-cultivated agricultural land [JICA 2006].

The producers of sunflower seeds and rapeseed seeds in Bulgaria are of 3 categories:

- tenant farmers;
- agricultural co-operatives;
- farmers that work on their own land.

In the absence of specific statistics, concerning sunflower and rapeseed cultivators, it is interesting to quote some general statistics, concerning the structure of land ownership in Bulgaria. According to [BMAF 2007a], the average size of agricultural properties is quite small: 0.64 hectares. However, due to the leasing of land by tenant farmers, the percentage of farms with cultivated area more than 50 hectares is quite high – 78.5%.

Most probably, in the case of sunflower and rapeseed growing, the farms with such activities and cultivated area above 50 hectares have a still higher percentage.

It is interesting also to note that agricultural activities correspond to about 24.9% of the overall employment in Bulgaria [BMAF 2007a].

In the typical case, the cultivation of sunflower and rapeseed for biodiesel production is initiated and organized by biodiesel producers. A good example in this respect is the company Ecoproecti OOD in Dimovo (North-Western Bulgaria). As this is described in [Georgiev 2006], this company constructed a biodiesel plant in a an area that previously had a very high rate of unemployment (more than 35%). Some additional activities included distribution to local farmers of high quality seedlings and cultivation of a company owned experimental field with the aim to achieve higher yields. The greater demand for sunflower and rapeseed resulted also in an increase of about 60% of local prices of agricultural land.

The Bulgarian Association of Farmers acts as a branch organization of agricultural producers.

4. Policy and taxation

In order to reach sustainable development, Bulgaria has the potential and the ambition to cooperate with all the interested national and foreign governments and NGOs, legal and natural persons and University centers for application of stimulating measures, related with the following:

- Stimulating the biodiesel demand;
- Environmental benefits;
- Development of production and distribution of biodiesel;
- Expanding the supply with feeding raw materials;
- Expand the commercial opportunities;
- Support the scientific research and development activities.

In order to encourage the biofuel production and consumption, various measures are undertaken in the country to compensate their higher production price, namely:

- Support the agricultural non-food sector;
- Fiscal differentiation for the account of the biofuels, aiming at market competitiveness;
- Fixing specific biofuel percentage from the total fuel consumption, sold on the market.

Development of agriculture is one of the most important aspects in the process of introduction on biofuels in the context of the existing opportunities for raw material base improvement. The increased production of biofuel raw material will contribute to the multi-functional role of the agriculture and will stimulate the development of agricultural production while creating new income sources, due to the fact that the biomass can be directly treated from the raw material or as a residual from other processes (secondary biomass).

The potential for biofuel production is based on the primary biomass, secondary biomass and the residuals or the organic wastes. The utilized vegetable oil and fat are a good example for the possibilities of the secondary biomass.

The energy crops, utilized as raw material for biodiesel are the rapeseed and the sunflower. It is well known that due to various soil and climatic and historical condition, Bulgaria's production of oil sunflower seed is considerably higher, compared to the rapeseed (for example during 2006 the respective quantities are 10156 555 tons of sunflower seed and 26 463 tons of rapeseed).

The climatic and agro-meteorological conditions for production of rapeseed in Bulgaria are favorable, but the low temperatures during the winter season, fast warming in the ripe period (May-June) and the lack of traditions in its production and consumption, impedes the quick implementation of this crop. In the last years, the scientists from the Institute of Soil Science "Pushkarov" are working on the selection of suitable for the Bulgarian conditions sort of rapeseed.

The iodine content in the biodiesel, produced from the commonly used sorts of sunflower in Bulgaria, exceeds the prescribed in the European norm N 14214 values.

Two approaches are possible for settling this issue:

- Establishment of national standard, with higher admissible values of the iodine number (such national standards exist in Spain and Czech Republic for example);
- Distribution of the so-called high oleic sort of sunflower, which enables adherence to the parameters of EN 14214. These sorts are widely used in various countries, for example France. Initially they were created for more healthier food, due to the fact that they have better proportion of non-saturation compared to saturated oil acids. For the purpose of biodiesel production, these sorts are more suitable raw material compared to the conventional sorts of sunflower.

Bulgaria has potential for production of energy crops. The cultivated areas during 2006 represent 3.09 million hectares or 59.5% from the utilized agricultural lands in the country. The favorable climatic conditions for production of different crops and the availability of agricultural lands, as well as established traditions in agricultural production, contribute to the well developed plant growing.

In 2006 the utilized agricultural area was 5,190 million ha or 46,8% from the territory of the country. During 2006, 436 thousand ha or 14% from the cultivated areas are fallow lands.

In 2006, the unutilized land (fallow land + non-utilized land) represent 19% from the total agricultural land. This is a good opportunity for the development of the biofuel production potential, i.e. of course if the necessary incentive mechanisms are set in the legislation.

In order to stimulate the production of energy crops, supporting and stimulating scheme was introduced in the country. The premium amounts to 45 €/ha. The maximum guarantee area is up to 1,5 million ha as budget limit.

Tax incentives are the second effective manner for stimulating the development, which will lead to decrease of the production price compared to the conventional fuel and with the availability of suitable fiscal policies. The tax instrument, related with the reduction of excise on the biofuels is the most effective, because the tax incentive measures are part of a set of technical, legal and economic measures.

For the application of Directive 2003/30/EC, most of the member states use excise exemption in favor of biofuels, based on the Directive, which restructures the framework of taxation of the energy products and electricity (2003/96/EC), which states that under specific conditions, the member states can apply tax incentives, when treating biofuels.

The utilization and the tax incentives, related with the biofuel is based of different texts in the European legislation. On first instance it is the European Directive 98/70/EC, amended and supplemented with the Directive 2003/17/EC, treating the quality of the fuel.

This Directive allows adding up to 5% of ethanol, up to 15% of ETBE (ethyl-tertio-butyl-ether) to the petrol and up to 5% of biodiesel in the diesel fuel. Higher percentage substance is absolutely compatible with the modern engines, but the consumer should be compulsory informed at the petrol station about the higher percentage substance. On the other hand the Directive 2003/30/EC fixes the prices in respect to the biofuel integration, whereas Directive 2003/96/EC provides possibilities for partial or full excise exemption.

The Act on Excise and the Tax Storages regulates the excise taxation, as well as the control on the production, utilization, storage, movement and security of the products, liable to excise taxation.

According to the Excise and Tax Storage Act, as of 1st of January 2006, zero excise duty rate was introduced for pure biodiesel (B100). This incentive turned to be extremely beneficial, due to the following reasons:

- There is a considerable social interest in the biodiesel production from local and international investors, as well as from the wide public.
- There are several recognized Bulgarian producers of biodiesel installations (“Sampo” AD Sofia), “M Engineering”(Veliko Turnovo), “Bioenergomash” (Aksakovo) and “Gamakol” EOOD – Plovdiv. In particular “M Engineering” have also international experience, with already installed system in Jalgava, Latvia and system in a process of installation in Romania.
- The construction of the installation for production of biodiesel, represents an effective instrument for increasing the employment in the agricultural areas with high level of unemployment and also to increase the price of agricultural lands.

As of January 1, 2007, the new amendments in the Excise Duty and Tax Warehouse Act [SG, Issue 105/22.12.2006] entered into force. These changes are in accordance with the European policy for encouragement of production and utilization of biofuels and introduce the zero excise for motor biodiesel and bioethanol motor fuel.

In line with the Bulgaria's priority policy and as a reflection of the European policy, a new *Renewable and Alternative Energy Sources and Biofuels Act* was developed, approved and promulgated in the State Gazette, issue 49/19.06.2007.

The main concept of the act is the establishment of normatively regulated rules and regulations, aiming at development and encouragement of energy production from RES, including the introduction of Directive 2003/30/EC in the internal legislation. As in the other member states, the transport sector is one of the main consumers of liquid fuels in the country. Its share in the end energy consumption is about 25%. There is stable tendency in the increase of the automobile park with about 1% annually, which consumes approximately 63% of liquid fuels, which in turn is with 30 – 40% higher energy intensity compared to the other European countries. Obviously, the introduction and the implementation of the Biofuel Directive in Bulgaria will be a multi-profile task, which will be respectively related not only to the energy component, but also to the development of agriculture, efficiency improvement in the transport sector, introduction of new fiscal policy and last, but not least changing the culture of the consumer.

The legislation provisions development of national indicative objectives for stimulating the consumption of biofuels and other renewable fuels in the transport sector, which are defined as minimum share from the end annual consumption of motor petrol and diesel fuel. The national indicative objectives are developed in cooperation with the Minister of Economy and Energy and the Minister of Transport and respectively approved by the Council of Ministers.

According to the provisions in the Renewable and Alternative Energy Sources and Biofuels Act, the producers and importers of liquid fuels for the transport sector are obliged to sell to the market petroleum-based fuels blended with biofuels in proportion specified in the Ordinance of liquid fuel quality, conditions, rules and regulations of their control, approved for the effective application of the Ambient Air Act and defining the technical and quality requirements to the liquid fuels, the norms of content of lead, sulphur and other harmful substances (contaminators) in them.

It is provisioned the biofuels to be used in the transport sector in pure form or as a mixtures, as composition of oil-base liquid fuels for the internal combustion engines. It is also provisioned the compulsory mixture of the biofuels with oil-based liquid fuels to be performed only in taxation storage, licensed according to the Law on Excise Duties and Fiscal Storehouses.

5. Conclusions

In order to reach the national indicative targets and in accordance with the regulations of the Renewable and Alternative Energy Sources and Biofuels Act, the government is developing the *National Long-term Program for the Consumption of Biofuel in the Transport Sector for the period 2007 – 2020*. The program is based on the performed analysis and studies performed under the framework of the Twinning Contract BG-04-IB-EN-01 "Transposition and implementation of the environmental acquis on fuel quality control at national level".

When defining the national indicative targets for consumption of biofuel in the country, the indicative objectives set in the *Directive 2003/30/EC* and the approved by the *European Council (8-9 March 2007)* new targets for increasing the share of renewables, treating in particular biofuels, have been considered.

The defined in this document objectives for biofuels are:

- Indicative target from 5,75 % for 2010 and;
- Compulsory minimum target from 10% for all the member states for the biofuel share from the total petroleum and diesel oil consumption for EU transport sector up to 2020 to be reached in an economically effective manner.

Table 3 presents the above mentioned targets and the forecast for the consumption of conventional fuels and biofuels in the period 2008 to 2020.

Table 3: Forecast for the consumption of mineral fuels and biofuels

	<i>Dimension</i>	<i>2008</i>	<i>2010</i>	<i>2015</i>	<i>2020</i>
Conventional fuels:	Thousand tons	2 193,1	2 317,3	2 731,9	3 146,0
Petrol	Thousand tons	485,3	426,0	417,1	370,5
Diesel oil	Thousand tons	1 707,8	1 891,3	2 314,8	2 775,5
Biofuels:	Thousand tons	43,9	133,2	218,6	314,5
Bioethanol	Thousand tons	9,7	24,5	33,4	37,0
Biodiesel	Thousand tons	34,2	108,7	185,2	277,5
Total fuel	Thousand tons	2 237,0	2450,5	2 950,5	3 460,5
<i>National target</i>	%	2,0	5,75	8,0	10,0

Respectively the necessary afforestation area with energy crops for production of biofuels for 2008 is 57 574 ha, for 2010 – 164 586 ha and in 2020 reaching 438 390 ha.

When defining the quantity of conventional fuel, the increasing in the last few years tendency for utilization of diesel oil, rather than petrol was taken into consideration. In the period 2005-2020, the average annual petrol consumption is 2,2%, whereas at the same time the consumption of the diesel fuel has increased with 5,6% per year.

For reaching the defined national indicative targets, it is necessary to attract and engage not only liquid fuel suppliers, but also the public transport, enterprises with large automobile parks (ground transport at airports, harbors, etc.), where it will be possible to use pure biofuels or mixture with higher biofuel content.

The National Long-term Program for the Consumption of Biofuel in the Transport Sector for the period 2007 – 2020 is in a process of discussed and soon will be adopted by the Council of Ministers of Republic of Bulgaria.

The total energy balance of the country for 2005 does not report the biofuel consumption. During 2006, 9 562 tons of biodiesel were consumed. Installations with the following production capacities are in process of construction:

- Biodiesel – 415 thousand tons by 2010;
- Bioethanol – 95 thousand tons by 2010.

If these projects are successfully implemented, the Republic of Bulgaria will be able to meet country's indicative target by 2010. Currently, these projects are still investment intentions and cannot be considered for increasing the national targets.

In the last few years the Bulgarian government initiated various legislative initiatives for the successful application of the requirements of *Directive 2003/30/EC* for stimulating the utilization of biofuels or other RES in the transport sector. The application of the requirements for stimulating the biofuel utilization on national level will lead to a wider utilization of biomass, which will lead to sustainable development not only in the agricultural sector and forestry, but also in the country as a whole.

In order to stimulate the biofuel utilization in Bulgaria, the proposed by the National Biofuel and Renewable Energy Sources Association actions and measures for active engagement of the governments should be approved, namely:

- Active awareness raising and popularization of the biofuel utilization, by introducing it in the state and municipal transport for own needs;
- Establish state register (maintained by the Ministry of Economy and Energy) for the biofuel production, thus identifying the producers;
- Remove the guarantee of 60 Euro per hectar, currently required by the energy crops producers in order to receive the subsidy of 45 Euro per hectar.

The National Biofuel and Renewable Energy Sources Association, with the active support of ESD-Bulgaria and key stakeholders are working to improve the normative framework and remove the still existing barriers.

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