

# Biodiesel in Germany - market trends and competition

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## Abstract

According to experts' opinion, for now, only biofuels as an alternative to fossil fuels will be able to make a noteworthy contribution to secure mobility in the short to medium term. This was emphasised by the Association of the German Automobile Industry (VDA) in February 2006 when the VDA self-imposed the obligation for the car industry to lay the technical foundations for a 10 % admixture of biofuels to diesel fuel and gasoline.

The European Commission In January 2007 the proposals for a "road map for renewable energies" with the aim to make more pressure on the member states of the enlarged European Union – EU27. So the challenge is to open the market to biofuels and at the same time to push the optimisation of combustion engines in order to reduce fuel consumption and emissions.

**Key words:** biodiesel, biofuel quota act, DIN EN 14214, taxation, biodiesel market

## Introduction

The main factors for the political motivation to promote the use of biofuels are the protection of the climate, securing the fuel supply, and the development of rural areas. Given the rapid rising of the crude oil price and increasing geopolitical uncertainties, the security of energy supply does not only govern politics in Germany but around the globe.

As an element of the national and European energy supply, the German and European biomass potential is gaining more increasing importance. This is supposed by the "EU Biomass Action Plan" suggested by the EU Commission at the end of 2005 and the EU strategy for biofuels from January 2006. In January 2007 the EU-Commission published the "Renwable Energy Road Map" with the proposals for the new targets for a further increase of the consumption renewable energy up to 20% until 2020. Especially for biofuels should be introduced a mandatory target: 10% of the fuel consumption on energy basis. It is imperative to do as much as possible in the given timescale as agricultural industry expectations will be extraordinarily high when Germany has taken over the presidency of the Council of the EU in January 2007.

## German parliament resolves partial taxation

By passing the amendment to the Mineral Oil Tax Act on January 1, 2004 to grant tax privileges for biofuels, Germany created legally binding regulations for biofuels. On the one hand the adoption of the EU Directive (2003/30/EG) on the Promotion of Biofuels, as well as the Energy Taxation Directive (2003/96/EG), restructuring the framework for the taxation of energy products, provided the pressure and urgency to promote biofuels as a strategic element of fuel supply. Those were based on specified EU targets. On the other hand authorisation was given to reduce the taxation of biofuels on national level for Member States. In February 2004 the EU Commission granted Germany's application to exempt biofuels from mineral oil tax from January 1, 2004 until December 31, 2009. As a result of this notification the EU Commission acknowledged that not only production costs have to be taken into account in order to determine the extent of any tax relief. The lower energy content of biofuels (use of pure fuels), resulting in an increased fuel consumption as an additional "cost increasing factor" must also be considered. This „cost increasing factor“ does not apply to the mineral oil industry for admixtures to Diesel fuel (max. 5 % of biodiesel according to DIN EN 590) or gasoline (max. 5 % of bioethanol according to DIN EN 228).

As far as biodiesel and bioethanol were concerned, the Commission concluded that the national mineral oil tax exemption will not lead to any overcompensation. The Commission approved the measures defined in the German Mineral Oil Tax Act concerning an annual review of any overcompensation by means of a report to the German Bundestag (over-compensation-check). The Commission stated that any financial aid is to be restricted to the compensation of the competition disadvantage due to higher production costs of biofuels in comparison to Diesel fuels. In 2004 and especially in 2005 this situation changed due to rising crude oil prices. In its coalition agreement from November 2005 the new German Coalition Government emphasised the particular importance of biomass as a source of renewable energy. However, with reference to the anticipated tax revenue shortfall due to the rapidly growing biodiesel and bioethanol capacities, the consolidation of the Federal Government Budget came to the fore. The coalition negotiations initially aimed at completely replacing tax privileges by an obligation to blend biofuels. This intention was not only opposed by industrial associations of the biofuel industry, UFOP and the German Farmers' Association ("Deutscher Bauernverband") but also by the automobile industry.

UFOP - as well as other associations – had intensive talks with delegates of the Coalition Government about the possible consequences for the biodiesel and agricultural industries, should the Energy Tax Act with its initially planned tax rates enter into force in 2009 after the granted tax relief period had expired. Finally, the Coalition Government not only accepted the protection of confidence concerning any made investments and production plants currently under construction but also the necessity that a reliable framework needs to be created beyond 2009. In principal the German Federal Government will follow

the strategy to combine tax privileges and administration law in order to live up to the constraints regarding the consolidation of the Federal Budget as well as to meet the target quantities of the action plan of the European Union.

### The Biofuel Quota Act

On 1<sup>st</sup> of January 2007 the Biofuel Quota Act went into force. As a consequence of that the following gradual reduction of tax privileges for biodiesel and vegetable oil took effect:

#### Taxation of Biofuels

Year	tax rates	
	biodiesel	vegetable oil
2007	9 Cents/litre	0 Cent/litre
2008	15 Cents/litre	10 Cents/litre
2009	21 Cents/litre	18 Cents/litre
2010	27 Cents/litre	26 Cents/litre
2011	33 Cents/litre	33 Cents/litre
from 2012	45 Cents/litre	45 Cents/litre

Principally, UFOP welcomes the fact that the German Federal Government followed the claim of UFOP and the DBV Deutscher Bauernverband (German Farmers' Association) to exempt agriculture and forestry permanently from partial taxation without any quotas.

At present the national tax regulations of the individual EU Member States for Diesel fuel taxation used in agriculture differ considerably. But the tax rates for the pure fuel market (forwarding trade, public filling stations) are considered as too high. There is a considerable risk involved that the commercialisation of pure biodiesel and vegetable oil may already become unprofitable in 2008/09.

UFOP demands that the amendment has to take into account that the guideline for stipulating the tax rate for biodiesel and vegetable oil fuels has to guarantee the competitiveness of biofuels and their analogue fossil fuels. Differing energy contents and additional technical expenditure necessary for the operation with the specific biofuel (biodiesel, vegetable oil, E85) must be part of any assessment. It is likely that already by 2008, the market for pure biofuels might be at a considerable competitive disadvantage, should the price for Diesel fuel possibly drop.

### The Regulations at a glance

#### Precondition for tax privilege for:

- Biodiesel – DIN EN 14214
- Vegetable Oil – DIN V 51605

*Biodiesel generated from animal fats for pure fuel use:*

*tax privileges are limited until December 31, 2011*

#### No taxation until 2015 for:

- Synthetic biofuels (biomass to liquid – btl)
  - Bioethanol based on hemicellulose
  - E85 (blend of 85 % bioethanol, 15 % gasoline)
- Subject to an annual revision regarding overcompensation
- Consensus essential from the Ministries of Agriculture, Environment, Traffic and Finance concerning minimum criteria for a sustainable farming of agricultural areas or/and the conditions to save carbon dioxide/CO<sub>2</sub>.

Amendment of the Federal Immission Control Act

Introduction of biofuel quotas (bonded warehouses/free circulation) for:

- Producers and traders of Diesel fuel and gasoline
- Producers of biofuels (biodiesel, vegetable oils)

#### Biodiesel/ Bioethanol Quota Obligation

Year	Total quota	Diesel quota	Petrol quota
2007	-	4.40%	1.20%
2008	-		2.00%
2009	6.25%	Minimum quota	2.80%
2010	6.75%	applies also to	3.60%
2011	7.00%	subsequent years	
2012	7.25%		Minimum quota
2013	7.50%		applies also to
2014	7.75%		subsequent years
2015	8.00%		

\* Proportion of the entire energy necessary for transport purposes

**Preconditions for Tax Privileges and Eligibility concerning Quota Obligation**

Biodiesel – DIN EN 14214

Plant oil – DIN V 51606

Bioethanol – 99 vol % alcohol content

Vegetable oils used directly in the refining process are not eligible.

New/innovative technologies are accepted, e.g. hydrogenation of vegetable oils according to the „Neste-Oil-Process“ („NextBTL).

Regulation of sanctions in case of non-compliance (based on caloric value):

- Diesel - biodiesel – 16 Euros per GJ (50 Cents/litre)
- Gasoline - bioethanol – 28 Euros per GJ (80 Cents/litre)
- Additional overall quota - 16 Euros/GJ (50 Cents/litre)

UFOP welcomes that the granting of tax privileges is dependent on the fulfilment of the applicable standards for biodiesel – DIN EN 14214 – and vegetable oil fuel – DIN V 51605. Up to now biodiesel could be imported from EU and non EU countries virtually without any quality control. Sometimes this led to severe problems for the final user. Often producers and retailers are confronted with the impairment of their image despite efforts of assuring quality production for their (final) customers and their endeavour to improve the quality beyond the requirements of the current standards. It is mandatory that biodiesel producers keep up with the general development concerning the quality of fossil Diesel and the improved engine and exhaust gas after-treatment technologies. The German Federal Government signals further that,

1. apart from rapeseed oil other feedstocks can be used to a limited extent if the requirements according to the standard are fulfilled;

2. excessive imports – which the public would find difficult to accept – of raw materials and/or biodiesel from countries outside the EU will be prevented.

The biodiesel industry is now well established in the public opinion due to a high level of transparency which comprises the production of raw materials and biodiesel itself. This also applies to a multitude of small companies – including agricultural ones – which are involved in the commercialisation of pure fuels. On the other hand the utilisation of palm and soy oils as a raw material for the production of biodiesel encounters public resistance. It raises concern that tax privileges and political incentives in Germany or within the EU may result in the promotion of the soya bean cultivation in Northern and Southern America or provoke primeval forest clearings for the creation of palm oil plantations. The demanded creation of a certification system for the production of raw materials and/or the required criteria for sustainable operation must now be coordinated at EU level in order to rule out any commercial conflicts right from the start.

## **Production of biodiesel**

By the end of 2007 the production capacity of biodiesel will have reached almost 3,4 to 3,7 mio. tonnes. Compared with 265.000 tonnes in the year 2000 the capacity for the production of biodiesel has increased very fast. Based on the national production capacity, biodiesel could already cover about 12 % of the consumption of Diesel fuel by 2008. Hence mandatory blending quotas are an important “safety net” for any future biodiesel sale. However, only about 1.3 to 1.4 million tonnes of biodiesel can be sold to the mineral oil industry if 5 vol % are admixed to diesel fuel according to the European Diesel fuel Standard EN 590.

Therefore, in view of the rapidly growing capacities, the Federal Government and the European Commission must see to the fact that the European standard for diesel fuels will allow a 10 vol % admixture of Biodiesel. The EU Commission – also upon request of the German Government – supplied a draft of a mandate to the European Committee for Standardization (CEN) for the consideration of a revision of the standard as soon as possible in consensus with the industry concerned.

After all, in recent years about EUR 400 to EUR 500 million were invested into the build-up of the biodiesel production. Given the taxation of biodiesel according to the Energy Tax Act 2007, there is a legitimate fear that overcapacities cannot be ruled out and the pressure to export biodiesel will increase. However, by no means is there an existing internal EU market for biofuels – on the contrary, some countries, especially France, implement a policy of impeding imports. As a result of French tendering procedures virtually no biofuel producers other than French ones can do business in France. In contrast, French enterprises can export biodiesel to Germany at all times and without any quantity restrictions.

Today Germany is not only the world’s leading producer of biodiesel but as a result also ahead with regard to the development of production plant technology. The large increase of enquiries from abroad, concerning visits to production facilities, confirms the growing international interest in German plant engineering and construction technology which is turning into a grand success.

The sustainable supply with rapeseed oil as raw material is a crucial strategic element to ensure the competitiveness of a biodiesel production plant. Especially in years when due to weather conditions the crop does not live up to expectations, high vegetable oil prices and/or the missing availability of rapeseed oil could threaten the existence of the production plants. Therefore, the plant’s location and effective access to the infrastructure, especially to navigable rivers and canals, is vital for its competitiveness. As a consequence of the increasing demand for rapeseed oil, the crushing capacity of oil mills will increase from 6 million tonnes at present to 7.5 million tonnes by the end of 2007. Existing oil mills will either be enlarged or integrated into biodiesel production plants or built in direct proximity.

## Establishment of biodiesel on the market

Parallel to the capacity development, biodiesel sales achieved again an all-time peak value of all in all 1.8 mio. tonnes in the year 2005 and estimated 2,2 mio. tonnes 2006. In 2005 about 1.5 million tonnes of biodiesel were sourced from domestic production, while already 300,000 to 400,000 tonnes were imported. Reliable statistical data is not available so far, due to still missing integration of biofuel data in the relevant mineral oil statistics. Nonetheless, biofuels are subject to the same obligation to report as fossil fuels. So there is still a need for the creation of a reporting network which is under discussion at present amongst the responsible authorities (Federal Ministry of Finance, Federal Ministry for Economy, Federal Ministry for the Environment and Federal Ministry for Agriculture) and the biofuel industry.

According to an assessment carried out by (AGQM *Arbeitsgemeinschaft Qualitätsmanagement Biodiesel e.V. / Association for the Quality Management of Biodiesel e.V. – www.agqm-biodiesel.de.*) (January 2006), filling station operators invested some 8 million Euros for the construction and conversion of public biodiesel filling stations in 2005 alone, totalling about 35 million Euros since 1996. For those companies, with a sold quantity of about 520,000 tonnes (about 420,000 tonnes in 2004), biodiesel has turned into an important additional source of income in a fiercely competitive fuel market. In 2005 a total of 1 million tonnes of biodiesel were sold as pure fuel directly to large-scale consumers (forwarding trade and public transport companies) and for private use at public filling stations. Especially imports have been and remain often of inadequate quality which resulted in complaints during autumn and winter of 2005. For that reason UFOP recommend to exclusively purchase biodiesel of assured quality of AGQM members.

Meanwhile, the network of public biodiesel filling stations comprises about 1,900 stations – about one in nine public filling stations in Germany offers biodiesel. 1.400 of those 1.900 biodiesel filling stations are associated with the quality management system of AGQM. The market segment of passenger cars will gradually lose importance due to the lack of approvals for the operation with biodiesel. The reason is the decision of the member companies of the Volkswagen Group (VW, Audi, SEAT, Skoda) to offer EURO-4-engines in combination with self-regenerating particle filter systems, to account for the discussion on particulate matter. In order to secure the existing potential of custom in the car sector, UFOP support two projects on the assessment of diesel particle filter systems for retro-fitting in old cars. These projects had been successful completed in autumn 2006.

The receding sale of biodiesel at filling stations will result in a regional decline of the number of filling stations. The removal of biodiesel from the range of products at the filling stations is to be recommended, should the turnover decline. Otherwise, as a consequence of the prolonged storage period, problems could arise in case of unannounced official quality control checks by the authorities. AGQM's checks at public filling stations have already led to the cancellation of brand licence contracts. This affects primarily filling stations which do not have any facilities to serve commercial vehicles (time of fuel turnover). Therefore, biodiesel in its pure form will be increasingly sold to the forwarding trade which will lead to more competition concerning that particular clientele. For that reason, only filling stations in urban areas or near motorways might add biodiesel to their range of products – usually instead of premium gasoline “Super plus” – thus compensating for some of the decrease in the number of biodiesel filling stations.

The petroleum industry admixed about 600,000 tonnes of biodiesel to Diesel fuel in proportions of up to 5 % vol. according to DIN EN 590. According to information from the MWV Mineralölwirtschaftsverband (*Association of the German Petroleum Industry*) 1,000,000 tonnes of biodiesel could have been admixed which failed for lack of biodiesel availability in 2005.

## Releases secure sales

The commercial vehicle sector is the „biodiesel customer“ showing the strongest demand for biodiesel by far. DaimlerChrysler, MAN and IVECO gave approvals for EURO-4 and EURO-5 truck engines in commercial vehicles. Moreover, DaimlerChrysler is offering extra equipment (bigger oil sump, separate fuel supply for the auxiliary heating system) to enable the utilisation of biodiesel. Various factors contributed to this marketing policy. One of the main reasons was the pressure from customers of the forwarding trade. Another important reason was the fact that quality control measures by AGQM showed considerable improvement of the biodiesel quality, especially in terms of the content of the so-called ‘ash forming substances’ (Calcium, Magnesium and others). That way any misgivings by the manufacturers of commercial vehicles with regard to the compatibility of modern exhaust gas after-treatment devices (SCR, BlueTec) and biodiesel were disproved. Concerning the requirements of modern Diesel engines, all prerequisites are already in existence for biodiesel to remain the most important fuel alternative in the medium-term, mainly as pure fuel for the operation of commercial vehicles.

Dependent on the development of the price for fossil diesel fuel, the agricultural and forestry sectors will gain considerably in importance concerning the commercialisation of pure biofuels following lasting tax exemption. The annual consumption of this commercial sector amounts to about 1.5 mio. tonnes of fossil diesel. The market potential for biodiesel is currently estimated to at around 300,000 to 400,000 tonnes considering the regulation for tax refunds of agricultural Diesel fuel (limited to 10,000 litres/farm). Apart from few exceptions, virtually all engines are approved for biodiesel. In 2006 UFOP successfully supported a project by DEUTZ AG with the aim to achieve approval for the use of biodiesel for engines of the latest generation which already comply with the regulations of emission level Tier III B. Therefore, it will also be possible in the agricultural sector to use biodiesel as pure fuel in the future.

## Rapeseed oil fuel

Notable investments estimated at 60 to 70 million Euros were also made in small pressing facilities for obtaining

rapeseed oil. During the past three years the number of decentral pressing facilities rose sharply from 98 to more than 300 with a grinding capacity of 0.5 to 0.6 million tonnes. Mainly rapeseed oil is produced for the use as pure fuel or as raw material for the production of biodiesel. UFOP assumes that their cooperation with biodiesel producers will be intensified as a result of permanent tax exemption for the agriculture. In July 2006 the pre-standard for rapeseed oil fuel – DIN V 51605 – was presented. From the very beginning UFOP financially supported this standardisation project with the purpose to ascertain the definition of terms according to the specified quality parameters, and thus the legal relationship between the end user and the fuel producers and/or traders. In addition to tax regulations, the demand pressure for high quality will be increased to offer the best possible protection for the consumer. Especially rapeseed oil producers will have to deal with this challenge. However, all participants are aware of the fact, that the standardisation process is not completed by the creation of a pre-standard. Rapeseed oil fuel according to DIN V 51605 has to be the quality on which comparable exhaust emission trials are to be based. These tests were not included in the 100-tractor-programme of the federal agency for renewable resources ([www.fnr.de](http://www.fnr.de)).

It is already clear that the limits for the ash-forming components (Calcium, Magnesium and others) as well as for phosphorus (deactivating agent for catalytic converters) will have to be subject to further reduction. The Bavarian Technology Center for Renewable Resources (TFZ) anticipated that small-scale facilities can still comply with more stringent requirements. However, they will experience a lower oil yield. From UFOP's point of view, the question for efficiency reasons arises if the crushing grade should be elevated. In order to be able to reliably guarantee the parameters for fuel quality, the regional erection of oil refining plants should be taken into consideration. This necessity can be derived from the results of the 100-tractor-programme in which, for a period of three years, 107 retrofitted tractors were tested in a large-scale field test with regard to their environmental soundness, endurance and field performance when operated with rapeseed oil. 63 of the 107 tractors (60 %) completed the project period without any or with very few disruptions. Some technical deficits concerning the engines and the quality of the fuel were identified and require further attention so that mass production maturity and practical performance capability can be achieved.

UFOP, the Schleswig-Holstein-Foundation and FNR cooperate in funding a project for converted tractors which did not take part in the 100-tractor-programme. Again, the experiences with retrofitting systems suitable or unsuitable for the operation with rapeseed oil are confirmed. The results are used during training lessons for farmers as well as the training and further education of mechanics for agricultural machinery.

## Summary

With its strategy for biofuels and its road map, the EU Commission intends to press ahead with the market introduction of biofuels all over the EU. This is motivated by the substantial and otherwise rising dependency on imports, especially of crude oil, as well as the possible contribution of biofuels to securing mobility. The EU Commission, the automotive industry and the agriculture sector agree on that only biofuels can contribute significantly in the near future. The Member States of the EU will be urged to favour biofuels by taking into account the fast increasing raw material demand. In addition obligatory use of biofuels is to be revised. The possible commitment of 10 % market share combined with the promotion of energy from biomass for heat and electricity supply will be a challenge and a chance for the agriculture to develop new fields for entrepreneurs.

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